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The Role of Fiscal Rules for Spending Multipliers in European Union Countries *

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Abstract

This paper focuses on the role of fiscal rules in shaping the macroeconomic effects of fiscal policy. We compare the fiscal multipliers across the European Union members and search for the drivers of their heterogeneity. To this aim we apply interacted panel vector autoregressive models to data from 27 EU countries over the period 1999-2022. Our results show that government spending multipliers are higher for countries with a relatively higher fiscal rule index compared to those with a lower index.

JEL Classification: C33, E62, H50

Keywords: fiscal multipliers, fiscal rules, debt, interacted panel VAR model, European Union

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1 Introduction

Fiscal rules have become a widely used instrument in the design and implementation of fiscal policy, particularly in the European Union (EU) member states, which are characterized by high complexity of their fiscal frameworks. At the same time, there is still relatively limited research on the impact of fiscal rules on various dimensions of economic performance. We aim to fill this gap by analysing the impact of fiscal rules on fiscal multipliers in the EU countries. As the main representation of fiscal rules in our study we use the Fiscal Rules Index (FRI). This index is a comprehensive measure used to evaluate the stringency and effectiveness of fiscal rules implemented by various governments.

Fiscal rules were implemented in national laws in all EU countries. The process intensified in the second decade of the 21st century, when European Union countries started the process of strengthening their fiscal frameworks, as a result of the 2011/85/EU directive, which tightened the rules of the Stability and Growth Pact from 1997[1]. With the directive, new standards for creating national budgetary frameworks were introduced, including numerical fiscal rules imposing top-down numerical restrictions on categories such as debt, deficits, or expenditures. However, the design of fiscal rules and their application in budgetary policies was delegated to Member States, resulting in a large variety of fiscal measures introduced at the national level.

The main contribution of this article is to explain the heterogeneity in effectiveness of fiscal policies in European Union economies by different fiscal policy frameworks. At the starting point of our analysis we show heterogeneous responses of GDP to positive government spending shocks in 27 European economies. We calculate fiscal multipliers for all economies included in the model. Next, we search for the drivers of this heterogeneity. Our findings for the baseline model can be summarized as follows. The increase in output after a positive government spending shock is larger when the quality of fiscal framework, as measured by the FRI, is high. In contrast, when the quality of fiscal framework is low the spending multipliers become statistically insignificant. This in turn may indicate the presence of crowding out effects and Ricardian equivalence. Moreover, spending multipliers in EU countries are larger for high general government debt economies and

[1] The Stability and Growth Pact was established by the resolution of the European Council of 17 June 1997 on the Stability and Growth Pact. It consists of Council Regulation No. 1466/97 and Council Regulation No. 1467/97.

for less open economies.

The second contribution of the article is the application of the interacted panel vector autoregression (IPVAR) model. The application of this model has a number of advantages. First, it enables the analysis of all 27 European Union countries within one model. Second, it allows us to capture a number of nonlinearities. Importantly, we can include more than one interaction variable in one model. Therefore, we estimate the reaction of output to a fiscal shock depending on the FRI, while controlling for heterogeneity in other dimensions, such as debt-to-GDP or trade openness indices. Third, it allows us to use different identification schemes for VAR models. One novelty of our approach is that we propose a procedure for the consistent estimation of the IPVAR model under a nonrecursive identification scheme. Fourth, the IPVAR model we apply enables including global variables that do not affect local variables.

Finally, we conduct a number of robustness checks, such as using different identification schemes, including global variables, changing trend assumptions, controlling for trade openness, disaggregating spending into consumption and investment, changing lag length and the time period of the analysis, and looking at different types of fiscal rules. These changes have had little effect on the results.

To the best of our knowledge, no extant studies analyse in detail the interaction between fiscal rules, or more generally, fiscal policy frameworks, and the effectiveness of fiscal policy, which may be measured using fiscal multipliers. This article aims to fill this gap. It builds on two main strands of literature: the studies on state dependent fiscal multipliers described in Section 2.1, especially those based on panel models and fiscal rules described in Section 2.2.

Subsequently, Section 3 presents the IPVAR model and our identification strategy. Section 4 describes our data. Empirical results for the baseline model and for robustness checks are described in Section 5. Lastly, Section 6 concludes the analysis.

2 Literature Review

This section reviews the literature in the two areas that the paper brings together, namely the determinants of fiscal multipliers and the effects of applying fiscal rules.

2.1 Panel Studies on Fiscal Multipliers

In this section we turn our attention to panel studies on fiscal multipliers. The common approach is to apply vector autoregressive (VAR) models or local linear projections, which facilitate the calculation of fiscal multipliers. The approach is based on the prominent study of Blanchard and Perotti (2002), where identification is achieved by restricting some of short term elasticities. It was then followed and enhanced by many others, such as, Favero and Giavazzi (2012), Mertens and Ravn (2014), Caldara and Kamps (2017), Angelini et al. (2023) just to mention a few.

Our work is related to a branch of literature that looks at the relation between fiscal multipliers and the level of debt. Perotti (1999) states that in times of fiscal stress the effects of government spending on private consumption are very different from those in normal times.[2] Corsetti et al. (2012) and Ilzetzki et al. (2013) are panel studies that show that countries with a high level of debt have smaller multipliers than countries with a low level of debt. Jackson et al. (2018) apply FAVAR model for euro area countries and look at both monetary and fiscal policy shocks. They find no significant differences between the effects of fiscal policy in high and low-debt periods. Caggiano et al. (2015) and Favero and Giavazzi (2012) show that the level of fiscal multipliers in the United States does not depend on the debt to GDP ratio.

It is worth noting that the relationship between public debt and economic growth has also received much attention in the literature (e.g. Reinhart and Rogoff, 2010; Afonso and Jalles, 2013; Panizza and Presbitero, 2014; Eberhardt and Presbitero, 2015; Woo and Kumar, 2015; Chudik et al., 2017; Eberhardt, 2019). Heimberger (2023) showed using meta-regression that a 10 percentage points increase in the public debt-to-GDP ratio is associated with a decline in annual GDP growth rates by about 0.14 percentage points.

Huidrom et al. (2020) show that a weaker fiscal position reduces the effectiveness of fiscal policy. [3] They look at Ricardian and interest rate channels, showing that after an increase in government spending CDS increases in weak fiscal position countries and also private consumption is crowded out in weak fiscal position countries.

[2] He studies a panel of nineteen OECD countries, from 1965 to 1999.

[3] They use an unbalanced panel of 34 countries between 1980 Q1 and 2014 Q1. The vector of endogenous variables for each country includes government consumption, GDP, REER, and current account balance.

Another common result in the empirical literature is that the spending multiplier is larger in closed economies than in open economies. This result is confirmed by both Beetsma et al. (2008) and Ilzetzki et al. (2013). The authors state that the result is consistent with the Mundell-Fleming model, where an open economy is an economy with a higher marginal propensity to import, so an increase in aggregate demand would be associated with a decrease in net exports and, thus, not necessarily an increase in domestic production.

Lastly, there is a large literature on the state dependence of fiscal multipliers depending on the level of output gap. The common conclusion is that government spending multipliers are larger in recessions than in expansions (Auerbach and Gorodnichenko, 2012). Auerbach and Gorodnichenko (2013) and Auerbach and Gorodnichenko (2017) are panel studies for OECD countries and 25 advanced economies, respectively. Both studies include EU economies. Auerbach and Gorodnichenko (2017) is based on local linear projections that, among other things, identify fiscal shocks using the Blanchard and Perotti (2002) procedure. Their main results is that when the economy is weak, expansionary fiscal policy stimulates output and reduces the debt to GDP ratio as well as CDS spreads and interest rates. When the economy is strong, the opposite happens. One may conclude that in economies with high public debt, the penalty for fiscal stimulus appears to be small in terms of elevated debt and borrowing costs.

Next, we concentrate on the studies that focus on European economies. Beetsma et al. (2008) estimate the model for 14 European Union countries using annual data between 1970 and 2004. They look at the impact of government spending on both trade balances and budget deficits. Their results are consistent with the twin deficits hypothesis, more precisely after an increase in government spending imports rise and exports fall, causing both a decrease in the trade balance and the public deficit.

Similarly, Nickel and Tudyka (2014) study 17 European countries using annual data between 1970 and 2010 and find negative spending multipliers for high debt economies as well as nonlinear effect of fiscal stimuli on the trade balance – positive for a higher level of debt.

Ianc and Turcu (2020) look at fiscal multipliers for 19 EU members and candidates between 2001 Q1 and 2017 Q1. They underline heterogeneities for EU candidates and EU members. For example, spending multipliers are positive for EU and Eurozone candidates countries but negative ones in Eurozone countries. It is worth noting that very mixed results are found for tax multipliers, which are both positive and negative for different groups of countries.

Amendola et al. (2020) consider a different problem, namely they investigate asymmetries with respect to shadow monetary policy rate. They estimate factor augmented interacted panel VAR model for euro area for the sample between 2002 Q1 and 2017 Q4. They include in their model not only government purchases, GDP, net taxes, and ECB shadow monetary policy rate, but also forecasts of government spending over the past 12 months, 5 PCA factors, and U.S. output gap, U.S. inflation and the U.S. shadow monetary policy rate. We follow this approach in the empirical section, in that we include U.S. foreign variables in one of our robustness checks. Their main result is that government spending multipliers are larger at the effective lower bound.

2.2 Fiscal Rules

The previous subsection identified a number of factors determining the level of fiscal multipliers. There are, however, no studies considering the quality of fiscal framework as another potential determinant, such as the presence and stringency of fiscal rules (for more information see Section 4.2). Although the existing literature provides evidence that fiscal rules – defined as long-lasting constraints on fiscal policy through numerical limits on budgetary aggregates (Schaechter et al., 2012) – may affect a number of different macro-fiscal categories, it does not consider fiscal multipliers as one of them.

Since the late 1970s, different authors have explored why policymakers may choose policies that deviate from a social optimum. One of the first fundamental articles about the 'rules versus discretion' dilemma in fiscal policy was the article by Kydland and Prescott (1977). Crucial in this field, the phenomenon called deficit bias emerged in the mid-1970s, referring to the tendency of government spending and deficits to increase, both in the United States and in Western European countries. In the 1990s, fiscal rules began to be seen as a remedy for a budgetary policy affected by the deficit bias attitude (Krogstrup and Wyplosz, 2009). At the same time, with the establishment of the Maastricht Treaty and the subsequent introduction of the euro, it was decided to introduce fiscal constraints at the European level (Calmfors, 2005). Many different theories have been developed to explain the deficit bias phenomenon and a number of theoretical arguments have emerged to justify constraints on fiscal policy discretion through fiscal rules (summarised in Calmfors, 2015; Badinger and Reuter, 2017).

Many empirical studies on fiscal rules are devoted to their impact on budget balances and fiscal stance. One of the first articles in this field for the EU countries is Debrun et al. (2008). They investigated the impact of fiscal rules in general, as well as their types, on fiscal aggregates. According to the authors, a particularly strong impact on improving the fiscal stance had budget balance (deficit) rules. Further articles in this field include i.a. Nerlich and Reuter (2013), Maltritz and Wüste (2015), Caselli and Reynaud (2020) and Heinemann et al. (2018). The last mentioned study is a meta-regression analysis that points to a statistically significant and constraining impact of fiscal rules on fiscal aggregates. These results hold especially strong for deficits but less so for debt, expenditures or revenues. Concerning the effect size, albeit only measurable for a small subset of studies, the results show that budget balance rules on average reduce the primary deficit by between -1.5 and -1.2 percent of GDP.

There are also articles focusing on the impact of fiscal rules on the volatility of economic growth. Some works show that under certain circumstances, fiscal rules decrease the procyclicality of fiscal policy (Bergman and Hutchison, 2015) and lead to a more stable GDP (Fatás and Mihov, 2006; Badinger and Reuter, 2017). Combes et al. (2017) in a panel of 56 developed, emerging and developing economies over 1990–2011 investigate the reaction of fiscal policy to the business cycle depending on the level of public debt-to-GDP and fiscal rules. They reveal a non-linear response of fiscal policy to the business cycle, conditional upon the level of debt – when the public debt-to-GDP ratio goes beyond threshold of 87%, fiscal policy turns pro-cyclical. To tackle this effect, they explore the role of fiscal rules – only some of them may mitigate fiscal policy procyclicality in high-debt contexts (golden rules and national rules, especially those targeting deficits).

Another strand of literature linking fiscal rules, government spending, and GDP is devoted to the impact of fiscal rules on public investment. In the second decade of the 21st century, the ratio of public investment to GDP has been declining in a large part of the EU countries. There have been comments in the economic debate that it is the fiscal framework based on numerical fiscal rules that hinders the realization of public investment (Thygesen et al., 2019; Basdevant et al., 2020). Several empirical studies have emerged on the relationship between fiscal rules and public investment (Dahan and Strawczynski, 2013; Ardanaz et al., 2021; Delgado-Téllez et al., 2022; Chmura, 2023), summarised by Blesse et al. (2023). They find no systematic evidence for a negative effect of fiscal rules on public investments. Other articles show that fiscal rules may have an impact e.g. on the cost of public borrowing (Afonso and Guimarães, 2015; Afonso and Jalles, 2019) or on cross-border bank claims (Siwińska-Gorzelak, 2024).

3 Methodology

We use an interacted panel VAR model that allows coefficient estimates to vary between cross-sectional units. The model was introduced by Towbin and Weber (2002) and reads:

$$\begin{pmatrix} \mathbf{C}_0 & \mathbf{0} \\ \mathbf{B}_{0i} & \mathbf{A}_{0i} \end{pmatrix} \begin{pmatrix} \mathbf{x^G}_t \\ \mathbf{x^L}_{it} \end{pmatrix} = \begin{pmatrix} \boldsymbol{\mu}^{\boldsymbol{G}} \\ \boldsymbol{\mu}^{\boldsymbol{L}}_i \end{pmatrix} + \sum_{p=1}^{P} \begin{pmatrix} \mathbf{C}_p & \mathbf{0} \\ \mathbf{B}_{pi} & \mathbf{A}_{pi} \end{pmatrix} \begin{pmatrix} \mathbf{x^G}_{t-p} \\ \mathbf{x^L}_{i,t-p} \end{pmatrix} + \begin{pmatrix} \boldsymbol{\epsilon}^{\boldsymbol{G}}_t \\ \boldsymbol{\epsilon}^{\boldsymbol{L}}_{it} \end{pmatrix}. \tag{1}$$

Two features of the model shall be noted on top of an otherwise standard panel VAR specification. First, the model features cross-unit heterogeneity as some of the parameters depend on i. Second, the general specification eq. (1) disentangles global and local variables, whereby the latter have no current nor lagged impact on the former. In the baseline specification considered in Section 5, we use three endogenous variables, namely government spending, real GDP, and net taxes $\mathbf{x^L}_{it} = \begin{pmatrix} G_{it} \\ Y_{it} \\ T_{it} \end{pmatrix}$ (see Subsection 4.1 for details) and the set of global variables $\mathbf{x^G}_t$ is empty. In one of the robustness analyses, the global regressor set is considered as 3 variables related to the United States economy (see Section 5.2.8) $\mathbf{x^G}_t = \begin{pmatrix} Y^*_{USA,t} \\ P^*_{USA,t} \\ R^*_{USA,t} \end{pmatrix}$

For $p = 0, ..., P$, the parameter matrices related to local variables are defined as follows:

$$\mathbf{A}_{pi} = \mathbf{A}_{p0} + \sum_{k=1}^{K} \mathbf{A}_{pk} \bar{z}_{ki}, \tag{2}$$

where $k = 1, ..., K$ is indexing interaction variables – these on which the parameter matrices depend – considered in this study as cross-sectional averages (cf. formula (28.31) as put forward by Pesaran (2015) on p. 710) and denoted $\bar{z}_{ki}$. In the baseline model $\bar{z}_{k1}$ is based on fiscal rule index (FRI) and $\bar{z}_{k2}$ is based on debt-to-GDP ratio (GDY).

To identify $\mathbf{A}_{0i}$, we pursue three alternative strategies. Firstly, as a baseline, we adopt the widespread approach to IPVAR analyses (see e.g. Dąbrowski et al., 2022) of a triangular (recursive) identification scheme:

$$\mathbf{A_{0i}} = \begin{pmatrix} 1 & 0 & 0 \\ a_{0i}^{21} & 1 & 0 \\ a_{0i}^{31} & a_{0i}^{32} & 1 \end{pmatrix}. \tag{3}$$

In this scheme government spending G is the most exogenous, policy variable. The second variable is output Y and because G is a part of Y, we allow for instantaneous impact of G on Y. The third variable is net taxes and because Y approximates tax base for T, we allow for instantaneous impact of Y on T. Second, following seminal paper of Blanchard and Perotti (2002), we consider:

$$\mathbf{A_{0i}} = \begin{pmatrix} 1 & 0 & 0 \\ a_{0i}^{21} & 1 & a_{0i}^{23} \\ 0 & a_{0i}^{32} & 1 \end{pmatrix}. \tag{4}$$

In this scheme we allow for immediate response of output to structural tax shocks. However, the estimates in the literature find this value close to zero (see the online appendix of Angelini et al. (2023)) or slightly negative Mertens and Ravn (2014). Third, we assume:

$$\mathbf{A_{0i}} = \begin{pmatrix} 1 & 0 & 0 \\ a_{0i}^{21} & 1 & a_{0i}^{23} \\ 0 & -1.85 & 1 \end{pmatrix}, \tag{5}$$

as in Caldara and Kamps (2008) or Capek and Cuaresma (2020).

Note that schemes (3) and (5) can be applied with estimation frameworks typical for equation-by-equation panel VAR in the structural form. This, however, does not apply to scheme (4) in which simultaneous interaction between variables 2 and 3 (in our baseline case: Y_{it} and T_{it}) is considered that violates the assumptions of consistent estimation. We therefore propose a procedure for consistent estimation of IPVAR under the identification scheme (4).

In related time-series SVAR analysis (cf. Hamilton (1994), subchapter 11.3), equation (1) reads

$$\mathbf{A}_0 \mathbf{x^L}_t = \boldsymbol{\mu^L} + \sum_{p=1}^{P} \mathbf{A}_p \mathbf{x^L}_{t-p} + \boldsymbol{\epsilon^L}_t \tag{6}$$

with $\boldsymbol{\epsilon^L}_{it}$ having expected value $\mathbf{0}$ and variance-covariance matrix $\mathbf{BB}'$. Schemes such as (3) impose additional assumptions on $\mathbf{B}$, conventionally as a diagonal matrix whose entries can be intuitively interpreted as a vector of standard deviations of the error term. Under such circumstances, the standard procedure consists of:

1. Consistent estimation of the parameters of reduced-form equation (6),
   $\mathbf{x^L}_t = \mathbf{A}_0^{-1}\boldsymbol{\mu^L} + \sum_{p=1}^{P} \mathbf{A}_0^{-1}\mathbf{A}_p \mathbf{x^L}_{t-p} + \mathbf{u^L}_t$, with $\mathbf{u^L}_t = \mathbf{A}_0^{-1}\boldsymbol{\epsilon^L}_t$.

2. Computation of the reduced form residuals $\hat{\mathbf{u}}_t^{\mathbf{L}}$ and their variance-covariance matrix $\hat{\mathbf{\Sigma}}_{\boldsymbol{u}}$.

3. Using the relationship between the structural and the reduced form errors to maximize the condensed log-likelihood function with respect to the unknown elements of $\mathbf{A}$ and $\mathbf{B}$:

$$\ln L_C(\mathbf{A}, \mathbf{B}) = -\frac{MT}{2} \ln(2\pi) + \frac{T}{2} \ln \left|\mathbf{B}^{-1}\mathbf{A}\right|^2 - \frac{T}{2} \operatorname{tr}\left(\mathbf{A}'\left(\mathbf{B}'\right)^{-1}\mathbf{B}^{-1}\mathbf{A}\hat{\mathbf{\Sigma}}^{\boldsymbol{u}}\right) \tag{7}$$

   where M denotes the number of VAR endogenous variables.

Our proposal consists in applying this approach in the IPVAR setup (1) to $\mathbf{A}_{0i}$ matrices on a country by country basis, while maintaining the basic assumptions of the original Towbin and Weber (2002) specification regarding heterogeneity, i.e. country-specific $\mathbf{A}_{0i}$ and panel-wide $\mathbf{B}$. In doing so, one assumes that the only source of observed heterogeneity of cross-section specific reduced-form residual matrices $\hat{\boldsymbol{\Sigma}}_{\boldsymbol{i}}^{\boldsymbol{u}}$ is heterogeneity in $\mathbf{A}_0$, as implied by:

$$\mathbf{u^L}_{it} = \mathbf{A}_{0i}^{-1}\boldsymbol{\epsilon^L}_{it}, \quad \boldsymbol{\epsilon^L}_{it} \sim \mathcal{N}(\mathbf{0}, \mathbf{B}). \tag{8}$$

Hence, the IPVAR estimation applies a similar procedure by estimating (1) in the reduced form, computing reduced-form residuals $\hat{\mathbf{u}}_{it}^{\mathbf{L}}$, computing their cross-section specific variance-covariance matrices $\hat{\boldsymbol{\Sigma}}_{\boldsymbol{i}}^{\boldsymbol{u}}$ and then estimating the unknown entries of $\mathbf{A_{0i}}$ and $\mathbf{B}$ by minimizing:

$$\ln L_C(\mathbf{A_{01}}, ..., \mathbf{A_{0N}}, \mathbf{B}) = \sum_{i=1}^{N}\sum_{t=1}^{T_i}\left(-\frac{MT_i}{2}\ln(2\pi) + \frac{T}{2}\ln\left|\mathbf{B}^{-1}\mathbf{A_{0i}}\right|^2 - \frac{T}{2}\operatorname{tr}\left(\mathbf{A_{0i}}'\left(\mathbf{B}'\right)^{-1}\mathbf{B}^{-1}\mathbf{A_{0i}}\hat{\boldsymbol{\Sigma}}_{\boldsymbol{i}}^{\boldsymbol{u}}\right)\right). \tag{9}$$

Notably, this procedure faces some constraints. First, just like in the case of the time series counterpart, it builds on the assumption of normality. Second, it does not allow $\mathbf{A}_{0i}$ to additionally depend on time, which would be necessary if eq. (2) was specified as $\mathbf{A_{pi}} = \mathbf{A_{p0}} + \sum_{\mathbf{k=1}}^{\mathbf{K}} \mathbf{A_{pk}z_{kit}}$, i.e. with a time-varying interaction variable. In such a case, the problem of estimating $\mathbf{A_{0i}}$ and $\mathbf{B}$ cannot be separated into reduced-form estimation and subsequent condensed likelihood maximization, but requires a comprehensive maximum likelihood procedure entailing a non-negligible numerical burden, especially when applied jointly with a bootstrap procedure to evaluate uncertainty of impulse response functions.

We build 90-percent confidence intervals around IRFs and their functions (fiscal multipliers) using nonparametric bootstrap procedure with 1000 draws.

The fiscal multiplier is defined as the euro response of GDP to an effective change in government spending or tax revenues of one euro (see for example Angelini et al. (2023), Blanchard and Perotti (2002), Caldara and Kamps (2017)). We denote IRF_{y_h} the response of log-output at horizon h to a (one-standard deviation) fiscal policy shock; and IRF_{p_0} the impact of the (one-standard deviation) fiscal policy shock to the corresponding fiscal variable, expressed in logs. We calculate two types of fiscal multipliers: dynamic and cumulative. The dynamic h periods ahead multiplier $\mathbf{M}_{Ph}$ is expressed as:

$$\mathbf{M}_{Ph} = \frac{IRF_{y_h}}{IRF_{p_0}}\frac{1}{\frac{\overline{P}}{\overline{Y}}}, \tag{10}$$

and the cummulative multiplier $\mathbf{M}_P$ after three years is expressed as:

$$\mathbf{M}_P = \frac{\sum_{h=0}^{h=12} IRF_{y_h}}{\sum_{h=0}^{h=12} IRF_{p_h}} \frac{1}{\frac{\overline{P}}{\overline{Y}}}, \tag{11}$$

where P is either government spending or government tax revenues, and $\frac{\overline{P}}{\overline{Y}}$ is the so-called scaling factor that converts elasticities to euros. $\overline{P}$ denotes the mean across our sample of fiscal spending or tax revenues (not in logs) and $\overline{Y}$ denotes the mean across our sample of the level of output (nominal GDP, not in logs).

4 Data

We use a quarterly sample of data for all EU-27 countries over 1999-2022. Ilzetzki et al. (2013) underline the importance of using quarterly and not annual data for SVAR fiscal models. They also point out that data should be not only collected but also reported at quarterly frequency, as is the case of the data that we use.

Our database contains up to 44 observations for each country and the panel data are strongly balanced (we observe only individual data missing at the beginning of the sample for single countries). The pooled data contains more than 2,500 observations.

4.1 Endogenous Variables

As endogenous variables in the baseline IPVAR model, we use the real GDP (Y) and two aggregate measures for expenditures (G) and net taxes (T) reflecting two possibilities for conducting the fiscal policy, based on the Eurostat data[4]. All data is in constant prices and deflated with the appropriate available deflator. The quarterly data show strong seasonal patterns and due to that, we use seasonally adjusted series directly from Eurostat if available or use the TRAMO-SEATS method (Maravall et al., 2015) otherwise. Data on endogenous variables is from Eurostat and is consistent with the ESA 2010 approach (European Union, 2013). Government expenditures are defined as a sum of government consumption and government investment, while net taxes are a

[4] A more detailed description of data sources (including ESA 2010 codes) is available in the Appendix A.

sum of taxes on production and imports, taxes on income and wealth, capital taxes and net social contributions less subsidies and social benefits and social transfers in kind (purchased market production by government). Our approach allows us to include most transactions between the public sector and households and corporate sectors of the economies.

In the next steps, the variables are divided by the size of the population in each country to obtain the variables in per capita terms. Then they are logarithmized and detrended using Hamilton filter (Hamilton, 2018). Alternatively, we tested using first differences, Hodrick-Prescott filter and quadratic trend (see Section 5.2).

In our baseline and most sensitivity analysis, we incorporate a limited set of dummy variables. For all countries in 2020 Q2, we take into account the beginning of lockdowns related to the COVID-19 pandemic and the largest public expenditures associated with the pandemic. For Ireland, we introduce a dummy variable from 2015 to account for a structural change in national accounts calculation. This change reflects the revised treatment of R&D expenditures in GDP estimation, under which profits from the licensing of intellectual property by multinational companies have been classified as investment (Khder et al., 2020). Additionally, we include three country-specific, one-quarter dummy variables to account for exceptional outliers in public investments affecting government expenditures. These include positive outliers in 2003 Q1 for Czechia and in 2018 Q3 for Cyprus. A negative outlier in public investment is observed for Italy in 2002 Q4, resulting from difficult economic conditions and strong fiscal consolidation.

4.2 Interaction Terms

As interaction terms in the baseline specification we use the means of two variables: the Fiscal Rules Index (FRI) and the general government gross debt in relation to GDP (GDY).

The first interaction term, particularly interesting for the conclusions from the article, is the index taken from the *Fiscal Rules Database* (European Commission, 2024). It approximates the strength and restrictiveness of fiscal rules in each Member State. This index is calculated for each national numerical fiscal rule covering all general government sub-sectors and then standardized to one value for each country each year since 1990. The index for each fiscal rule takes into account and evaluates the following features: (1) the strength of the legal basis, (2) the precision of the objectives and binding character, (3) institutions monitoring the compliance with the rules, (4) the existence of appropriate corrective mechanisms and exit clauses, and (5) the resilience of the rules to shocks outside the control of the government. Next, indices available for each fiscal rule in each period of time are aggregated to a single comprehensive score per country per year. Finally, the national indices are normalized in such a way that their average in the entire sample is 0 and the standard deviation is 1. The methodology for creating the index evaluating fiscal rules was based on the work of Deroose et al. (2006), and the evaluation is performed annually by the DG EFCIN in cooperation with national experts. The data depicting the evolution of the FRI in all EU-27 countries are presented in Figure 1. The presented maps show that over the past two decades, all European Union countries have improved or implemented fiscal rules, although the scale and pace of this process have varied from country to country.

The second interaction term is the level of general government gross debt in relation to GDP, the dominant control variable in the existing literature, taken directly in a transformed form from Eurostat. General government gross debt, also known as Maastricht debt, is the nominal value of total gross debt outstanding at the end of the quarter and consolidated between and within the government subsectors. It is the most universal and comparable measure of public debt between Member States, to which most fiscal rules refer.

In the robustness analyses we also use a third interaction variable: trade openness measured as exports plus imports relative to GDP.

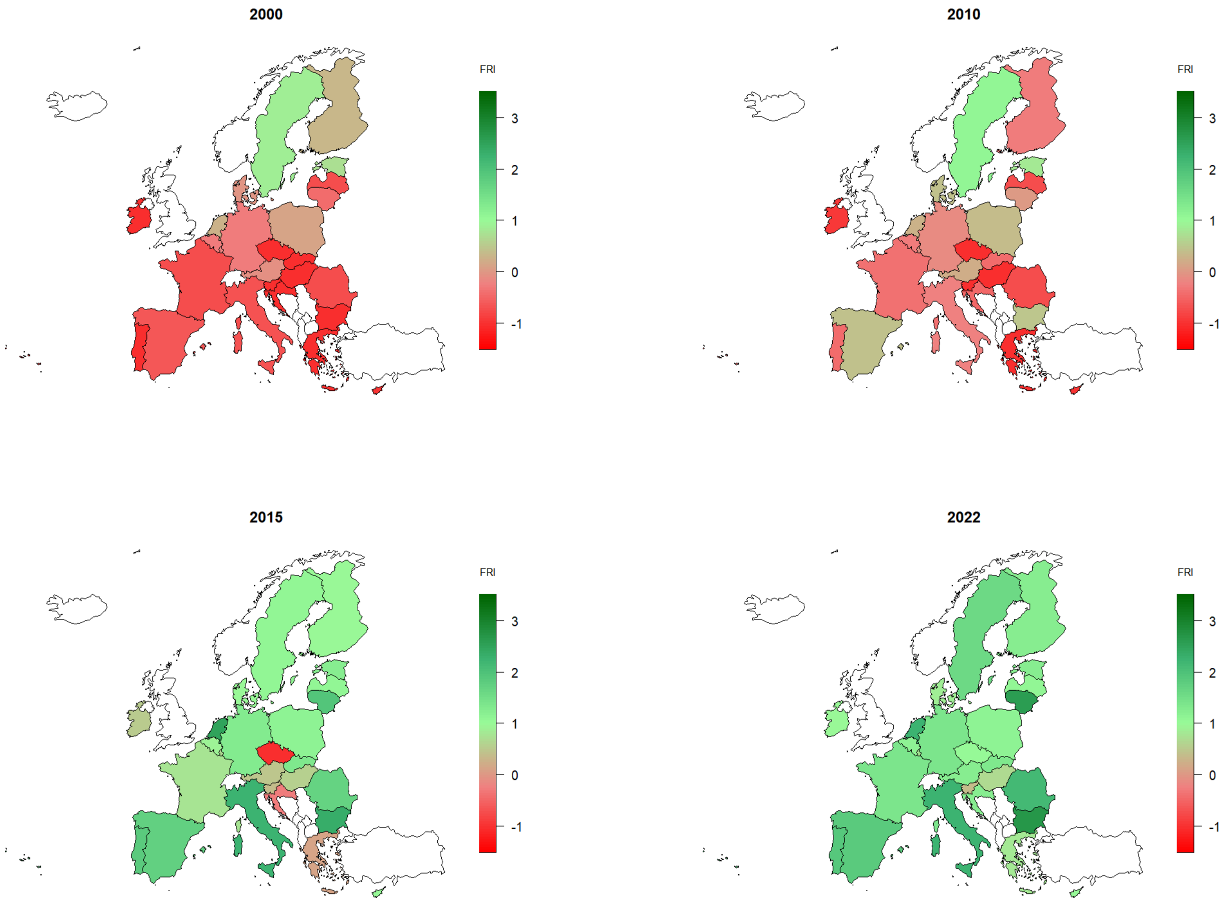
5 Results

5.1 Baseline Analysis

5.1.1 Shape and Heterogeneity in Impulse Response Functions

Our baseline results were obtained in an IPVAR model with 3 local variables ($\mathbf{x^L}_{it} = [G_{it}, Y_{it}, T_{it}]'$), no global variables, full sample of quarterly data with $P = 4$ lags and two interaction variables: FRI and the debt-to-GDP ratio. We use a widespread triangular identification strategy for con-

Figure 1: Fiscal Rules Index evolution (2000-2022) in the EU-27 countries.



temporaneous relationships $\mathbf{A}_{0i}$, with the ordering as above, i.e. with G_{it} in the front as the "most" exogenous, Y_{it} in the middle as encompassing the same period as G_{it} by definition, and T_{it} at the end to follow Y_{it} as a proxy for the tax base. All these specification choices are tested for robustness in Subsection 5.2.

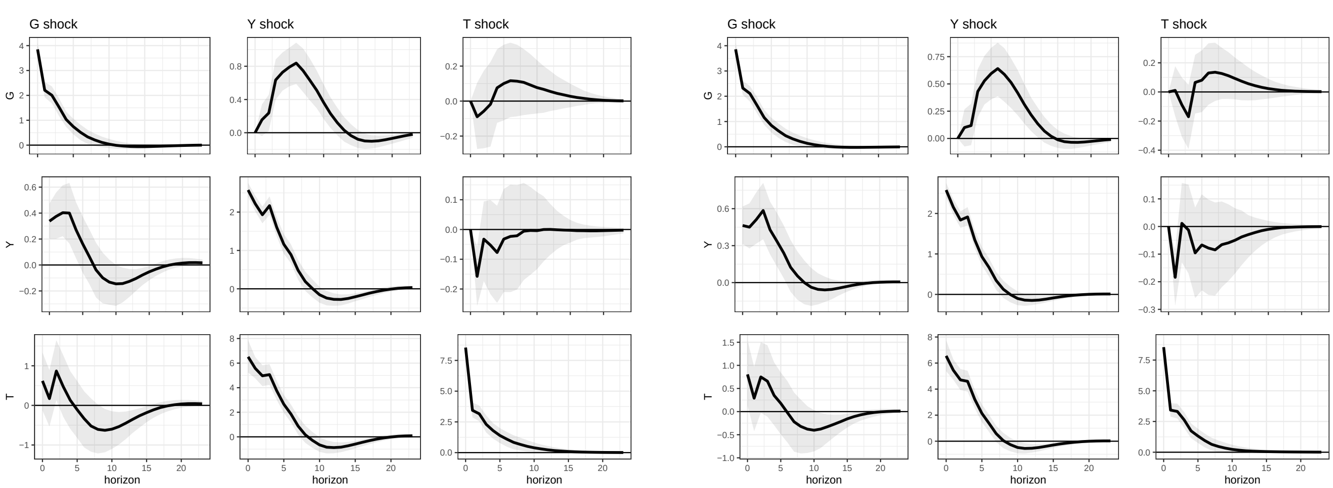
Under the observable heterogeneity scheme specified in IPVAR, the impulse-response functions (IRF) depend on the values of interaction variables as additional arguments. One can substitute the mean values of both FRI and the debt-to-GDP ratio to derive individual IRFs for all countries. Figure 2 contains the results for two big EU economies, representing the New and the Old Member States: Poland (PL) and Germany (DE) respectively. One can conclude that these differ slightly in quantitative, but not qualitative terms. The element of special interest in both panels is column 1 (G shock) and row 2 (Y response), as this IRF leads to the derivation of the numerator in the fiscal multipliers formulae (see Equation 10). The response is hump-shaped with a peak after 2-3 quarters, significantly positive (and below unity), and dies out after a similar time of approximately 10 quarters. The difference in dynamic multipliers is moderate, with the response at peak clearly above 0.5 in DE and slightly below in PL, and the shape remaining unchanged (see Figure 2).

Table 2 presents the values of spending multipliers on impact, after one, two, and three years for all European Union countries derived from our baseline IPVAR model. These results confirm the heterogeneity in output responses to government spending shocks in the EU. The values of the obtained spending multipliers lie within the range of multipliers found in the literature, see, for example, Table 2 in Huidrom et al. (2020). Huidrom et al. (2020) arrive at multipliers between 0.0 and 0.9. Nickel and Tudyka (2014) obtain multipliers between 0.0 and 1.2 for EU countries. Amendola et al. (2020) calculate cumulative spending multiplier for the euro area equal to 1.24. Whereas Beetsma et al. (2008) show that 1% GDP public spending impulse produces a 1.2% output rise on impact and a 1.6% peak response of output in 14 EU countries.

The highest multiplier values after one year were obtained for Italy (1.09), Greece (0.90), and Portugal (0.77). For a large group of thirteen countries, the spending multipliers are statistically insignificant after one year. The lowest statistically significant spending multiplier after one year was obtained for Finland (0.33).

Figure 2: IPVAR-based impulse-response functions for selected countries

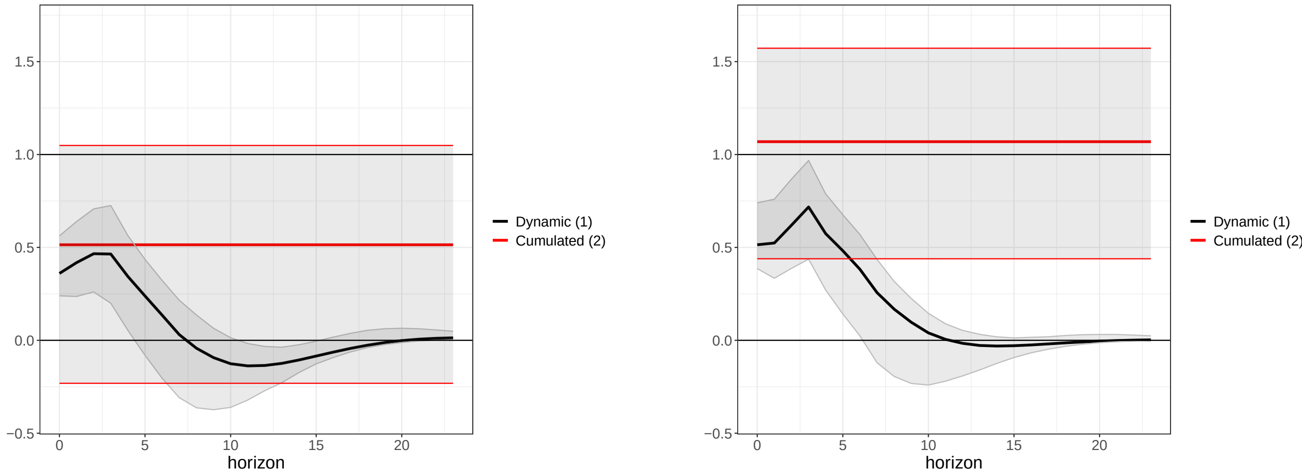
(a) Poland (b) Germany



Source: own elaboration.

Figure 3: Fiscal multipliers (based on GDP response to expenditure)

(a) Poland   (b) Germany



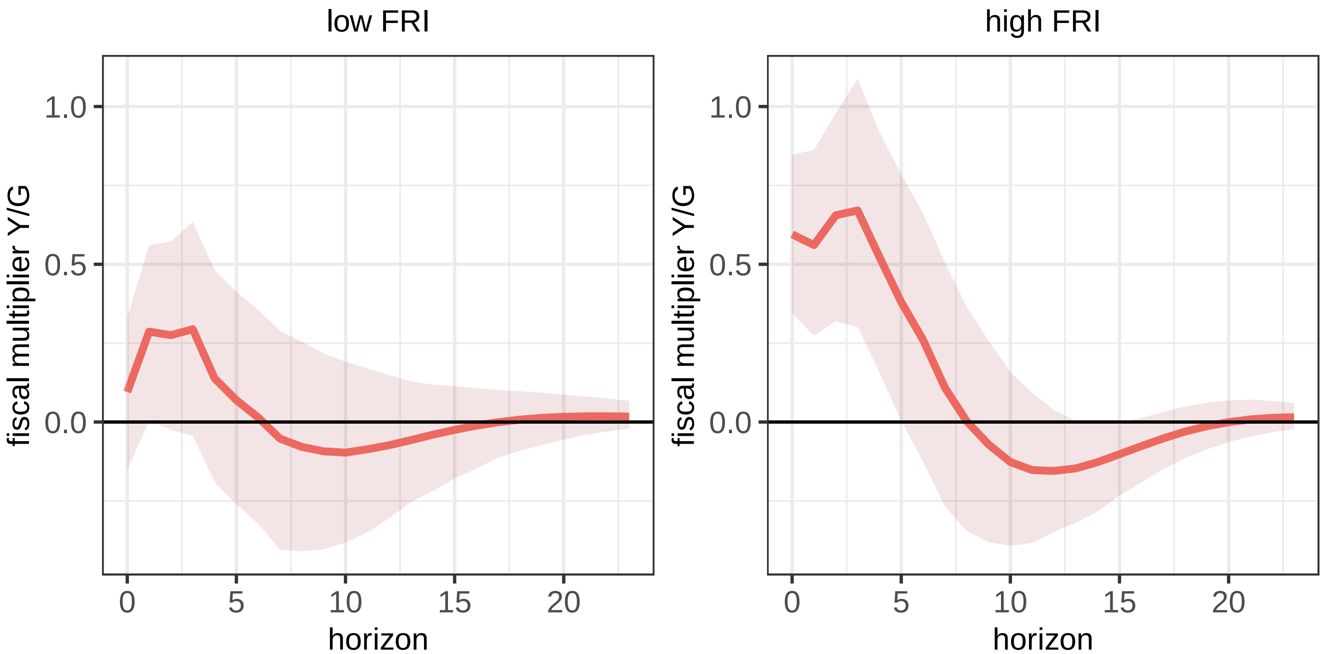
Source: own elaboration.

5.1.2 Baseline Analysis - Fiscal Rule Index

The central question is which factors drive such differences and what is the degree of such heterogeneity in the entire sample. To understand this, we first look at hypothetical IRFs for the mean value of FRI (both across time and panel units) prevailing among the two worst- and the two best-performers in terms of FRI included in the sample, that is for FRI$= -0.54$ (Czechia and Slovenia) and FRI$= 1.07$ (Netherlands and Sweden), respectively. Figure 4 confirms that differences between countries can also become qualitative. For the lowest observable FRI values, the response of Y to G is mostly insignificant. The opposite is the case when the quality of the fiscal framework, as measured by FRI, is high within the observable range. The response of Y is significant over the first 5 quarters, and higher in terms of the point values.

The Fiscal Rules Index assesses the fiscal framework of European Union countries in a comprehensive manner. A higher index indicates that a country's fiscal rules have a strong legal basis, are sufficiently flexible to ensure countercyclical properties, and that the budget process is supervised by strong monitoring bodies (fiscal councils). This should lead to a situation where spending policies are appropriately thought out and focused on the most necessary expenditures (characterized by higher fiscal multipliers).

Figure 4: Fiscal expenditure multiplier in low-FRI and high-FRI countries (and mean debt/GDP)



Source: own elaboration.

5.1.3 Baseline Analysis - Debt-to-GDP Ratio

The second interaction variable – the debt-to-GDP ratio – also significantly contributes to heterogeneity in IRF trajectories. Figure 5 compares the responses of GDP to an expenditure shock in the hypothetical scenario when the debt amounts to 12.2% GDP, which is the time- and cross-sectional average of the two least indebted GG sectors in the panel (Estonia, EE, and Luxembourg, LU), and to 134.8% (Greece, EL, and Italy, IT). The interpretation of the difference, however, is not straightforward: G shocks induce positive responses in GDP (and hence lead to higher fiscal multipliers) in more indebted economies, on average. This result, highly robust against a battery of sensitivity checks discussed below, runs against some of the extant literature contributions (Corsetti et al. (2012), Ilzetzki et al. (2013), and Huidrom et al. (2020)) who find that a higher debt to GDP ratio leads to lower spending multipliers. However, their samples end earlier (in 2014 or 2017, respectively) and they include a different group of countries (OECD countries). Our result, in turn, is in accordance with a study for the euro area, see Boitani et al. (2022).

More insights into this are delivered by Fig. 6 and Fig. 7 (in Appendix B). The obtained heterogeneous IRFs are intuitively consistent with the generally positive relationship between the debt to GDP ratio on the one hand and the correlation between G and Y on the other. The relationship becomes even stronger when lags of G are used to compute the correlation coefficient. The slope, however, is noticeably affected by two low-debt countries (EE, LU) on the one hand and two high-debt ones on the other (EL, IT). Looking at the transformed time series of G and Y for these countries separately, one can notice that their sample variance is dominated by the stress episodes of 2008-2012 (financial and subsequent euro area debt crisis), as well as the pandemic crisis post-2020. In the case of EL, which largely extends to European high-debtors, negative shocks to G occurred and were followed by sharp declines in Y triggered by fiscal austerity measures. This piece of evidence is dominant in identifying positive fiscal multipliers. In the case of EE, on the other hand, it is a dip in Y followed by, rather than preceded by, a dip in G, and this pattern - again - extends to a group of low- and mid-debtors in the EU. In these countries, the VAR model identifies most of G volatility as responses rather than shocks, and consequently finds limited evidence supporting positive fiscal multipliers in action.

Alternatively, though perhaps less likely, the result could be explained by the following mechanism, that could be named the fear of future inflation. In highly indebted economies, higher government spending can increase concerns about future high inflation. Thus, this could cause private agents to spend more and this in turn could result in higher spending multipliers.

Boitani et al. (2022) arrive at the same result for the euro area countries. They obtain significantly higher multipliers for high debt versus low debt economies. Their interpretation of this result is that it is caused by a well known rule that spending multipliers tend to be higher in recessions than in expansions, whereas in the sample period under analysis, countries entering the high-debt scenario are also those that were experiencing periods of recession.

Figure 5: Fiscal expenditure multiplier in low-debt and high-debt countries (and mean FRI)

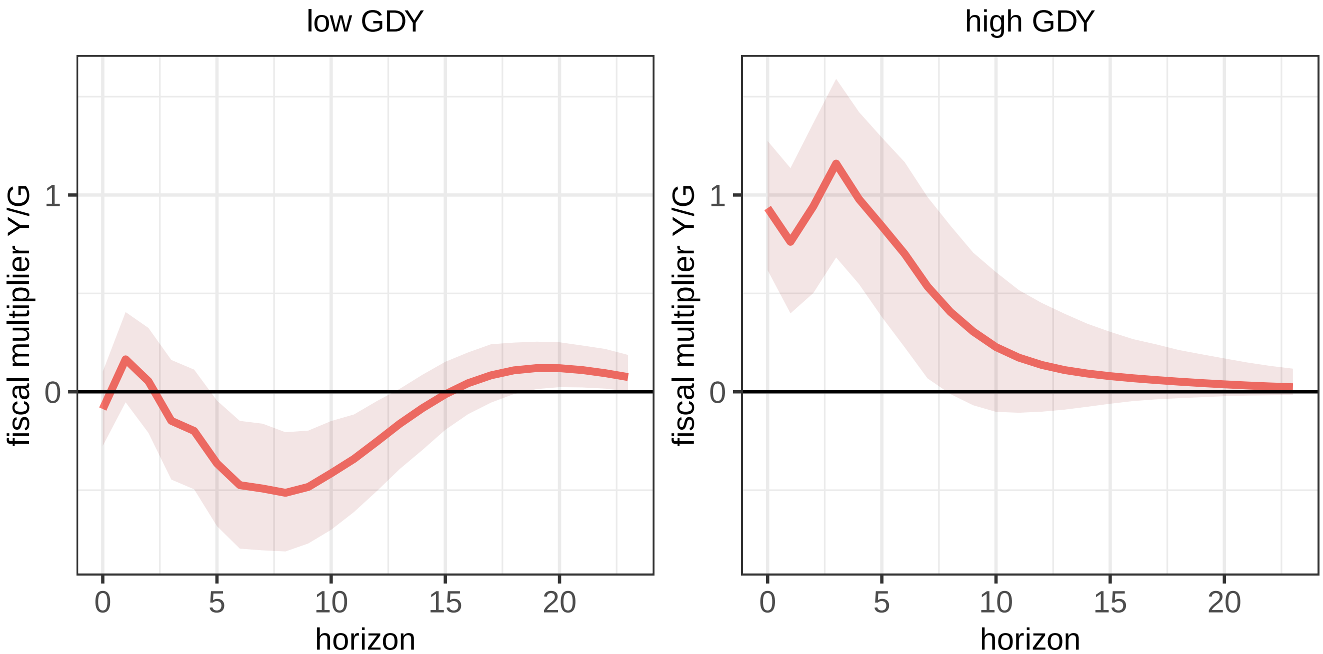
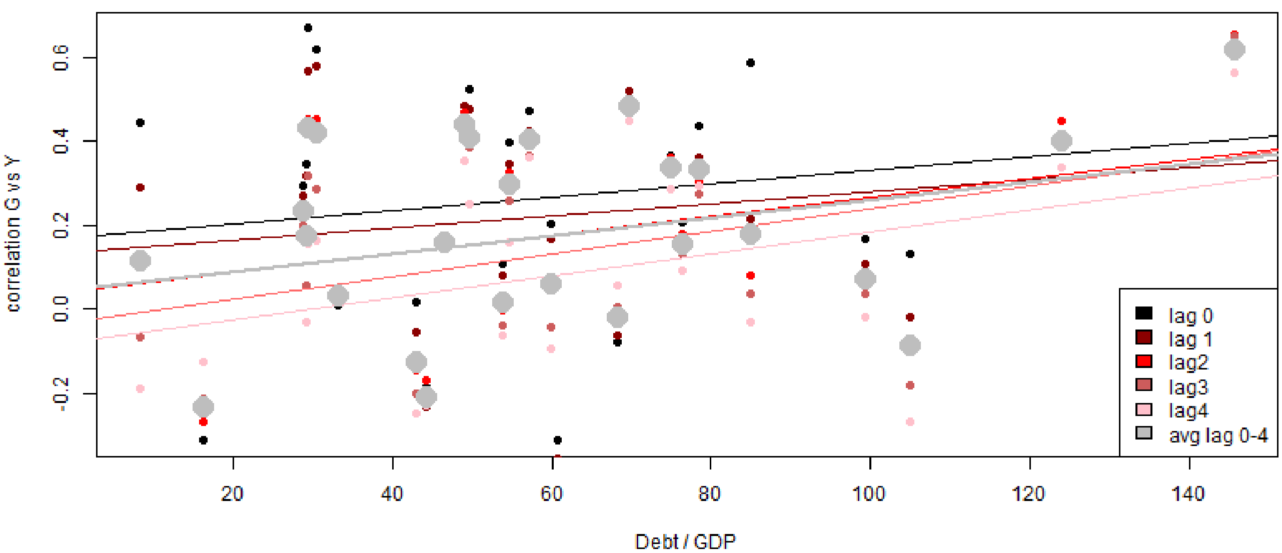


Figure 6: Dynamic correlations G (current or lagged) vs Y (current) against GG debt.



5.2 Sensitivity analysis

5.2.1 Identification Scheme

Using alternative identification schemes (4) and (5) does not affect our main conclusions about the response of Y to the G shock. There are only minor differences as compared to the baseline, recursive identification. Using the Maximum Likelihood approach in the form proposed in Section 3 also leaves them unaffected.

5.2.2 Specification of Trends in the Data

The fiscal VAR literature offers little guidance on how to handle trends in the data (Caldara and Kamps, 2017). We test whether the results change if we set different trend assumptions. Therefore, instead of the Hamilton trend we test three different specifications, namely first differences, the Hodrick-Prescott filter, and quadratic trends.

The direction of asymmetries is confirmed by all three specifications. The result for the debt to GDP ratio is robust and statistically significant across all the models. The result for FRI is more fragile. If we use first differences (with cumulated IRFs) or the Hodrick-Prescott filter, the asymmetry for FRI is only statistically significant on impact. In these cases spending multipliers are positive and significant for both high and low FRI economies. However, if we apply quadratic trends we confirm all the results for the baseline model, including the asymmetry for FRI.

5.2.3 Openness as interaction variable

The number of papers looks at the role of openness in spending multipliers (Cloyne et al., 2023). Beetsma et al. (2008) and Ilzetzki et al. (2013) find higher spending multipliers in more closed than open economies. The results of our model confirm these results (see Fig. 12 in Appendix B). We replace FRI or debt to GDP ratio with trade openness, which is measured as exports plus imports relative to GDP. In both cases we observe that the spending multiplier is positive in less open economies, whereas it may be negative in more open economies. This is consistent with the hypothesis that in less open economies, less of the fiscal stimulus leaks abroad.

5.2.4 Government Consumption and Government Investment Data

Some papers show that government investment and government consumption multipliers are statistically significantly different from each other (Boehm, 2020; Haug and Sznajderska, 2024). We check how the results change if we replace government total spending by government consumption or government investment. A similar experiment is performed by Amendola et al. (2020).

The results for both government consumption and government investment confirm the asymmetries found in the baseline model, meaning higher spending multipliers for economies with higher FRI and also for economies with higher debt-to-GDP ratio. The only difference is that for low debt-to-GDP economies we found the government consumption spending multiplier to be not statistically significantly different from zero (and not negative as in the baseline).

5.2.5 VAR Lag Length

In our baseline specification we set $P = 4$ as it is common in fiscal VAR literature, taking into account the quarterly frequency of the dataset and the approximately annual time horizon of fiscal planning. However, the information criteria (Akaike, AIC, and Schwarz, BIC) suggest a lower L of 2 or 1, respectively. Such alternative lag length selections do not change the qualitative conclusions from the baseline analysis (see Figure 10 in Appendix B).

Lag	AIC	BIC
1	9.252391	**10.05843**
2	**9.204227**	10.18543
3	9.243425	10.40355
4	9.228717	10.57168

Table 1: AIC and BIC Values by Lag

5.2.6 Pre-Covid Sample

In our baseline specification, we use quarterly data from 1999 until 2022. For the next sensitivity analysis, we shorten our sample to 2019 Q4 to eliminate the impact of the COVID-19 pandemic on our estimates. In contrast to the baseline results, in this case there is no significant difference between the responses of Y to G shock for countries with high and low FRI (see Figure 13 in Appendix B).

We conclude that the quality of the fiscal framework began to play a more important role during the pandemic crisis and low-FRI countries conducted their expenditure policies less effectively in this period. At the same time high-FRI countries were better prepared for the shock and managed to stabilize output more effectively, which is reflected in higher spending multipliers in the whole sample.

5.2.7 Different Interaction Variables Concerning Fiscal Rules

As the main representation of fiscal rules in the baseline we use Fiscal Rules Index from the European Commission database. Here we replace the FRI with dummy variables representing the existence of the main types of fiscal rules (budget balance, debt, and expenditure). In the extended database we include only the most binding fiscal rules in each country, which meet the following criteria: first, they are enshrined in the constitutions of countries, national laws, coalition agreements or agreements between political parties (the ruling party with the opposition); second, they apply at the general government or at least at the central budget level; third, they cover a minimum of 30% of the general government sector.

Analyzing the results (see Figures 14, 15, 16 in Appendix B), we can observe that the responses of Y to G shock in countries (periods) with and without specific types of rules are similar. In all cases the shape of the fiscal multiplier is more or less standard, only in the case of introducing expenditure rules (ER) the response slightly larger than in countries and periods where there are no that type of rules.

Comparing results from this analysis with our baseline results, the conclusion is that only the presence of a specific type of fiscal rule does not play as important a role as the whole fiscal framework quality captured by the FRI. The index, which we use in the main results, includes not only the existence of different types of rules, but also their main features, effectiveness, interactions between rules in each country, legal base, and monitoring bodies.

5.2.8 Global Variables

Following Amendola et al. (2020) we include in our model three global variables, namely U.S. output gap, U.S. inflation and the U.S. shadow monetary policy rate.[5] In the model with global variables the values of government spending fiscal multipliers in economies with higher FRI are

[5] Real GDP from FRED, Consumer Price Index for All Urban Consumers from FRED, Krippner shadow rate.

still higher than in the economies with lower FRI, as it was in the baseline model. The difference is that the response of Y to G is statistically significant for low FRI countries after 2 and 3 quarters.

The model with global variables confirms the results from the baseline model for the second interaction variable, the debt-to-GDP ratio. Positive spending shocks induce a positive response in GDP only in more indebted economies. In the case of less indebted countries, such as Estonia, we obtain a counterintuitive result (i.e. an increase in output after a negative spending shock). We believe that this is due to the influence of stress episodes of 2008-2012 and 2020, where in the former case decreases in spending were followed by increases in output and in the latter case increases in spending were followed by decreases in output (see Figure 7 in Appendix B).

5.2.9 Tax Multipliers

Additionally, we calculated the values of tax multipliers for our baseline model. We note that for all countries, the tax multipliers are not statistically significantly different from zero after one year.[6] The tax multipliers are statistically significant after two years for the following countries: Cyprus, Czechia, Croatia, Hungary, Malta, and Slovenia. Their values are low and lie in the range between -0.20 for Cyprus and -0.38 for Czechia. Thus, the structural tax shocks seem to have a limited impact on output. This is in accordance with the results of Ianc and Turcu (2020), who find mixed results for tax multipliers for European Union countries, specifically, both increases and decreases in terms of GDP are found after a positive tax shock.

Our results show that positive tax shocks lead to weaker cumulated decreases in output in economies with high FRI. The negative reaction of output to a positive tax shock is only initially stronger in countries with high FRI, where one may observe a sharp decrease in output after the first quarter (see Fig. 11). The reaction is then stronger and also slower in countries with low FRI with a maximum decrease in output after 9 quarters.

[6] These results are available from the Authors on request.

6 Conclusions

Our paper contributes to the ongoing debate about the role of fiscal rules in macroeconomic governance. Fiscal rules may be associated with improved budget balances, lower debt and lower public spending volatility. They aim to discipline politicians' spending, create confidence for economic agents as well as build up buffers for economic shocks.

According to the best of our knowledge, this is the first study that tries to find a link between the level of the fiscal rule index and the value of fiscal multipliers, which are a simple and popular way to evaluate the effectiveness of fiscal policy in stabilizing output.

We apply the interacted panel VAR model estimated on quarterly data for 27 European Union countries between 1999 and 2022. We allow for three different identification schemes. One novelty of our study lies in using the maximum likelihood method for a non-recursive identification scheme, which is based on Blanchard and Perotti (2002).

We observe large heterogeneity in the response of output to fiscal shocks in EU countries. The central question of our analysis is which factors drive such differences. Our results show that higher levels of the fiscal rule index may be associated with more effective fiscal policy, and higher fiscal multipliers. A higher fiscal rule index indicates that a country's fiscal rules have a strong legal basis, are sufficiently flexible to ensure countercyclical properties, and that the budget process is supervised by strong monitoring bodies. Hence, this should lead to a situation where spending policies are appropriately thought out and focused on the most necessary expenditures (characterized by higher fiscal multipliers). Our study shows that this was particularly visible during the recent Covid-19 pandemic, when countries with high FRI were characterized by higher values of spending multipliers.

Also our results show that in countries with a higher debt-to-GDP level the level of spending multipliers is higher, which can be justified by two stress periods (recession periods) in our sample. At first glance, this result may be surprising, but it is confirmed by another study on European countries, see Boitani et al. (2022). Additionally the level of spending multipliers is higher for less open economies, which confirms the conclusions often found in the literature.

We perform a number of different robustness checks. The results remain essentially the same when we use different identification schemes, include global variables, look separately at government consumption and government investment, and use a different number of lags. Interestingly, when we look at different types of fiscal rules (budget balance, debt, and expenditure rule) we do not find any asymmetries depending on a particular fiscal rule index. This shows that only implementing all three types of fiscal rules allows us to enhance the stabilizing role of fiscal policy.

Lastly, we calculate both spending and tax multipliers for all countries included in the sample. The spending multipliers are between 1.25 for Italy and are not statistically significant for a group of thirteen countries after one year. After one year the tax multipliers are statistically insignificant, but after two years they are significant, low and negative for a group of six countries. Moreover, positive tax shocks seem to lead to weaker cumulated decreases in output in economies with high FRI.

To sum up, fiscal rules seem to be positively related to the effectiveness of fiscal policy in European Union countries. They seem to contribute to larger GDP gains after a positive government spending shock and less GDP losses after a positive tax shock. The impact of fiscal rules is surrounded by a high level of uncertainty because of other factors that affect the effectiveness of fiscal policy, such as the level of debt or the level of trade openness, that need to be controlled for.

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A Data sources and transformation

Variable	Components	Data source	Seasonal adjustment	Deflator
GDP (Y)		Eurostat (B1GQ)	Eurostat	GDP deflator
Government expenditure (G)	(+) Government consumption	Eurostat (P3_S13)	Eurostat	Public consumption deflator
	(+) Government investment (gross fixed capital formation)	Eurostat (P51G)	Eurostat / Own (for Italy)	Total investment deflator
Net taxes (T)	(+) Taxes on production and imports	Eurostat (D2REC)	Own (on an aggregate level)	GDP deflator
	(+) Taxes on income, wealth	Eurostat (D5REC)		
	(+) Capital taxes	Eurostat (D91REC)		
	(+) Net social contributions	Eurostat (D61REC)		
	(-) Subsidies	Eurostat (D3PAY)		
	(-) Social benefits and social transfers in kind (purchased market production)	Eurostat (D62_D631PAY)		
Fiscal Rules Index (FRI)		Fiscal Rules Database (European Commission)	N/A	N/A
Government debt (% of GDP) (GDY)		Eurostat (GD_S13)	N/A	N/A
Openness (% of GDP) (OPY)		Eurostat ((P6+P7)/B1GQ)	Eurostat / Own (for Malta)	Export/ Import deflators
Population (POP)		Eurostat (annual data, linear interpolation)	N/A	N/A

B Additional results

Figure 7: Data on G (GG gov. expenditure) and Y (GDP) in Greece (EL) and Estonia (EE), after transformations (Hamilton-filtered)

(a) EL (b) EE

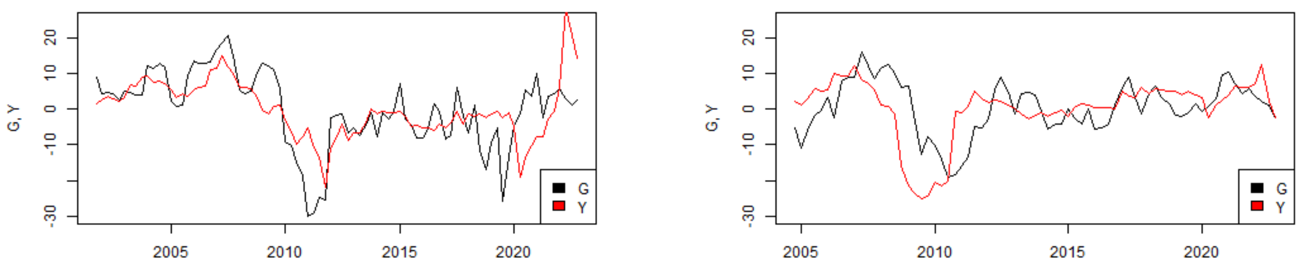

Figure 8: Fiscal expenditure multiplier in low-FRI and high-FRI countries: identification scheme, eq. (4) (ML estimation)

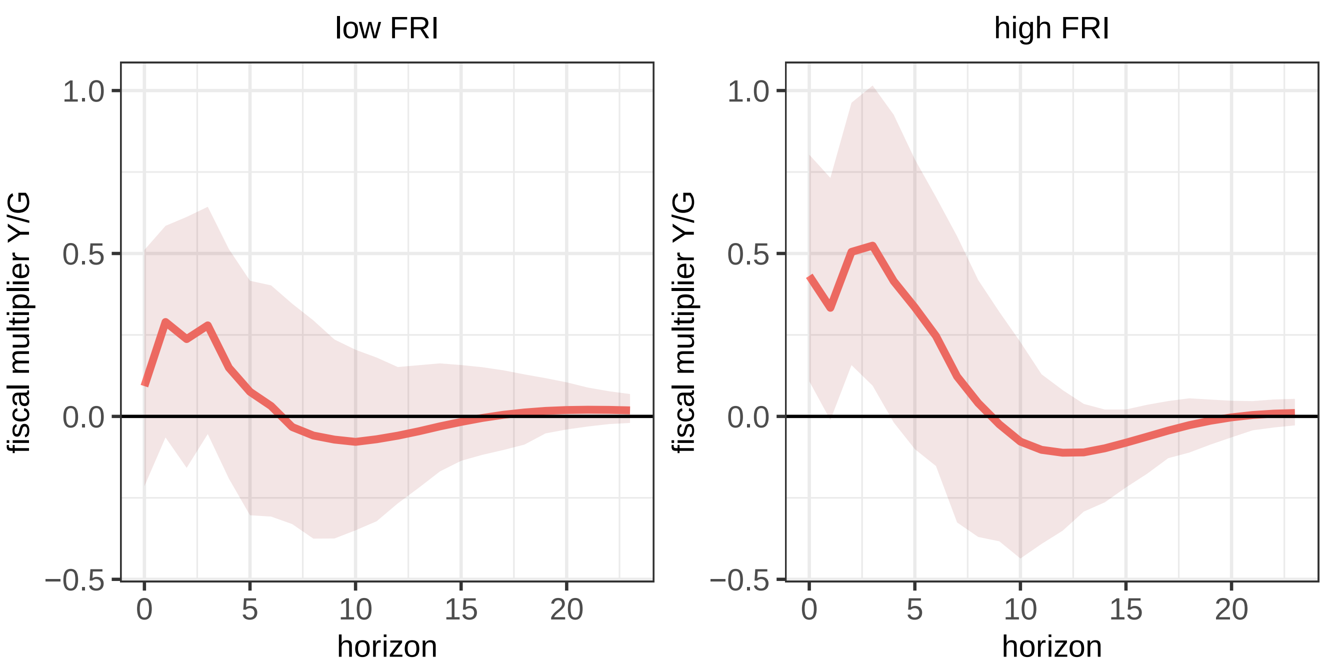

Figure 9: Fiscal expenditure multiplier in low-FRI and high-FRI countries: identification scheme (5)

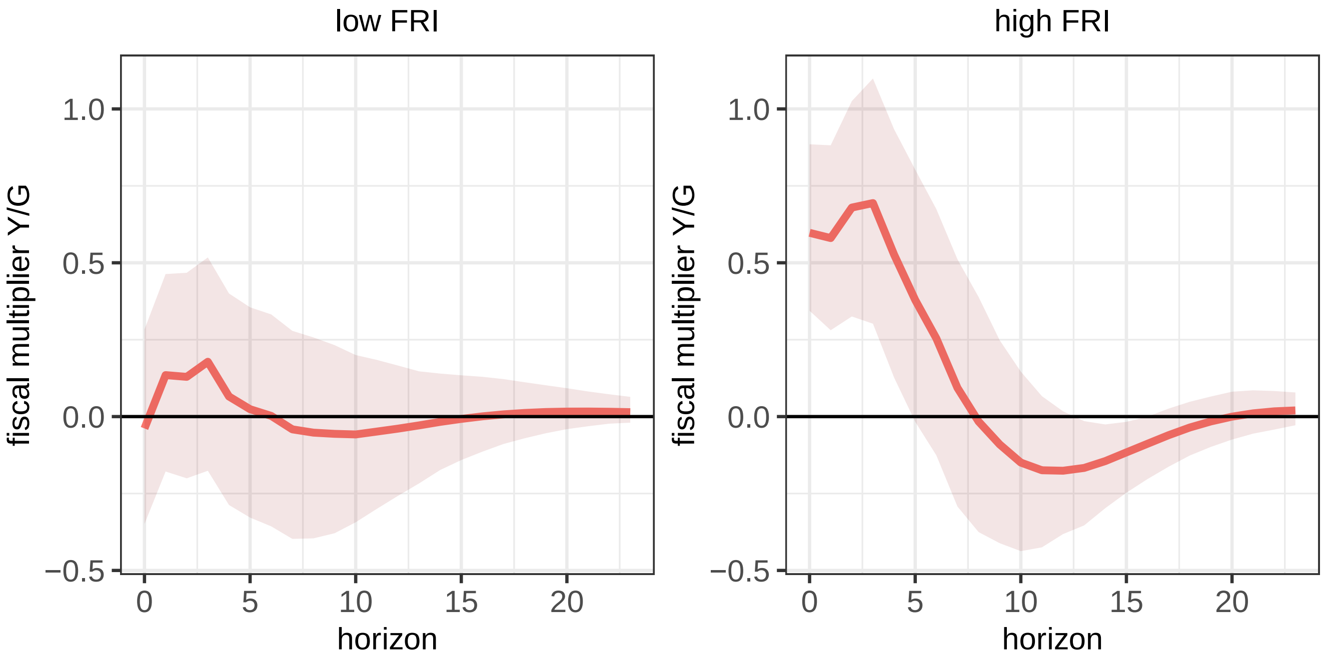

Figure 10: Fiscal expenditure multiplier in low-FRI and high-FRI countries: VAR with 2 lags

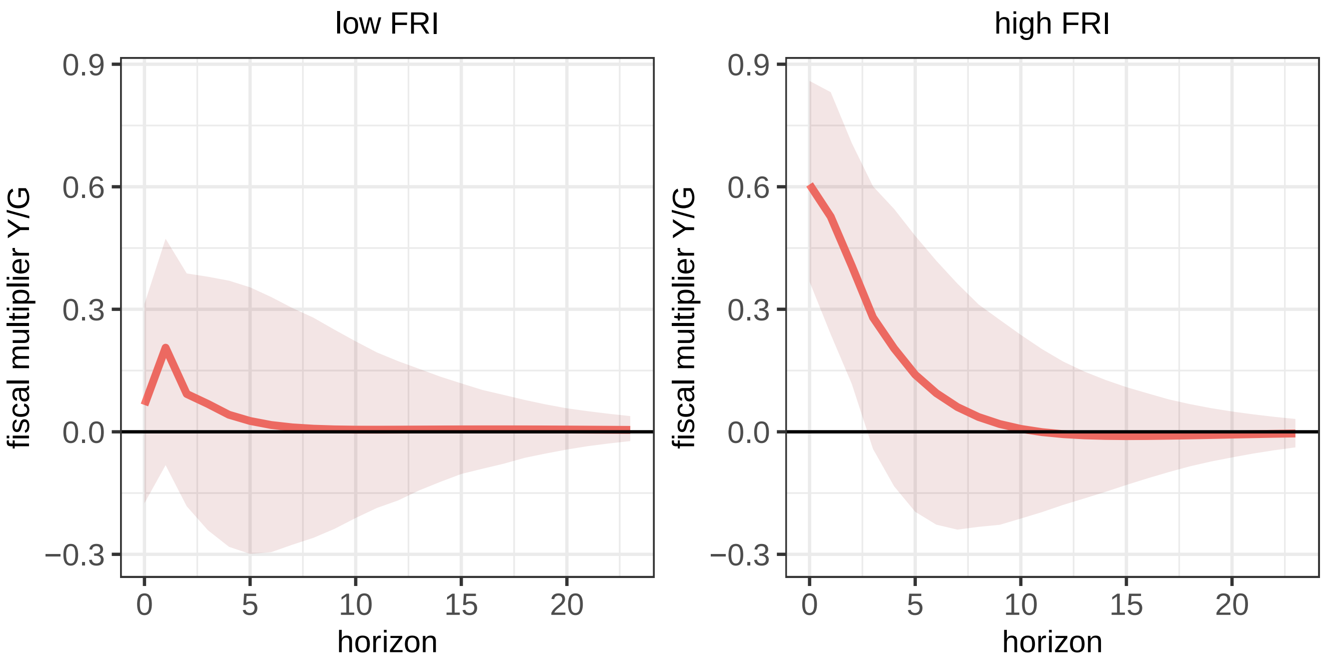

Figure 11: Fiscal tax multiplier in low-FRI and high-FRI countries

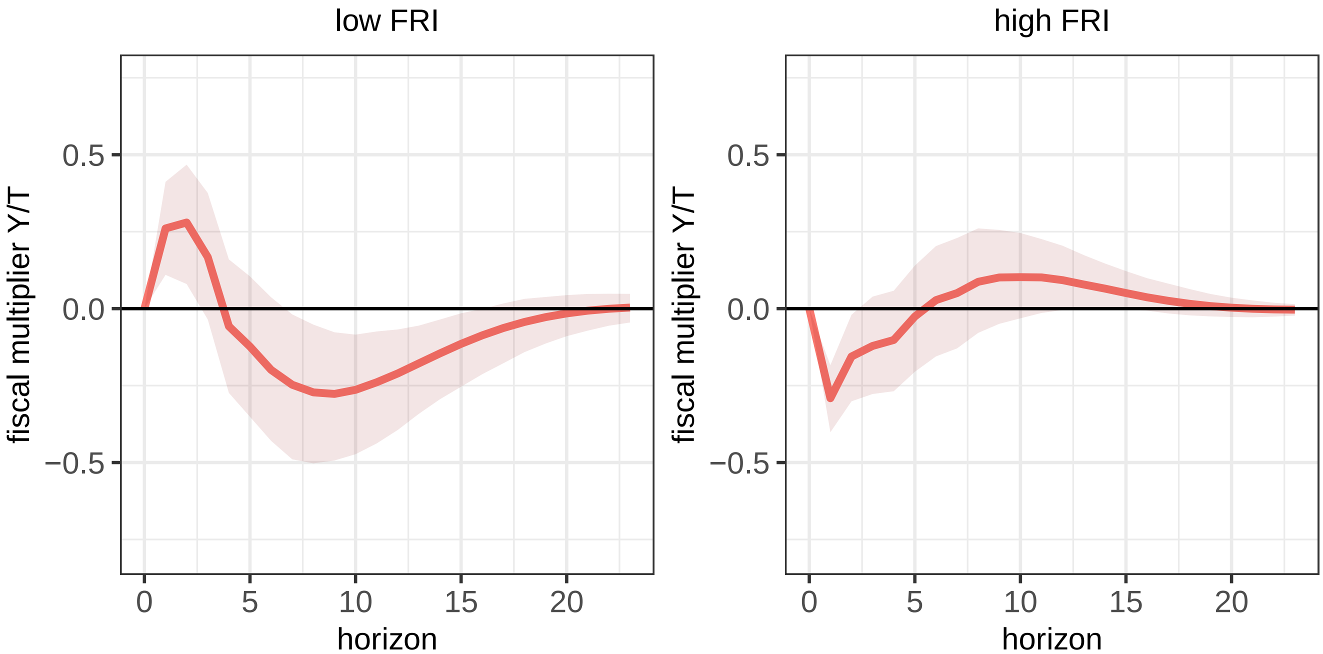

Figure 12: Spending multiplier in less and more open economies

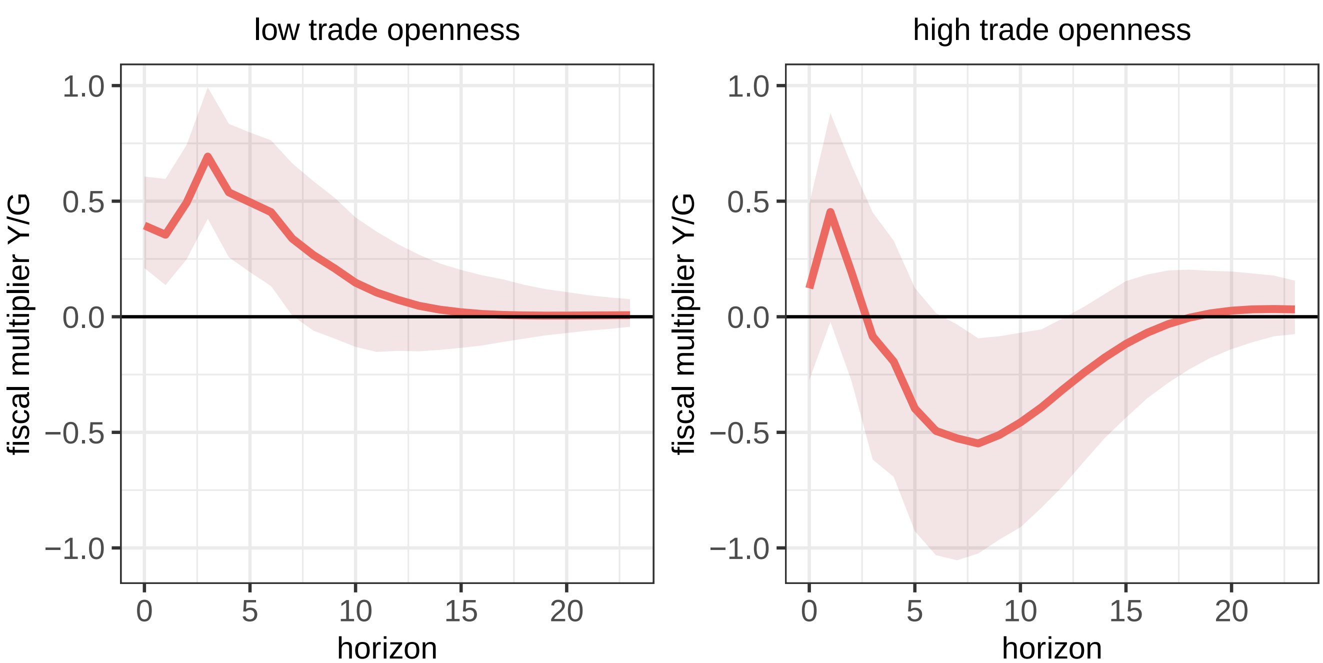

Figure 13: Fiscal expenditure multiplier in low-FRI and high-FRI countries: sample until 2019

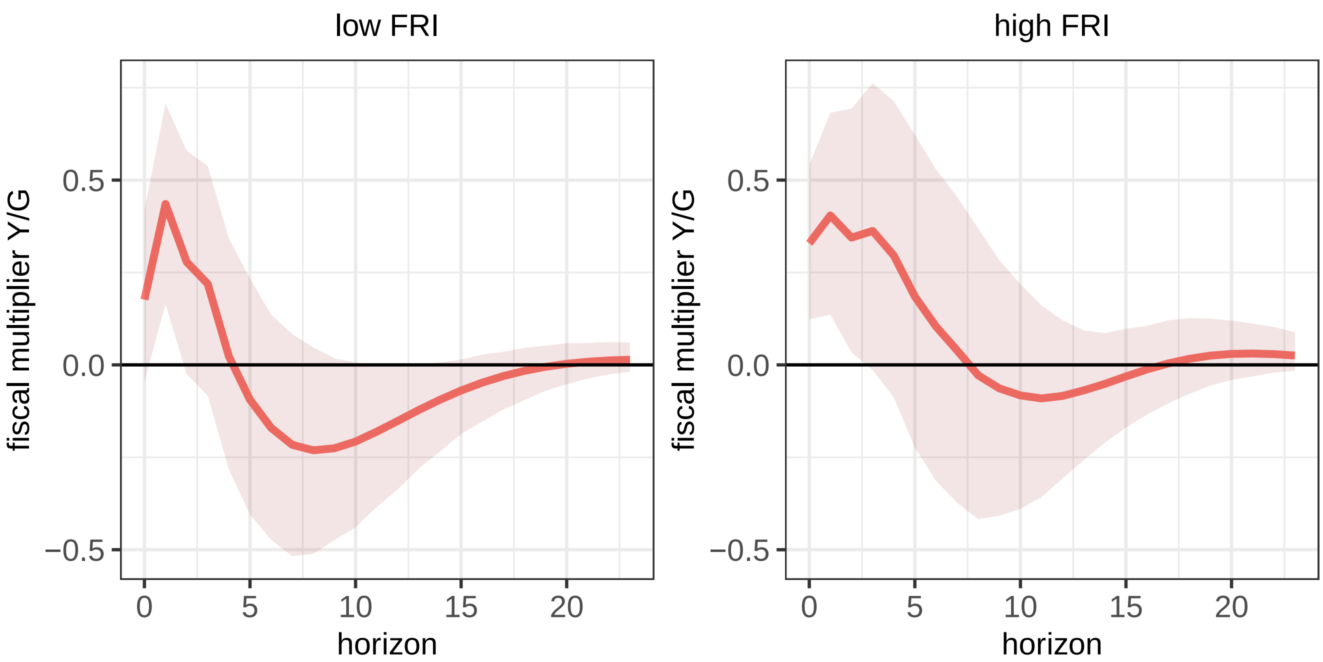

Figure 14: Fiscal expenditure multiplier in countries with and without budget balance rule

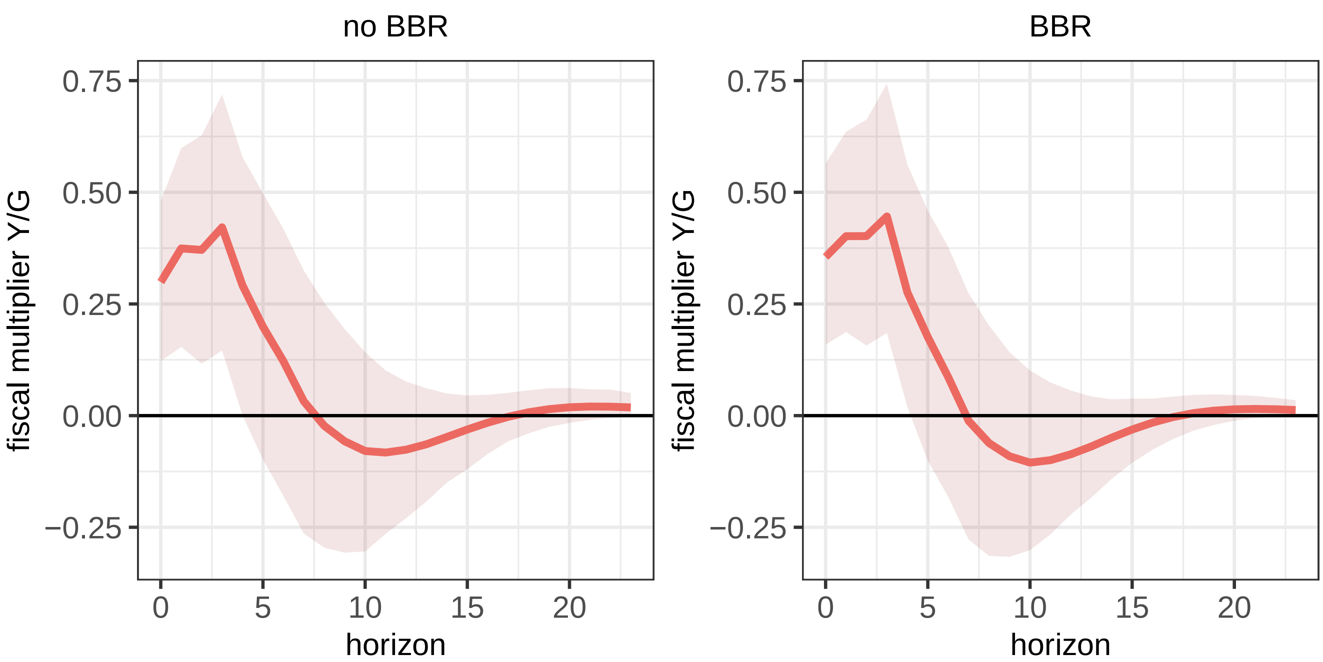

Figure 15: Fiscal expenditure multiplier in countries with and without debt rule

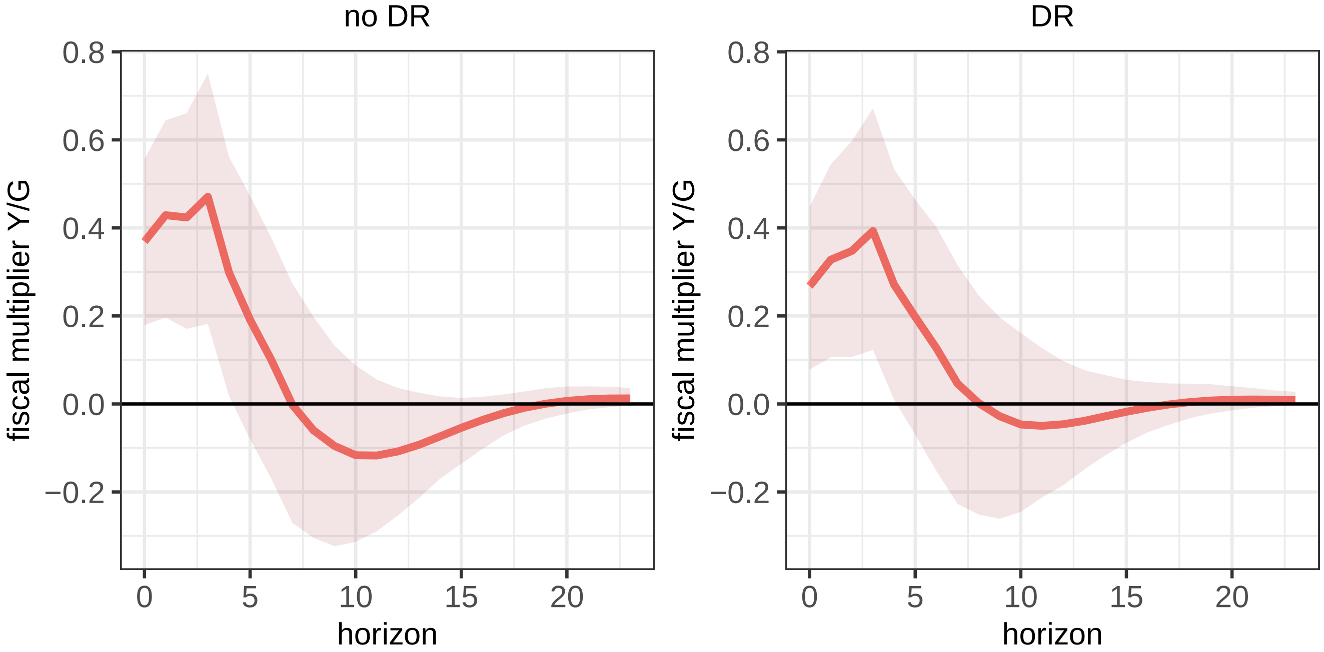

Figure 16: Fiscal expenditure multiplier in countries with and without expenditure rule

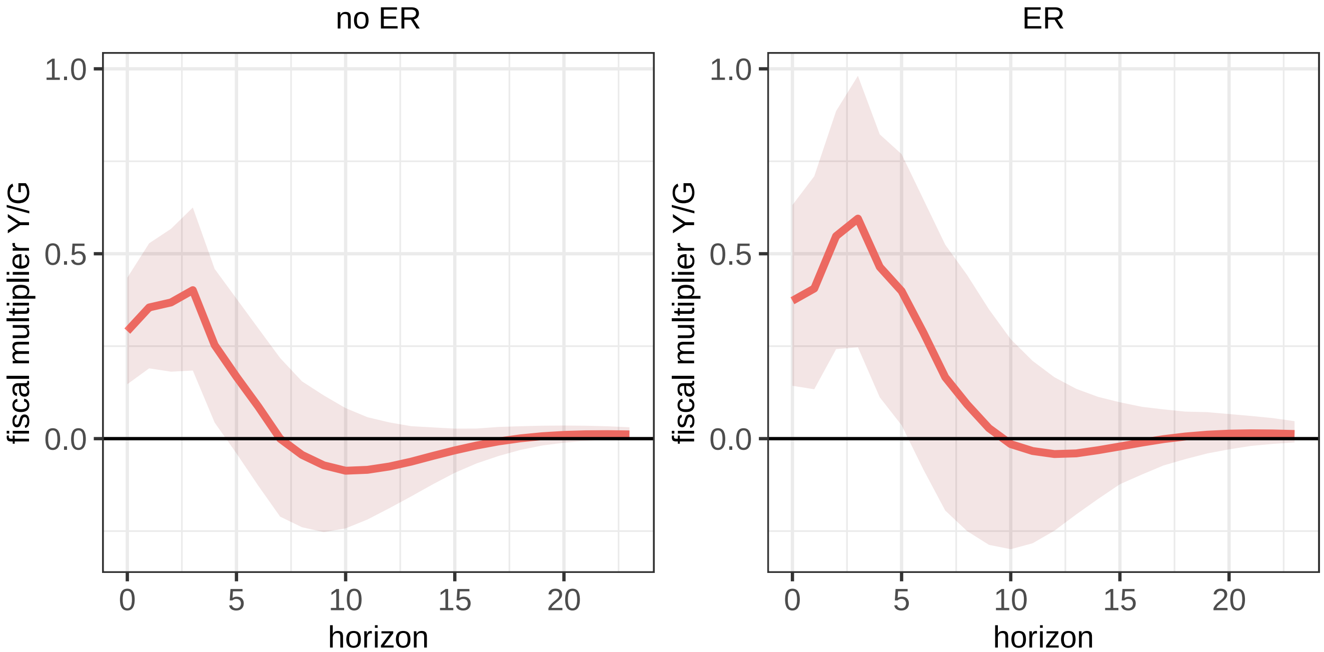

Table 2: Fiscal multipliers among EU Member States derived from baseline IPVAR.

Country	h=0			h=4			h=8			h=12		
	Point	Lower	Upper	Point	Lower	Upper	Point	Lower	Upper	Point	Lower	Upper
AT	0.560	0.421	0.786	0.643	0.323	0.867	0.239	-0.117	0.383	0.030	-0.159	0.101
BE	0.693	0.512	0.978	0.833	0.459	1.105	0.445	0.007	0.613	0.185	-0.086	0.283
BG	0.290	0.092	0.555	0.161	-0.279	0.543	-0.276	-0.711	0.070	-0.281	-0.520	-0.042
CY	0.473	0.273	0.684	0.594	0.247	0.815	0.302	-0.108	0.452	0.131	-0.115	0.209
CZ	-0.088	-0.442	0.151	-0.022	-0.463	0.296	-0.342	-0.775	-0.011	-0.317	-0.613	-0.017
DE	0.514	0.382	0.719	0.574	0.266	0.787	0.168	-0.173	0.308	-0.016	-0.193	0.051
DK	0.230	0.138	0.356	0.207	-0.012	0.346	-0.081	-0.305	0.033	-0.121	-0.225	-0.040
EE	0.055	-0.147	0.277	-0.132	-0.563	0.235	-0.487	-0.961	-0.121	-0.302	-0.574	0.023
EL	0.903	0.604	1.303	1.101	0.522	1.550	0.827	0.142	1.184	0.481	-0.076	0.786
ES	0.685	0.471	1.037	0.749	0.303	1.123	0.208	-0.280	0.504	-0.059	-0.306	0.106
FI	0.326	0.224	0.475	0.329	0.091	0.495	0.007	-0.250	0.122	-0.088	-0.211	-0.018
FR	0.431	0.304	0.599	0.527	0.277	0.687	0.273	-0.021	0.372	0.111	-0.072	0.151
HR	0.170	-0.026	0.316	0.226	-0.048	0.396	0.004	-0.282	0.149	-0.044	-0.210	0.070
HU	0.246	0.029	0.420	0.334	0.022	0.526	0.136	-0.195	0.300	0.050	-0.164	0.161
IE	0.288	0.026	0.495	0.373	-0.008	0.607	0.051	-0.364	0.246	-0.034	-0.270	0.110
IT	1.094	0.784	1.628	1.250	0.629	1.758	0.548	-0.152	0.942	0.194	-0.228	0.453
LT	0.200	0.053	0.377	0.110	-0.215	0.347	-0.258	-0.581	-0.044	-0.229	-0.382	-0.062
LU	-0.031	-0.267	0.164	-0.125	-0.555	0.182	-0.525	-0.938	-0.224	-0.350	-0.564	-0.056
LV	0.010	-0.217	0.180	-0.002	-0.325	0.232	-0.326	-0.656	-0.109	-0.257	-0.423	-0.053
MT	0.260	0.053	0.427	0.331	0.023	0.517	0.058	-0.282	0.216	-0.020	-0.211	0.092
NL	0.434	0.267	0.693	0.423	0.080	0.736	0.016	-0.341	0.284	-0.141	-0.327	0.015
PL	0.360	0.231	0.541	0.343	0.048	0.548	-0.042	-0.343	0.115	-0.135	-0.283	-0.039
PT	0.770	0.576	1.093	0.914	0.495	1.222	0.445	-0.047	0.650	0.156	-0.132	0.258
RO	0.093	-0.109	0.272	0.035	-0.308	0.274	-0.352	-0.702	-0.141	-0.273	-0.441	-0.067
SE	0.312	0.169	0.519	0.266	-0.030	0.543	-0.076	-0.378	0.165	-0.163	-0.319	-0.021
SI	0.043	-0.294	0.269	0.121	-0.305	0.418	-0.139	-0.565	0.135	-0.160	-0.446	0.082
SK	0.238	0.117	0.372	0.236	-0.001	0.390	-0.084	-0.347	0.029	-0.123	-0.245	-0.035

Source: own elaboration.