Sosyoekonomi

2026, Vol. 34(67), 285-299

RESEARCH ARTICLE

ISSN: 1305-5577
DOI: 10.17233/sosyoekonomi.2026.01.12
Date Submitted: 03.02.2025
Date Revised: 20.05.2025
Date Accepted: 29.12.2025

The Impact of Fiscal Rules on Long-Term Borrowing Costs in EU Countries[1]

Ceren BAYDAK *(https://orcid.org/0009-0005-7327-3434), Central Bank of the Republic of Türkiye, Türkiye; ceren.baydak@tcmb.gov.tr*

İrem YENDİ-ÇETİN *(https://orcid.org/0000-0002-3717-7462), Hacettepe University, Türkiye; iremyendi@hacettepe.edu.tr*

AB Ülkelerinde Mali Kuralların Kamu Borçlanma Maliyeti Üzerindeki Etkileri[2]

Abstract

Fiscal credibility denotes the public's trust in the government's fiscal plans; it is defined as the government's ability to meet its debt obligations and to comply with planned tax and expenditure policies. The primary purpose of this study is to analyse the relationship between fiscal rule practices and long-term interest rates by examining the determinants of public borrowing costs. Empirical results from selected European Union (EU) countries for 2001-2018 show that improvements in the fiscal rule index are associated with lower long-term interest rates, and that the effect of public debt levels on borrowing costs is nonlinear. The results of the analysis show that the adoption of fiscal rule practices will contribute to establishing fiscal credibility, which represents confidence in the government's fiscal policies and their ability to fulfil their financial obligations, and to enable countries to finance their deficits at a lower cost.

Keywords : Fiscal Rules, Government Borrowing Cost, Public Debt.

JEL Classification Codes : H63, H61, G12.

Öz

Mali kredibilite, kamuoyunun hükümetin mali planlarına olan güvenini temsil eder; hükümetin borç yükümlülüklerini yerine getirebilme yeteneği ve planlanan vergi ve harcama politikalarına uyumu olarak tanımlanır. Bu çalışmanın temel amacı kamu borçlanma maliyetlerinin belirleyicilerini inceleyerek mali kural uygulamaları ile uzun vadeli faiz oranları arasındaki ilişkiyi analiz etmektir. 2001-2018 yılları arasında seçilmiş Avrupa Birliği (AB) ülkeleri verileri kullanılarak elde edilen ampirik sonuçlar, mali kural endeksindeki iyileşmenin uzun vadeli faiz oranlarının düşmesine yol açtığını ve kamu borç düzeylerinin borçlanma maliyetleri üzerindeki etkisinin doğrusal olmadığını göstermektedir. Analiz sonuçları, mali kural uygulamalarının benimsenmesinin, hükümetin mali politikalarına ve mali açıdan yükümlülüklerini yerine getirebileceklerine olan güveni temsil eden "mali

---

[1] *This article is derived from the master's thesis entitled "The Effect of Fiscal Rules on Public Borrowing Costs: An Analysis of European Union Countries", prepared under the supervision of Assoc. Prof. Dr. İrem Yendi-Çetin. The views expressed in this study belong solely to the author(s) and do not necessarily reflect the official views of the Central Bank of the Republic of Türkiye.*

[2] *Bu makale, Doç. Dr. İrem Yendi-Çetin danışmanlığında hazırlanan "Mali Kuralların Kamu Borçlanma Maliyetine Etkisi: Avrupa Birliği Ülkeleri Üzerine Bir İnceleme" başlıklı yüksek lisans tezinden türetilmiştir. Bu çalışmada ifade edilen görüşler yazar(lar)a aittir ve Türkiye Cumhuriyeti Merkez Bankası'nın resmi görüşlerini yansıtmaz.*

kredibilite"nin tesis edilmesine ve ülkelerin açıkları finanse etmesini daha düşük maliyetle gerçekleştirilmesine katkı sağlayacağını göstermektedir.

Anahtar Sözcükler : Mali Kurallar, Devlet Borçlanma Maliyeti, Kamu Borçları.

1. Introduction

The suspension and reactivation of fiscal rules, particularly in European Union (EU) countries, have become a vital issue following the COVID-19 pandemic, particularly with respect to fiscal discipline and its effects on a stable recovery. Strict fiscal rules governing public debt and budget deficits were temporarily relaxed during the pandemic to provide economies with the flexibility needed to address the crisis.

Nevertheless, numerous studies in the literature highlight the importance of reactivating these rules in 2024 to ensure the sustainability of public finances and long-term economic growth and stability. Fiscal rules are vital for regulating government spending and debt policies, maintaining fiscal discipline, and developing a resilient economic structure capable of withstanding future economic disruptions (Gbohoui & Medas, 2024).

New European fiscal rules took effect in April 2024. The new framework replaces rigid numerical fiscal targets with a more flexible, country-specific approach that accounts for the expected evolution of each nation's debt levels over time. This method aims to provide a more precise assessment of each country's fiscal health and debt path by accounting for potential changes in economic growth and interest rates. The European Union's revival of fiscal rules following the COVID-19 pandemic is vital to ensuring the sustainability of public budgets across member states. The updated regulations focus on managing public expenditure based on country-specific debt sustainability assessments, aiming to bring debt-to-income ratios down to sustainable levels (Darvas et al., 2024).

The discussions above show that the effect of fiscal rules on maintaining fiscal credibility will often be evaluated after 2024. Using available data, this study aims to explore how fiscal constraints and public debt influence the long-term cost of public borrowing, a key indicator of fiscal credibility, in EU member states during the pre-COVID-19 period. Public borrowing costs significantly affect fiscal credibility, economic stability, and sustainability, particularly in regions such as the EU. Understanding the factors that influence long-term borrowing costs is essential for effective public finance management, economic growth, macroeconomic stability, and investment climate. This study contributes to the literature by assessing how fiscal rules and government debt levels affect long-term borrowing costs in EU countries from 2001 to 2018. Results from the Fully Modified OLS (FMOLS) method indicate that the relationship between public debt levels and borrowing costs is nonlinear, and that improvements in the fiscal rule index are associated with lower long-term interest rates. Unlike previous research, which typically examines fiscal rules or public debt separately, this study evaluates both the nonlinear effects of public debt levels and the influence of fiscal rule strength simultaneously, using a panel FMOLS approach

across 16 EU nations from 2001 to 2018. By focusing on a pre-COVID period and including a diverse range of EU countries, it provides unique insights into how fiscal frameworks operated under relatively stable macroeconomic conditions. Additionally, it identifies a debt-to-GDP ratio threshold (around 62%) beyond which borrowing costs increase, supporting and extending findings from Ardagna et al. (2007).

In this framework, section 2 examines the factors influencing the government's long-term borrowing costs. Section 3 outlines the methodology and econometric model. Section 4 describes the data. Section 5 reports the empirical findings. Section 6 summarises the paper's conclusions.

2. Literature Review

Long-term interest rates used to assess the cost of public-sector borrowing reflect the yields on investment instruments issued by the public sector and guaranteed by the state. Central banks focus on yields of these instruments, including traditional pricing data, which is an essential source of information in monetary policy, to evaluate the inflation and output outlook. For private and corporate entities, government bonds often serve as the benchmark for pricing fixed-income securities (Lo Conte, 2009). On the other hand, the level of long-term interest rates is an essential variable in savings and investment decisions, and understanding the determinants of yield differences across government bonds is crucial for ensuring the sustainability of public finance.

Views on the determinants of long-term interest rates have varied among economic doctrines. The traditional view asserts that rising public debt, fiscal deficits, and increased public spending crowd out private investment and raise long-term interest rates. In this perspective, it has been argued that higher public debt ratios and budget deficits lead to increased government bond yields because investors doubt a country's debt sustainability (Akram & Das, 2017). Conversely, the Keynesian view holds that central bank policy interest rates and other monetary policy instruments are the primary determinants of government bond yields (Keynes, 1936). Countries with low fiscal discipline are more susceptible to domestic fragility and fluctuations in market perceptions of country risk. In this context, interest rates shaped by market expectations and serving as signals within the economy are likely to be influenced by the design and implementation of fiscal rules (Szarowská, 2013: 796).

When evaluating the determinants of long-term government bond yields, the initial focus is on the economy's fiscal condition. The primary variables for assessing the fiscal situation are budget deficits and public debt levels. The theoretical reasons why the primary deficit raises long-term interest rates can be explained as follows:

In standard macroeconomic models, the primary deficit initially boosts aggregate demand. It raises both nominal and real interest rates in the IS-LM model, even though the nominal money supply is treated as exogenous. The monetary authority raises interest rates

to compensate for changes in the output gap (Taylor rule). While the immediate effect of fiscal expansion is on short-term interest rates, long-term rates will also be impacted because deficits are permanent and price adjustments happen gradually (Ardagna et al., 2007).

Within the scope of the Neoclassical view, which assumes that individuals make consumption-saving decisions by considering their life cycles, budget deficits resulting from rising public expenditures will have a crowding-out effect. Accordingly, budget deficits increase lifetime consumption by transferring taxes to future generations. Assuming full resource utilisation, the amount of savings decreases as consumption increases, and interest rates rise to restore balance in the capital markets. In this case, private capital accumulation is diminished by the crowding-out effect.

The standard explanation of how budget deficits affect interest rates, as described by Barro, begins with the assumption that replacing the budget deficit with current taxation increases overall consumer demand. In other words, desired private saving rises by less than the tax cut, which results in a decrease in desired national saving. For a closed economy, the anticipated real interest rate must increase to restore equilibrium between desired national savings and investment demand. A higher real interest rate discourages investment by raising the cost of capital. Consequently, public debt imposes an intergenerational burden by reducing the capital stock (Barro, 1989).

In an open economy, a small country's budget deficits will have minimal effects on the real interest rate in international capital markets. Therefore, in standard analysis, increasing the country's budget deficit primarily results in increased foreign borrowing rather than a higher real interest rate. In other words, budget deficits lead to current account deficits. Real interest rates rise only if expected real interest rates are sufficiently high to influence international markets, or if increasing national debt causes foreign lenders to demand higher expected returns on the country's obligations. In any case, the impact of a country's budget deficits on crowding out domestic investment in the short term and the capital stock in the long term is weaker. However, the current account deficit leads to a lower stock of national wealth in the long run and, consequently, to higher foreign demand (Barro, 1989).

In debt-crisis models that explain how budget deficits and debt ratios affect interest rates, it is stated that default risk depends on the debtor's income flows; in this case, default risk is also influenced by the primary budget balance (Ardagna et al., 2007). A higher debt-to-GDP ratio or interest rate can raise government bond yields through the default-risk premium. The public debt-to-GDP ratio is regarded as a measure of a government's capacity to service its debt. LitGruber and Kamin (2012) explain the increases in long-term yields on public debt as arising from portfolio balance effects, inflation expectations, and default risk. Investors require higher interest rates to accept a larger portion of their portfolios in debt. Conversely, an increase in public debt may raise inflation expectations due to fears of debt monetisation. At the same time, a higher public debt-to-GDP ratio could elevate the government's default risk, necessitating a corresponding rise in bond yields. This high ratio also increases a country's vulnerability to an international liquidity crisis. In such instances,

capital outflows could lead to a sharp increase in borrowing costs. Many studies in the literature have stated that budget deficits and public debt levels are linked to the long-term borrowing costs faced by the public (e.g., Dai & Philippon, 2004; Gale & Orszag, 2004; Codogno et al., 2008; Attinasi et al., 2009; Poghosyan, 2012). Accordingly, increases in budget deficits and public debt levels result in higher public borrowing costs. However, studies in the literature suggest that an increase in public debt does not always lead to higher public borrowing costs, and that the level of public debt is a key determinant of this relationship. In this context, the study by Ardagna et al. (2007) for OECD countries states that a one-percentage-point rise in the primary deficit raises long-term interest rates by roughly 10 basis points; that the effect of debt on interest rates is non-linear; and that increases in debt impact interest rates mainly in countries with above-average debt levels. Their analysis shows that higher public debt has a statistically significant positive effect on long-term interest rates, predominantly in "high debt" countries. The study's specifications indicate that a rise in the public debt-to-GDP ratio will negatively affect long-term interest rates if the ratio is below 62.5% and 65.4%, respectively, in two different models. When the debt ratio exceeds these thresholds, the effect turns positive. These findings imply that the relationship between long-term interest rates and public debt may be nonlinear and contingent on the level of public debt. When debt levels are low, increasing debt may correlate with declining interest rates. However, once a threshold is crossed, further increases in debt are typically associated with higher interest rates. More broadly, a negative coefficient on the public debt stock could be explained by the liquidity effect. In countries with very low public debt, government bonds may be less liquid and involve higher transaction costs, which can push interest rates upward. Another perspective, by Caporale and Williams (2002), suggests that a negative coefficient of public debt-to-GDP ratios on long-term interest rates results from the portfolio effect. When governments issue high-quality bonds, the market demands more of them than lower-quality debt, raising bond prices and consequently lowering yields. Conversely, if investors view government bonds as risky or of poor quality, the opposite occurs. Therefore, it should be recognised that the relationship between long-term interest rates and public debt stock may not be linear and might depend on the debt level (Ardagna et al., 2007).

Another factor cited in the literature that influences public borrowing costs is fiscal rules. Borrowing costs are indicated by the difference between a country's borrowing rate and the "risk- free" interest rate. These rates, known as risk premiums, are generally favourable because of the risks countries face. If adopting fiscal rules enhances policy credibility, other conditions remaining equal, government bond yields are expected to fall (Thornton & Vasilakis, 2018). In this context, in their study where Afonso and Jalles (2017) evaluated the impact of fiscal rules on government bond spreads in the short and medium term for 34 developed countries and 21 emerging market economies between 1980 and 2016, they stated that the dynamic effect of fiscal rules on the public's long- term borrowing costs is negative and statistically significant, reducing government borrowing costs by approximately 1. 2-1. 1.8 percentage points. Similarly, Thornton and Vasilakis (2018; 2020) concluded in their studies that fiscal rules lower the cost of public borrowing across different

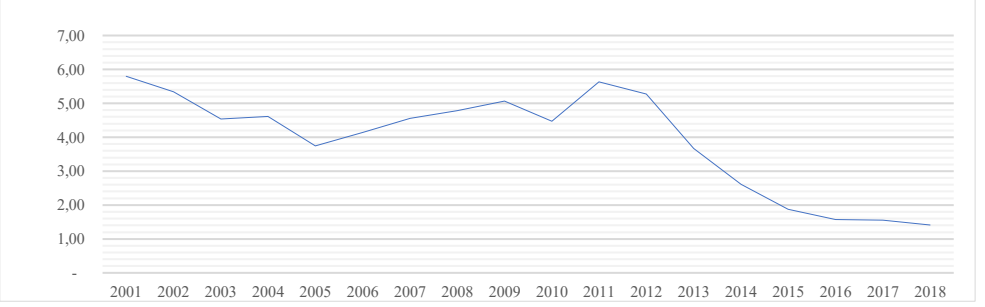
country groups. In the study by Bretscher et al. (2019), the components of fiscal policy that determine the risk premium were examined. Accordingly, because of the positive relationship between shocks to public spending levels and inflation, unexpected increases in public spending raise long-term interest rates. Meanwhile, shocks from government spending uncertainty generate a positive term premium and elevate long- term interest rates. Likewise, End (2023) highlights the importance of consistent government communication (budget and fiscal plans) for stabilising expectations and bolstering credibility. Credibility functions as a trust reserve influenced by fiscal policy, historical performance, and institutions (such as fiscal rules and councils). The literature demonstrates that establishing fiscal credibility through regulations, procedures, and institutions that direct fiscal policy is a vital tool for countries to access fiscal markets more effectively and reduce debt costs.

3. Data

In this study, data from 16 EU member states between 2001 and 2018 were used to analyse the effects of fiscal rules and public debt on the cost of public borrowing. The 10-year bond interest rate, which reflects long-term interest rates as an indicator of the cost of public borrowing, was included as the dependent variable in the model. The public debt level and the fiscal rule index were used as independent variables, whereas per capita income and the money supply were used as control variables. The 10-year government bond nominal yield, the dependent variable, was denoted as "GBY." The "DR" variable represents the ratio of public debt to GDP. The "FRI" variable indicates the fiscal rule index, and "M3" signifies the money supply. The "GDPPER" variable, taken as the logarithm, indicates the per capita income level. All variables in the estimation are used in their level form except for per capita income (GDPPER), which is transformed into natural logarithms (lnGDPPER) to account for scale differences and nonlinear effects. Accordingly, the interpretation of its coefficient is a percentage change in long-term interest rates resulting from a 1% change in per capita income, whereas the other coefficients reflect level-to-level effects. The GBY and M3 variables were obtained from the OECD database, while the DR, GDPPER, and FRI variables were sourced from the AMECO, World Bank, and European Commission databases, respectively. To measure the strength of fiscal rules in European Union countries, the fiscal rule index (FRI) is computed based on criteria for compliance with budget balance, debt, expenditure, and revenue rules. The fiscal rule index for each member state is calculated by summing the weighted fiscal rule strength index for all fiscal rules in force in that member state, separately for each level of government (general government, central government, local government, and social security institutions). The fiscal rule strength index (FRSI), available in the European Commission's economic database and covering all numerical fiscal rules at all levels of government, is calculated considering five criteria. These criteria are: (1) the legal basis of the rule, (2) flexibility for target revisions, (3) mechanisms for monitoring compliance and implementation, (4) the existence of predefined implementation mechanisms, and (5) media visibility of the rule (European Commission, 2022).

Following the 2008 financial crisis, governments increased spending, cut taxes, and launched economic stimulus packages. As a result, deficits and debt levels rose rapidly, prompting investors to doubt some countries' ability to repay their debts and to demand higher credit-risk premiums (Comenda, 2020). Due to the ECB's loose monetary policy adopted since mid-2012, margins around the risk-free interest rate have declined, and long-term interest rates have fallen, supported by bailout packages and negative policy interest rates (Reuter, 2020). By the end of 2018, the borrowing costs of Eurozone countries averaged 140 basis points, a rate that has steadily declined since the 2011 debt crisis (Figure 1).

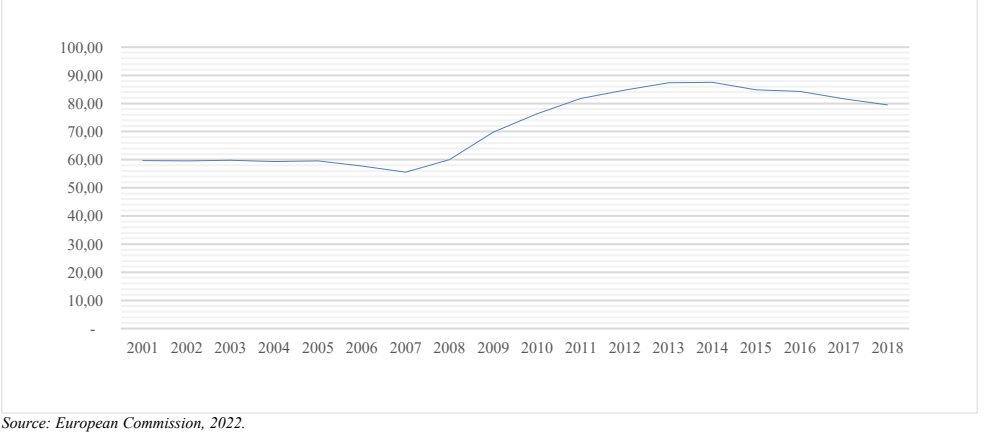
Figure: 1
Long-Term Interest Rates in Sample Countries



Source: OECD, 2023.

The average trajectory of the public debt level, one of the main determinants of long-term interest rates, in the sample countries for the years 2001-2018 is shown below.

Figure: 2
Public Debt / GDP Ratio in Sample Countries

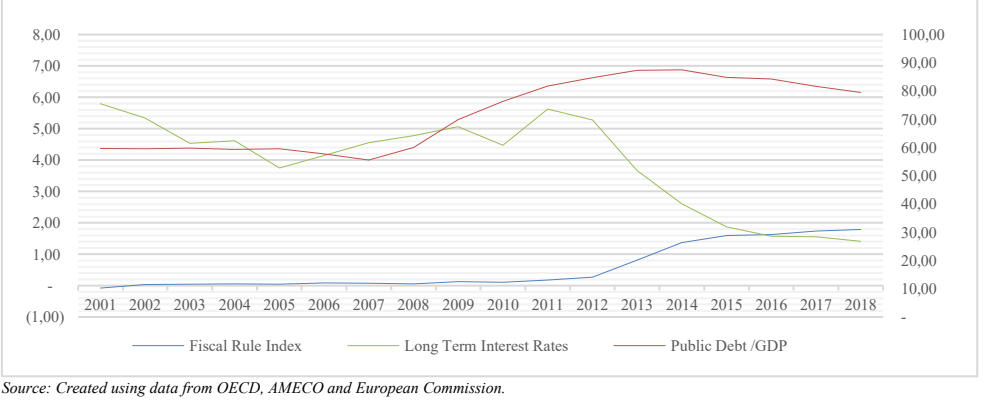


Source: European Commission, 2022.

Despite the Maastricht debt criterion of 60%, public debt-to-GDP ratios remain high across the sample countries, with the average public debt-to-GDP ratio reaching 80% by the end of 2018. Public debt has increased notably since the 2008 crisis, exceeding 60%. The fact that debt levels exceed the specified criteria indicates that, despite the fiscal rules in place within the European Union, fiscal policy tends to adjust in line with economic conditions, and debt levels across member states have not declined sharply (Reuter, 2020).

Figure 3 illustrates the concurrent trends in public debt, the fiscal rule index, and long-term interest rates across the sample countries. The ratios on the right axis represent the public-debt-to-GDP ratio, whereas the fiscal rule index and long-term interest rates are plotted on the left axis. As shown in the figure, as the fiscal rule index strengthened, long-term interest rates decreased. Public debt and long-term interest rates did not move in unison; however, long-term interest rates declined sharply during the period when public debt was decreasing.

Figure: 3
Simultaneous Course of Public Debt, Fiscal Rule Index and Long-Term Interest Rates



Source: Created using data from OECD, AMECO and European Commission.

In this study, three different models were developed to examine how fiscal rules and public debt levels influence the cost of public borrowing. In Model (1), in addition to the DR variable, the DR^2 term was included to assess whether public debt has a linear effect. In Model (2), the fiscal rule index (FRI) was included to determine the impact of fiscal rule compliance on long-term interest rates. In Model (3), consistent with the existing literature, M3 and GDPPER were added as control variables. The New Keynesian model explains how an increase in the money supply affects interest rates through the IS-LM model. Central bank activities, such as open market operations and bond purchases, reduce the total bond supply in the market, raise bond prices, and consequently lower yields (Meyer et al., 2020). Existing research often highlights that increasing the money supply tends to lower interest rates. For example, Wright (2011) noted that the Federal Reserve's large-scale asset purchases,

intended to stimulate the economy, led to lower yields on Treasury and corporate bonds. Afonso et al. (2020) indicated that increasing liquidity is associated with falling returns, noting that liquidity injections through long-term refinancing operations (LTROs) implemented by the European Central Bank reduced government bond yields in eurozone countries. Between 2008 and 2013, liquidity was expanded via collateral increases across the Eurozone, which contributed to reduced long-term interest rates. Poghosyan (2012) observed that increased consumption, driven by higher per capita income, is positively associated with long-term real bond yields. Likewise, Koroleva and Kopeykin (2022) demonstrated that changes in per capita GDP tend to correspond with movements in government bond yields.

$$GBY_{it} = \beta_{1it} DR_{it} + \beta_{2it} DR^2_{it} + \varepsilon_{it} \quad (1)$$

$$GBY_{it} = \beta_{1it} DR_{it} + \beta_{2it} DR^2_{it} + \beta_{3it} FRI_{it} + \varepsilon_{it} \quad (2)$$

$$GBY_{it} = \beta_{1it} DR_{it} + \beta_{2it} DR^2_{it} + \beta_{3it} FRI_{it} + \beta_{4it} InPerCap_{it} + \beta_{5it} M3_{it} + \varepsilon_{it} \quad (3)$$

4. Method and Empirical Results

This study analysed the long-term impact of fiscal rules and public debt on public borrowing costs using the FMOLS estimator.

When the series of variables are not stationary, the linear combinations of these series may be stationary, indicating a long-term relationship. Kao and Chen (1995) demonstrated that the EKK could be biased in panel cointegrated models. Phillips and Moon (1999) and Pedroni (1996, 2000, 2004) recommended using the FMOLS estimator to address endogeneity and autocorrelation in panel cointegration models. (Baltagi & Kao, 2000: 29).

Generally, the cointegrated system can be represented as follows (Pedroni, 2000):

$$y_{i,t} = \alpha_i + \gamma_t + \beta_{ji} x_{i,t} + e_{i,t} \quad (4)$$

$$x_{i,t} = x_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

In equations (4) and (5), when i=1,…, N and t=1,…, T, N denotes the cross-sectional dimension and T denotes the time dimension. αi and γt denote the panel-specific fixed effects and common time fixed effects, respectively. If yi,t and xi,t have a unit root but are cointegrated, then ei,t is stationary by definition. In this context, Pedroni (2000) showed that the cross-sectional estimator of βi (i=1,…, N) and the t-statistic can be computed using the FMOLS estimator for the ith panel. In this context; $\beta_j = N^{-1} \sum_{i=1}^{N} \beta_{ji}$ nd the associated t-statistic is $t_{\beta ii} = N^{-1} \sum_{i=1}^{N} \beta_{ii}$.

Firstly, Levin, Lin, and Chu (2002) (LLC), Im, Pesaran, and Shin (2003) (IPS), and Maddala and Wu (1999) used the ADF Fisher $\chi 2$ (ADF) and PP Fisher $\chi 2$ (PP) unit root tests to examine whether the variables were stationary.

Table: 1
Panel Unit Root Tests

Variables	Levin, Lin and Chu	Im, Pesaran and Shin	ADF - Fisher	PP - Fisher
GBY	-103.850	107.490	258.121	185.326
DR	2.99740 ***	-0.88640	352.370	208.965
DR^2	-3.03233***	-124.756	389.948	196.765
FRI	-2.99740***	0.88640	352.370	208.965
M3	0.85683	414.377	647.234	546.398
GDPPER	-124.971	105.284	211.047	154.098
ΔGBY	-13.0221***	-9.97603***	147.218***	157.691***
ΔDR	-5.08887***	-3.60251***	62.0874***	60.3089***
ΔDR^2	-4.53890***	-3.44166***	60.4858***	60.2037***
ΔFRI	-14.1009***	-11.1081***	162.914***	177.958***
ΔM3	-5.30591***	-4.59315***	76.6859***	54.2657***
ΔGDPPER	-6.91264***	-5.07472***	81.8766***	97.4616***

*Note: *** indicates statistical significance at the 1% level.*

According to IPS, ADF, and PP unit root tests, the series are not stationary at the 1% significance level and contain a unit root. Conversely, based on the LLC tests of the GBY variable, it appears not to be stationary at the 1% significance level. When the first difference of the series is taken, the series becomes stationary. In the study, after examining whether the variables were stationary, the existence of long-term relationships among the variables at the same degree of stationarity was investigated using Pedroni's cointegration tests. According to Group ADF statistics developed by Pedroni (2004), the null hypothesis of no cointegration between the variables was rejected.

Table: 2
Panel Cointegration Test Results

Group ADF	2.738460***

*Note: *** indicates statistical significance at the 1% level.*

Finally, the long-term relationship between variables found to be cointegrated of the same degree was estimated using the FMOLS estimator.

Table: 3
FMOLS Estimation Results

	Model 1	Model 2	Model 3
DR	-0.112244***	-0.047415**	-0.049936***
DR^2	0.000565***	0.000496***	0.000402***
FRI		-1.843070***	-1.014280***
M3			-0.026110**
InGDPPER			0.719302***

*Note: ***, ** indicate statistical significance at 1% and 5% levels, respectively.*

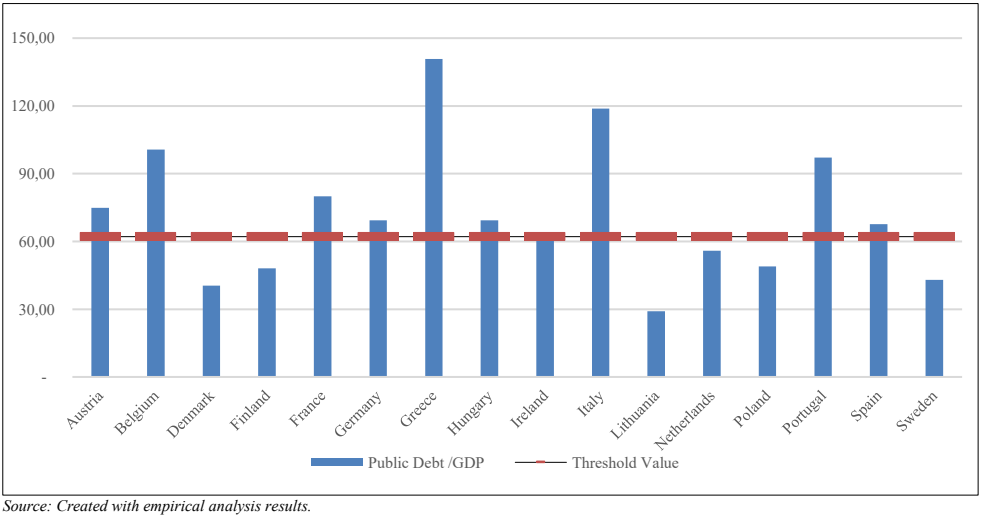
When evaluating the results from Model (1), the coefficient of the DR variable is negative and statistically significant. The positive coefficient on the DR^2 variable indicates that the DR variable has a positive linear effect on long-term interest rates. In other words, the ratio of public debt to GDP decreases long-term interest rates up to a certain point, after which it increases. In the first model without the fiscal rule index, a 1% increase in the public-debt-to-GDP ratio initially decreases long-term interest rates by 0.11%, but this effect

is nonlinear. Once the public debt-to-GDP ratio reaches a certain threshold, a 1% increase in the public debt-to-GDP ratio raises long-term interest rates by 0.05%.

In Model (2), where the fiscal rule index is included, the coefficient of the index is negative as anticipated. A one-unit increase in the fiscal rule index will decrease long-term interest rates by 1.8%. This finding indicates that fiscal rules lower borrowing costs in EU countries. In Model (2), the DR and DR^2 variables retain their signs and statistical significance.

When control variables are added to Model (3), the results are similar to those in Models (1) and (2). According to Model (3), a 1% increase in the public debt-to-GDP ratio initially decreases long-term interest rates by 0.049 percentage points, but beyond a certain threshold, it raises them by 0.0004 percentage points. This finding supports Ardagna et al.'s (2007) conclusion that the effect of debt on interest rates is nonlinear and that higher debt affects interest rates only for countries with above-average debt.

Figure: 4
Public Debt/GDP Ratios in Sample Countries



Source: Created with empirical analysis results.

The results from the third model indicate that when the public debt-to-GDP ratio exceeds 62%, long-term interest rates tend to rise. The 62% debt-to-GDP threshold was derived from the estimated coefficients of the DR and DR^2 variables in Model 3. Specifically, the turning point of the nonlinear relationship was calculated using the formula $-\beta_1/(2\beta_2)$, which yields approximately 62%. This value aligns with thresholds identified by Ardagna et al. (2007), at which the nonlinear effects of debt on interest rates become evident. Therefore, the threshold is supported by both empirical data and theory. Figure 4 presents

the average public debt-to-GDP ratios for the sample countries from 2001 to 2018, based on the 62% threshold derived from the analysis.

When comparing Debt/GDP values for 2001-2018 with the threshold identified in the study, it is evident that countries other than Denmark, Finland, Ireland, Lithuania, the Netherlands, Poland, and Sweden have public debt ratios exceeding 62%. This highlights the importance of implementing fiscal rules that limit public debt once a certain threshold is reached.

According to the results obtained within the scope of Model (3), there is a strong and negative relationship between the fiscal rule index and long-term interest rates. A one-unit increase in the fiscal rule index will reduce long-term interest rates by 1.01 points. This result indicates that as compliance with fiscal rules increases in EU countries, the margin in borrowing costs decreases. The fiscal rule index will strengthen as the criteria for compliance with the budget balance, debt, expenditure, and revenue rules are approached. In this context, a reliable fiscal policy designed with a planned budget, public expenditure policies that are limited or directed toward productive areas, a public debt level limited to a particular threshold value and monitored by additional audit mechanisms, and revenue rules that aim to restrict discretionary policies by defining where public revenues are used will reduce risk borrowing costs by increasing compliance with fiscal rules. Simultaneously, the following interpretation can be made by considering the five criteria used in the calculation of the fiscal rule strength index (FRSI): as the definition of the legal basis of the rules constituting the fiscal rule index approaches the constitutional level, the degree of flexibility for revising the targets decreases; the independence of the mechanisms monitoring the compliance and implementation of the rule increases; the existence of predefined implementation mechanisms is present; and the media closely monitor the implementation and outcomes of fiscal rules. Consequently, the fiscal rule index will increase, and borrowing costs will decrease.

The analysis results indicate that increases in the money supply negatively affect long-term interest rates, consistent with the New Keynesian model. Furthermore, as per capita income rises, consumption patterns and ultimately money demand will grow, leading to a tendency for long-term interest rates to rise. When GDP per capita is incorporated into the model, a 1% increase in GDP per capita raises the long-term borrowing cost by 0.007%.

5. Conclusion

This study examined the effect of fiscal rules and public debt levels on long-term borrowing costs, a key indicator of fiscal credibility, using data from 16 EU countries from 2001 to 2018 and employing the FMOLS estimator. The empirical results show that improvements in the fiscal rule index notably reduce long-term borrowing costs, whereas the effect of public debt levels is nonlinear: costs initially decline but become harmful beyond a certain point (approximately 62% of GDP).

These results largely align with earlier studies (e.g., Afonso and Jalles, 2017; Thornton and Vasilakis, 2018), which emphasise the cost-reducing impacts of fiscal rules. However, this study contributes to the literature by identifying a threshold effect in the debt-interest rate relationship and by showing how the credibility of fiscal frameworks shapes market perceptions even during relatively stable periods. Unlike many studies that examine fiscal rules or debt independently, this research assesses both variables simultaneously, providing a more comprehensive understanding of how they interact to influence borrowing costs.

The 62% debt-to-GDP threshold was derived from the nonlinear specification in Model 3, based on the turning-point formula $-\beta_1/(2\beta_2)$, using the estimated coefficients for the public debt and squared debt terms. This empirical finding also broadly aligns with the threshold levels reported by Ardagna et al. (2007) for OECD countries. The result suggests that while moderate public debt levels may not adversely impact borrowing costs, exceeding a certain threshold significantly raises perceived fiscal risk and results in higher interest rates demanded by investors.

From a policy perspective, the findings indicate that EU countries should not only reinstate but also strengthen fiscal rules that were suspended during the COVID-19 crisis. Effective fiscal rules must be legally binding, transparent, and adaptable to each country's specific fiscal situation. Importantly, they need to be supported by independent monitoring bodies and enforcement mechanisms. Public communication and media visibility of these rules further bolster fiscal credibility by increasing transparency and accountability.

Although this study focuses on the pre-COVID period (2001-2018) to examine the structural effects of fiscal rules under stable macroeconomic conditions, its findings offer valuable insights for the post-pandemic fiscal environment. The suspension of fiscal rules across EU countries during the COVID-19 crisis highlighted the need for more resilient and adaptable fiscal frameworks. As the EU introduces a reformed set of fiscal rules from 2024, understanding how rules functioned before the crisis offers an essential reference point. Based on our results, post-COVID fiscal governance should focus not only on flexibility during shocks but also on maintaining a credible long-term commitment to debt sustainability. This involves designing rules with clear thresholds, automatic correction mechanisms, and vigorous institutional enforcement to restore market confidence and manage borrowing costs in the coming years.

In conclusion, fiscal credibility, grounded in strict and enforceable rules, plays a crucial role in reducing borrowing costs and securing long-term fiscal stability. The findings of this study offer policymakers essential guidance: adopting credible, well-designed fiscal rules is not merely a bureaucratic requirement but a strategic economic instrument to bolster market confidence, sustain debt levels, and support macroeconomic stability.

References

Afonso, A. & J. Jalles (2017), "Do Fiscal Rules Lower Government Financing Costs?", *Working Papers REM*, 2017/15, ISEG - Lisbon School of Economics and Management, REM, Universidade de Lisboa.

Afonso, A. et al. (2020), "The Effects of Macroeconomic, Fiscal and Monetary Policy Announcements on Sovereign Bond Spreads", *International Review of Law and Economics*, 63, 105924.

Akram, T. & A. Das (2017), "The Dynamics of Government Bond Yields in the Eurozone", *Working Paper* No. 889, Levy Economics Institute of Bard College.

Ardagna, S. et al. (2007), "Fiscal Discipline and the Cost of Public Debt Service: Some Estimates for OECD Countries", *The B.E. Journal of Macroeconomics*, 7(1), 1-35.

Attinasi, M.G. (2009), "What Explains the Surge in Euro Area Sovereign Spreads During the Fiscal Crisis of 2007-09?", European Central Bank *Working Paper* Series No. 1131.

Baltagi, B. & C. Kao (2000), "Nonstationary Panels, Cointegration in Panels and Dynamic Panels: A Survey", Syracuse University Surface, Center for Policy Research, *Working Paper* No. 16.

Barro, R.J. (1989), "The Ricardian Approach to Budget Deficits", *Journal of Economic Perspectives,* 3(2), 37-54.

Bretscher, L. et al. (2019), "Fiscal Policy Driven Bond Risk Premia", *Journal of Financial Economics*, 138(1), 53-73.

Caporale, G. & G. William (2002), "Long-term Nominal Interest Rates and Domestic Fundamentals", *Review of Financial Economics*, 11(2), 119-130.

Codogno, L. et al. (2008), "Yield Spreads on EMU Government Bonds", *Economic Policy*, 18(37), 503-532.

Comenda, J.D.S. (2020), "Government Borrowing Costs and Fiscal Developments", *Master's Final Work Dissertation*, Lisbon School of Economics and Management, Master's in Monetary and Financial Economics.

Dai, Q. & T. Philippon (2004), "Government Deficits and Interest Rates: A No-Arbitrage Structural VAR Approach", *Working Paper*, New York: New York University.

Darvas, Z. et al. (2024), "The New Economic Governance Framework: Implications for Monetary Policy", *Monetary Dialogue Papers*, European Parliament's Committee on Economic and Monetary Affairs.

End, N. (2023), "Big Brother is Also Being Watched: Measuring Fiscal Credibility", *Journal of Macroeconomics*, 77(C), 103548.

European Commission (2022), *AMECO Database*, <https://economy-finance.ec.europa.eu/economic-research-and-databases/economic-databases/ameco-database_en>, 12.12.2022.

Gale, G. & P.R. Orszag (2004), "Budget Deficits, National Saving, and Interest Rates", *Brookings Papers on Economic Activity*, 35(2), 101-210.

Gbohoui, W. & P. Medas (2024), "Fiscal Rules, Escape Clauses, and Large Shocks", *Fiscal Affairs*, (Special Series on Fiscal Policies to Respond to COVID-19).

Kao, C. & B. Chen (1995), "On the Estimation and Inference for Cointegration in Panel Data When the Cross Section and Time Series Dimensions Are Comparable", *Manuscript*, New York, NY: Center for Policy Research, Syracuse University.

Keynes, J.M. (1936), *The General Theory of Employment, Interest and Money*, London: Macmillan.

Koroleva, E. & M. Kopeykin (2022), "Understanding of Macro Factors That Affect Yield of Government Bond", *Risks*, 10(8), 166.

Lo Conte, R. (2009), "Government Bond Yield Spreads: A Survey", *Giornale degli Economisti e Annali di Economia*, 68(3), 341-370.

Meyer, D. et al. (2020), "An Evaluation of the Relationship Between Government Bond Yields, Exchange Rates and Other Monetary Variables: The South African Case", *Journal of Contemporary Management*, 17(2), 523-549.

Mukhtar, T. & M. Zakaria (2008), "Budget Deficits and Interest Rates: An Empirical Analysis for Pakistan", *Journal of Economic Cooperation*, 29(2), 1-14.

OECD (2023), *Long-term Interest Rates: Long-term Interest Rates Refer to Government Bonds Maturing in Ten Years*, <https://www.oecd.org/en/data/indicators/long-term-interest-rates.html>, 10.11.2023.

Pedroni, P. (2000), "Fully-modified OLS for Heterogeneous Cointegrated Panels", *Advances in Econometrics*, (15), 93-130.

Pedroni, P. (2004), "Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests With An Application to The PPP Hypothesis", *Econometric Theory*, (3), 579-625.

Poghosyan, T. (2012), "Long-Run and Short-Run Determinants of Sovereign Bond Yields in Advanced Economies", IMF *Working Papers*.

Reuter, W.H. (2020), *Benefits and Drawbacks of an "Expenditure Rule", as well as af a "Golden Rule" in the EU fiscal framework, Euro Area Scrutiny*, Economic Governance Support Unit (EGOV), European Parliament.

Szarowská, I. (2013), "Fiscal Discipline As A Driver of Sovereign Risk Spread in the European Unıon Countries", in: *22nd International Business Information Management Association Conference*.

Thornton, J. & C. Vasilakis (2018), "Fiscal Rules and Government Borrowing Costs: International Evidence", *Economic Inquiry*, 56(1), 446-459.

Thornton, J. & C. Vasilakis (2020), "Do Fiscal Rules Reduce Government Borrowing Costs in Developing Countries?", *International Journal of Finance and Economics*, 25(4), 499-510.

Wright, J.H. (2011), "What does Monetary Policy Do To Long-Term Interest Rates at the Zero Lower Bound?", *NBER Working Paper* 17154.