LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

MASTER

MONETARY AND FINANCIAL ECONOMICS

MASTER´S FINAL WORK

DISSERTATION

THE IMPACT OF FISCAL RULES ON GOVERNMENT PERFORMANCE AND BORROWING COSTS.

ALEXANDRA COELHO CORREIA

SUPERVISION:

ANTÓNIO AFONSO.

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GLOSSARY

CA- Current Account Balance

CAPB- Cyclical Adjusted Primary Balance

CIP- Consumer Price Index

EC- European Commission

EMU- European Monetary Union

ERI- Expenditure Rule Index

EU- European Union

FRI-Fiscal Rule Index

GDP- Gross Domestic Production

IP- Industrial Production

OLS- Ordinary Least Squares

PE- Primary Expenditure

REER- Real Effective Exchange Rate

SGP- Sustainability Growth Pact

US- United States of America

VIX- Chicago Board Opinion Exchange Market Volatility Index

2SLS- Two Stage Least Squares

ABSTRACT

We assess the impact of numerical fiscal rules on budget balances and sovereign yields, as well as the impact of expenditure rules on primary expenditure. The panel data covers 28 EU countries for the period of 1990-2018. The results show that numerical fiscal rules improve government performance leading to a reduction of budget deficits and lowers sovereign bond yields. Distinctively, expenditure rules hold a significant impact on primary expenditure.

Keywords: Numerical fiscal rules, budget balance, sovereign bonds.

JEL codes**:** C23, E62, H60

Tabele contente

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THE IMPACT OF FISCAL RULES ON GOVERNMENT PERFORMANCE AND BORROWING COSTS

By Alexandra Coelho Correia

1. INTRODUCTION

The build-up of budget deficits among some European Union (EU) countries has risen well above the Maastricht Treaty[1] criteria implemented in 1992, for countries to be able to enter the Economic and Monetary Union (EMU).

Numerous empirical studies have shown the efficiency of fiscal rules in preventing the build-up of public debt and imposing fiscal discipline on governments. As reported by Afonso and Jalles (2019) the impact of fiscal rules in the bond yield is negatively correlated, which implies lower government borrowing costs especially for advanced economies.

Fiscal rules have also a relevant impact on debtors' credibility, where the financial crisis of 2009 lead to a credibility crisis concerning the sustainability of public debt which led to a transformation in the market for government bonds within the Euro Area. An increase in Creditor´s awareness of the defaulting risk regarding sovereign bonds lead to an increase in the financing cost of several Euro member countries. This fundamental change in risk sensibility multiplied the interest rate but was also associated with a deteriorating fiscal position (Heinemann *et al.*, 2013).

Fostering a better fiscal reputation is an important step to prevent the increase in borrowing costs, currently, policymakers try to do so with the implementation of better European and national rules. In particular, the Stability and Growth Pact (SGP) play a

[1] The debt-to-GDP ratio should not be over 60% and a budget deficit limited to 3% of GDP.

fundamental role to reinforce the fulfillment of the Maastricht Treaty criteria by applying sanctions to the member countries that exceed those limits.

Furthermore, in 2012 the European Heads of State signed the Six Pack and Fiscal Compact in order to foster fiscal sustainability. All the participating countries had to introduce national fiscal rules such as a maximum limit of annual structural deficits of 5% of GDP. The expectation is that independently of current budgetary performances, such fiscal rules send out credible signals and cut short the way towards lowering the risk on spreads.

This study aims to assess the importance of numerical fiscal rules regarding the improvement of budget balances, but also shows the link between fiscal rules and government borrowing costs by analyzing the impact of fiscal rules in government yields. Moreover, we compute an Expenditure rule index to evaluate the impact of this specific group or rule in primary expenditure.

This analysis is based on a dataset elaborated by the European Commission containing all types of numerical fiscal rules for the 28 Member States from 1990 to 2018. Also for further analysis of the relevance of fiscal rules we compute an Expenditure rule index based on the same dataset.

This paper is organized in the following order: Section 2 provides a literature review, Section 3 an empirical analysis which is composed of the sub-sections methodology, data, results; and finally Section 4 the conclusion.

2. REVIEW

2.1Government borrowing costs in the EU

The main cost of issuing debt is associated with the default risk premia, within the context of a monetary union, it appears to be consistent that several economic variables and also non-economical play a central role in how the markets behave based on the global macroeconomics conditions.

According to Alesina *et al.*, (1992), the existence of default premia increases in a nonlinear way, with higher debt levels and with the growth rate of debt. Using data from OECD, it is also observed that the differential between public and private bond yields is positively related to the level of public debt.

It is was also shown by Bernoth *et al.*, (2004) that the differential between bonds issued by EU countries, Germany or the USA contains risk premia that increases with debt, deficits, and debt-services ratio and also depends on the issuer's relative bond market size. The study consists of data of spreads between the Deutsche mark (Euro after 1999) and US dollar-denominated bonds issues of 12 EU governments, Germany and the US government.

The authors also use data from before and after the implementation of the EMU to obtain direct estimates about the effect of the monetary union on risk premia paid by the European governments. The positive relation between the default risk premia and the debt as well debt-services ratio is consistent with the view that credit markets monitor fiscal performance, exerting disciplinary pressure on governments.

It is noticeable that countries that hold a larger share in the total EU debt will pay lower interest rates compared to those countries that hold smaller shares. Nevertheless, liquidity risk premia drops with EMU membership, which points to an enhancement of

financial market integration. Members of a monetary union will enjoy lower risk premia but this benefit declines with the rise of public debt compared to Germany. This outcome is mainly driven by the assumption that markets anticipate fiscal support from the EMU countries in financial distress unless these had been much undisciplined before.

At the onset of the financial crisis the assumption that EU members are credible debtors, reflected in low long-term interest rates and low spreads compared to German bonds. This latter came under fire, resulting in increased attention to fiscal developments and related impact on government borrowing costs. By employing dynamic panel data and using de Arellano-bond estimator, allowed for consistent estimates of the study parameters. Bobetko *et al.*,(2013) This study covering 17 European countries, of which 9 were developed and 8 were emerging markets, confirms the belief that a worsening of current and expected budget balances, as well as increases in public debt leads to growth in the short and long term interest rates for sovereign debtors.

According to the authors, the main spreads determinators recognized in the literature are credit risk, international risk aversion, and liquidity risk. These findings imply that spreads had a stronger response to changes in the overall market risk after the beginning of the crisis, also credit risk indicators increased significantly as a determinator of spreads during the mentioned period.

For the period 2004-2011, the fiscal balances and public debt projections had a significant impact on the differential in government bond yields for countries with emerging markets. On the other hand, in developed countries, sovereign spread dynamics were mostly driven by the global market sentiments.

The results above confirm that markets appreciate both savings and growth. However, if the expected growth rises or the projections of fiscal policy becomes more prudent the markets should demand lower spreads.

The main focus has been on fiscal variables, and recent studies have stated that not only fiscal variables, but also political factors have a significant impact on credit risk and consequently borrowing costs. According to Zilinsky, (2009) creditors care about both economic and non-economic variables, and investors recalibrate or update the importance of the country's characteristics, for example, its credit rating and democratic capital.

As reported by Zilinsky public debt and a range of other economic variables had a relatively weak correlation with spreads in the EU during an expansionary period, on the other hand, it was observed that democratic capital was a robust predictor of spreads between 2003 and 2007, but completely lost its relevance within a financial distress situation mainly after 2008 with the inception of the financial crises.

The main point, is that investors do not always behave the same way, adapting according to the local and global conditions as expected. The conclusion is that although democratic capital lost its relevance in 2008, countries which had longer democratic traditions in the EU, compared to the new member enjoyed a reputational advantage. Thus, institutional characteristics may sometimes (depending on the global macroeconomics conditions) play a central role in determining borrowing costs.

2.2 The effect of fiscal rules

There has been clear evidence that European Union countries have increased their reliance on numerical fiscal rules, in which the Maastricht treaty and the SGP seem to have been a catalyst for its introduction. (Dahan *et al.*, 2010; Ayuso-i-Casals *et al.*, 2012). Particularly, (Debrun *et al.*, 2008; X. Debrun, 2000) conducted studies to assess the importance of numerical fiscal rules in the enhance the fiscal stance .

In general, it is supported by the literature the assumption that fiscal rules enrich public finance and also numerical expenditure rules can improve budgetary discipline (Afonso & Guimarães, 2015; Sebastian Hauptmeier *et al.*,2010; Holm-hadulla *et al.*,2010).

Numerical fiscal rules may fulfill different objectives, with the main focus being fostering fiscal sustainability. Kumar et al., (2009) provides the following definitions:

- Budget balance rules, which are specified as the overall balance, helps to ensure that the debt-to-GDP ratio is an appropriate criteria for fiscal solvency since it can insure that the intertemporal budget constrain of the government is met. Primary balance rules are less related to debt sustainability, since an increase in interest payments would not require an adjustment, even if they affect the budget and public debt.

- Debt rules set an explicit limit or target for public debt in percentage of GDP. By definition these types of rules are the most effective in terms of ensuring convergence to the debt target, unfortunately, do not provide sufficient guidance for fiscal policy when the debt level is below its threshold.

- Expenditure rules generally set limits on total, primary, or current spending in absolute terms, growth rate, or in the percentage of GDP, as such, these types of rules are not directly correlated to debt sustainability, considering they do not constrain the revenue

side. Nevertheless, they provide an operational tool to trigger the required fiscal consolidation when they are supplemented by debt or budgetary rules.

- Revenue rules set upper and lower limits on revenues and are aimed to promote revenue collection that can prevent an excessive tax burden. These rules similarly to expenditure rules are also not directly linked to the control of public debt as they do not constrain spending.

As specified by Ayuso-i-Casals et al., (2012), it is possible to observe a linkage between numerical rules and fiscal outcomes. The main goal of the study was to provide a comprehensive overview of the fiscal rules enforced in 25 EU countries and to analyze the determinants and the respective impact on the budgetary outcome. In this study it is perceived that when numerical fiscal rules cover bigger shares of government finances, *ceteris paribus*, lower deficits were observed, but also that the characteristics of fiscal rules hold explanatory power on the budgetary outcomes. Particularly, the existence of a strong reinforcement mechanism appears to be an important feature in maximizing the effect of fiscal rules.

Several empirical studies support the use of fiscal rules to enhance fiscal developments, for instance, Debrun, (2000) highlights that a suitable institutional designed fiscal policy is crucial for the success of EMU, since new supranational policymakers would not automatically enjoy the benefits of well-established stability-oriented reputation.

It has been shown that the mission of the EU fiscal framework and also country-specific institutional features play an important role in inducing the introduction of fiscal rules, based on Debrun *et al.*, (2008), it is also noticeable a strong link between numerical fiscal rules and fiscal performance, as well as the hypothesis that fiscal rules are only

introduced at times of recession and/or when fiscal stress is not supported. Also, the type and design of fiscal rules appear to matter for their effectiveness. According to the author rules that mainly target the budget balance or the general government debt have a significant and consistent impact on deficits, on the other hand, expenditure rules alone do not produce a significant impact on the budgetary balance. It is also suggested that in countries where rules are designed with the main goal of reducing or avoid deficits by using the stabilization function of fiscal policy, on average shows less pro-cyclical policies.

For Wierts, (2008), expenditures policies do not have a systematical reaction to short-term revenues shocks, which commonly have a cyclical nature. However, it is shown that extra or shortfall on revenues leads to a procyclical policy reaction in expenditure. Nonetheless, over the years it has been often argued that a well-designed medium-term expenditure rule may counter the procyclical response on the expenditure side of the budget.

More recently, in a study by (Afonso & Jalles, 2019) covering both advanced and emerging economies between 1980-2016, which assesses the effect of fiscal rules on sovereign bond spreads, they concluded that fiscal rules have a robust negative and statistically significant effect on sovereign bonds. In addition, the more fiscally responsible countries are the ones that have more success in reducing government borrowing costs through fiscal rules implementation. Besides the fact that fiscal rules are an ally in times of recession, they also signal the financial markets, leading them to reduce the risk premium in government's bonds. Also, when it comes to the design fiscal rules, independent monitoring of compliance, done outside the government also leads to a reduction of sovereign spreads.

3. EMPIRICAL ANALYSIS

3.1 Methodology

For the empirical analysis, a fiscal reaction function is estimated following the common approach in the literature. Having said that, the fiscal reaction function aims to assess the impact of fiscal rules on the primary balance (Debrun *et al.*,, 2008) and takes the following form

$$(1)\ capb_{it} = \beta i + \delta debt_{it-1} + \lambda outputgap_{it-1} + \phi fri_{it} + \gamma x_{it} + u_{it},$$

The variables are determined as *capbit,* defined by the cyclically adjusted primary balance in country *i* for period *t,* β_i represented as the individual effect of each country *i,* $debt_{it-1}$ is the debt-to-GDP in the country *i* in period *t-1*, the $outputgap_{it-1}$ is the lagged output gap in country *i* in period *t-1*, fri_{it} represents the fiscal rule index for country *i* in period *t* and finally x_{it} represents the variables that might hold additional explanatory power in the model focusing specific events (eg. EMU run-up, introduction SGL). The above mentioned variables are further detailed in the next section.

After computing the results it is expected that $\phi>0$, meaning that more and better fiscal rules (better FRI) influence positively the CAPB, leading to a better and healthier fiscal position. We also assess the effectiveness of expenditure rules, by computing an expenditure rule index calculated using EC Fiscal Rule Dataset and by regressing those results using primary expenditure as a dependent variable.

In addition, it is important to verify if the induction of fiscal rules will improve governments "savings", one of the more direct ways to evaluate it is by checking the

impact of FRI on long-term government bond yields. To do so we estimated the next equation:

$$(2)\ yield_{it} = \beta_{it} + \rho\bar{X}_{it} + \phi fri_{it} + \gamma vix_{it} + \lambda I_{it} + u_{it}$$

$yield_{it}$ stands for the 10-year maturity bond yield, $\bar{X}_{it}$ is a vector consisting of , DEBT, CA, REER, IP, GDPgr, and CIP, for period *t,* and country *i.* vix_{it} is the measure of investors' willingness to take risk. I_{it} represents the short-term interest rate for each period *t,* and country *i* and *fri* is once more the EC fiscal rule index.

3.2 Data

The data was collected for 28 EU countries between 1990-2018 namely: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom.

The macroeconomic variables included in this study were extracted from the AMECO database, including the following : CAPB, Debt-to-GDP ratio (debt), Primary expenditure (pe), Output gap measured as the gap between actual and potential gross domestic product (outputgap), 10-year sovereign bond yield (yield), short-term interest rate (I), current account balance (CA), consumer price index (CPI), real effective exchange rate (REER), industrial production (IP) and finally, GDP growth rate (GDPgr), as mentioned above. The measurement of international risk aversion is taken from the

Chicago Board Options Exchange Market Volatility Index (VIX) computed yearly, from Yahoo! Finance.

In addition, to evaluate the impact of particular events into the dependent variable, we included a set of 3 dummy variables in the regression:

- EMU: intends to take into account the run-up to the EMU, taking the value 1 for the EU-15 countries and years between 1994 and 1998 (Debrun *et al.*, 2008; Ayuso-i-Casals et al., 2012)
- SGP represents the introduction of the SGP and assumes the value 1 for Euro-area countries and years after 1998. (Debrun *et al.*, 2008; Ayuso-i-Casals et al., 2012)
- Enlargement: assumes the value 1 for the 10 countries that enter the EU in 2004 and after. (Debrun *et al.*, 2008; Ayuso-i-Casals et al., 2012)

Regarding EC's fiscal rule index (FRI), the same is constructed based on information collected directly from the Members States. The dataset covers all types of numerical fiscal rules: budget balance, debt, expenditure, and revenue rules; and all levels of government: central, regional and local, general government, and social security. The survey reports information divided into five criteria: the statutory base of the rule, the room for revising objectives, mechanisms for monitoring compliance and enforcement of the rule, the existence of predefined enforcement mechanisms, and the media visibility of the rule. This index covers the period of 1990-2018.

Taking a further evaluation into the EC's fiscal rule index we can observe that rules have become increasingly more relevant, from only 13 rules in 1990 to 112 in 2018. The majority of rules have been budget balance rules, both debt and expenditure rules have increased considerably especially in the last 4 years of the covered period.

[Figure 1]

Regarding the type of government, most rules were applied to the general government and local government. Both local and central government's main target are budget balance rules. Expenditure rules have a wider representation in the General Government and revenue rules appear to have the smallest share among all types of governments.

[Table 1]

Currently, almost all EU countries have implemented fiscal rules, and the countries with higher number of rules implemented are Bulgaria, Italy, and Portugal. On the other hand, Cyprus, Czech Republic, and Greece have lower a number of rules in force. The countries that have more expenditure rules implemented are Italy, Bulgaria and the Netherlands.

3.3 Results

The baseline results suggest that the EC's FRI is generally significant with a positive coefficient, meaning that if the FRI increases by one unit, then the Cyclically adjusted primary balance (CAPB) can increase up to 0,41 percentage points (p.p.), as observed in column (1), Table 2. For this regression, we also omitted the control variable to assess if the impact of rules is biased and its robustness.

[Table 2]

In column (2) as the control variables were introduced, we can observe that fiscal rules are still statistically significant. The simple OLS regression showed that the control variables are not statistically significant as the run-up to the EMU, the introduction of 10 new member states (enlargement) and SGP have all positive coefficients. This means that during the year of implementation of the EMU in the EU-15 countries, an increase of 0,0360 p.p. on the CAPB was noticeable, also the integration of 10 new members after 2004 lead to an increase of 0,288 p.p on the CAPB, and for countries that have been part of the European Union since 1998 (SGP) a positive impact on CAPB of 0,163 p.p was reflected. As mentioned before the control variables are not statistically significant.

In column (3), Table 2, the Random Effects model results are essentially the same with also a statistically significant FRI. The difference resides in the fact that, the control variable SGP is statistical significant at 1%, but with a negative coefficient. The interpretation is that during the introduction of SGP in 1998 the EU countries had a negative impact on CAPB. The result might be driven by the asymmetry of the use of fiscal policy over the cycle, meaning thar if the deficits are not substantially reduced during the periods when countries have "economic freedom" when they set strict limits[2] there is no room for the automatic stabilizers fully work without breaching the limits that the SGP sets.

For the Tow Stage Least Squares regression, presented in column (4), with the instrument of FRI being its own lag, we conclude that FRI is still statistically significant with a coefficient of 0,421 p.p., and with the coefficient for P-value of the Wu-Hausman

[2] The introduction of the SGP lead to limit on the deficit of 3% of GDP.

test pointing to no endogeneity problems. However, we still had concerns of reverse causality between the fiscal stance and the FRI, and to access those concerns we computed the Granger Causality Test. The P-values obtained from the causality test are inconclusive, meaning that we cannot assume if the causality runs from the implementation of fiscal rules that leads to better balances, or whether it is better fiscal outcomes that lead to the implementation of more rules.

We repeat the same regression in Table 3, but this time the dependent variable is the primary expenditure - since interest payments are hardly controlled by governments, so expenditure rules are more effective concerning expenditures alone. To do so, we also compute an expenditure rule index based on EC's data set, using the fiscal rule strength and the government coverage for expenditure rules provided by the data set and compute the ERI[3].

[Table 3]

It's performed once more an OLS regression and as well an IV regression to assess the impact of expenditure rules on primary expenditure, for the same reason stated above (check biasness and robustness), we started by computing a regression omitting the control variables column (1), Table 3, and observed that the ERI has a significant impact on Primary expenditures which translates as if ERI increases by one unit the Primary expenditures decreases up to 0,886 p.p.

[3] The ERI is calculated taking into account the European Commission criteria, using the fiscal rule strength already provided by the data set. The expenditures rule index is obtained as follows. Fist we start by multiplying the already provided fiscal rules strength by the coverage of general government finances for only expenditure rules, Next the product obtain are summed up, per countries for each year.

Once the control variables are added the expenditure rule index is still statistically significant but with a lower coefficient (-0,466 p.p.). For the control variables only the Run-up to the EMU by EU-15 is statistically significant with a positive coefficient, the explanation is that the Run-up to the EMU leads to an increase of 6,502 p.p. in primary expenditure. We also can observe that the introduction of the 10 new EU members in 2004 lead to a decrease in the primary expenditure of 2,027 p.p., but the results are not statistically significant. Also in the random effect regression column (3), Table 3, we can observe that countries that have been part of the EU since 1998 affect negatively the Primary Expenditure with a coefficient of -4,377 p.p. and with a statistical significance of 10%.

For the IV regression the results are consistently the same, the instrument of ERI is its own lag, and once more the P-value for the endogeneity test is not statistically significant, meaning that ERI is not endogenous. Besides this, according to the Granger Causality Test we cannot conclude that the causality runs from the rules implementation or from better fiscal outcomes. The results remain robust when ERI instruments are used, confirming that the results are not biased due to of reverse causality.

To highlight the importance of fiscal rules, we perform once more an empirical study that aims to assess the impact of fiscal rules on government 10-years bond yield. The FRI was statistically significant in all regressions meaning that if the FRI increases by one unit the yields decrease by 0,453 p.p. column (1), Table 4. In column (2), Table 4 we performed a fixes effect regression and the results were essentially the same. Once we computed the IV regression the FRI was still statistical significant leading to a decrease of 0,540p.p. in the 10-years bond yield if FRI improves by 1 unit, and the P-

value of the Wu-Hausman test indicated that we had no endogeneity problems. The causality test is not conclusive, so we cannot be sure if it runs from FRI to yield.

[Table 4]

In addition, the variables that represent a better economic environment – GDPgr and IP- as expected, lead to lower values of sovereign bond yield. Regarding the Exchange market volatility index, we can observe that investors are becoming more risk-averse- vix increasing- in all regressions the vix was statistically significant meaning that if the vix increases by one unit the yields can reduce up to 0,0385 p.p.. This can be corroborated by fact that such rules are associated with government commitment to reach a particular goal, and translates into a higher degree of certain regarding fiscal outcomes, compared to a no rule scenario.

All together, we can observe that FRI has a strong explanatory power over budget balances, and that the variables that capture developments in the EU and EMU (EMU, Enlargement, and SPG) hold some explanatory power. If we only take into account expenditure rules, we also observe a positive impact on primary expenditure ratios. Additionally, countries in which these rules are applied to discretionary public expenditure, benefit from better expenditure ratios.

Furthermore, fiscal rules have an important impact on 10-Years government bond yield regarding capital market sentiments, and so we can conclude that fiscal markets value rules and countries experience lower yields.

4. CONCLUSION

The main goal of this study was to assess if countries that have fiscal rules in force experience better fiscal outcomes such as better budget balances that consequently translate into better Debt ratios. It is suggested by the literature that in fact exists a correlation between fiscal rules and fiscal balances. From the empirical study presented above, we can conclude that fiscal rules lead to better CAPB, unfortunately, we can't guarantee that the causality runs from FRI to CAPB.

Also, we cheeked if rules that target public expenditure contribute to their control and the consolidation of government outcomes (better fiscal balances). The computed regressions showed that the ERI has a significant explanatory power for developments in primary expenditure, and so enforcing the importance of expenditure rules.

With regards to the perspective of capital markets, we regressed the FRI into 10-years bond yield, concluding that the implementation of rules lead to lower yields, however, we can't conclude that the causality runs from FRI to yields. The impact of vix on the government bond yields is negative meaning that financial markets are becoming more risk-averse, leading to improvement on sovereign yields.

Essentially we can confirm that FRI has a significant impact in countries performance and also leads to lower government borrowing costs (smaller yields). Additionally, capital markets seem to reward countries that have implemented fiscal rules.

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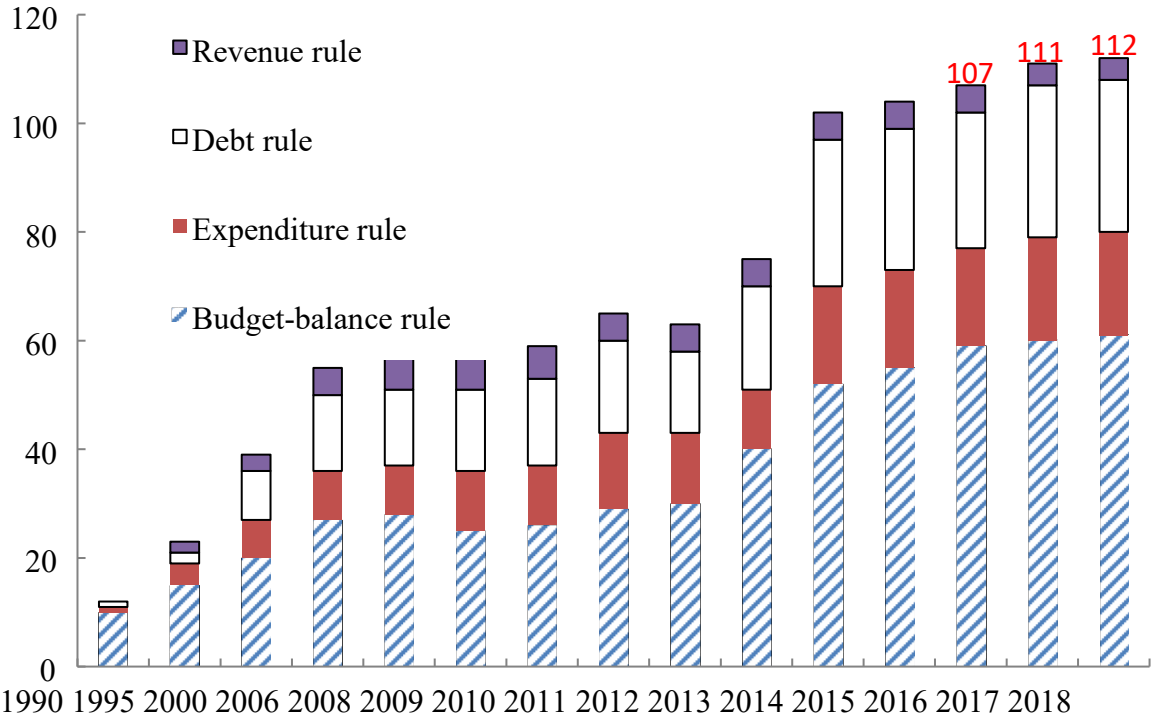
APPENDIX

Table 1: Total Numeric Fiscal Rules By Type of Government and aggregated Target (1990-2018)

	GG	LG	RG	CG	SS	Multiple	Total
BBR	55	25	7	10	9	8	114
DR	29	17	4	5	0	1	56
ER	25	2	4	8	2	12	53
RR	2	0	0	6	1	3	12
ER/BBR	0	0	0	0	0	4	4
Total	111	44	15	29	12	28	239

Note: BBR- Budget balance Rules; DR- Debt Rules; ER- Expenditure Rules; RR- Revenue Rules; GG- General Government; LG- Local Government; RG- Regional Government; CG- Central Government and SS- Social Security.
Source: Numerical Fiscal Rules Dataset, European Commission

Figure 1: Numerical fiscal rules by type of aggregate targeted since 1990



Note: BBR – Balance Budget Rule; DR – Debt Rule; ER – Expenditure Rule; RR – Revenue Rule; Source: Numerical Fiscal Rule Database, European Commission.

Table 2 : Baseline results: The impact of fiscal rules on Government fiscal performance

Dependent variable	Cyclically Adjusted Primary Balance			
	(1) OLS	(2) OLS	(3) OLS	(4) 2SLS
DEBT	0.0297***	0.0300***	0.0692***	0.0301***
	(0.00364)	(0.00420)	(0.00725)	(0.00415)
FRI	0.410***	0.411***	0.484***	0.421***
	(0.121)	(0.124)	(0.104)	(0.139)
Δoutputgap	0.0358	0.0250	-0.0397	0.0240
	(0.0759)	(0.0768)	(0.0552)	(0.0760)
Enlargement		0.288	0.954	0.291
		(0.513)	(1.237)	(0.506)
EMU		0.0360	-0.414	0.0419
		(0.529)	(1.251)	(0.524)
SGP		0.163	-1.226*	0.164
		(0.331)	(0.712)	(0.326)
_cons	-1.967***	-2.218***	-3.956***	-2.233***
	(0.320)	(0.477)	(1.040)	(0.481)
N	265	265	265	265
R^2	0.209	0.213		0.213
adj. R^2	0.200	0.195		0.195
Hausman test	NO	NO	YES	NO
Endogeneity test	NO	NO	NO	YES

Note: Standard errors are reported in parentheses, the level of significance is reported as follows * p < 0.10, ** p < 0.05, *** p < 0.01. the FRI is taken from the EC data set and the instrumental variables user in the 2SLS regression is the FRI own lag.

Table 3: The impact of Expenditure rules in Primary Expenditure

Dependent Variable	Primary Expenditure			
	(1) OLS	(2) OLS	(3) OLS	(4) 2SLS
Δdebt	-0.0311	-0.00504	0.00544	-0.0239
	(0.0383)	(0.0376)	(0.0173)	(0.203)
outputgap	-0.525**	-0.139	-0.538***	-0.00705
	(0.260)	(0.231)	(0.125)	(0.316)
ERI	-0.886***	-0.466***	-0.360**	-0.587***
	(0.162)	(0.154)	(0.155)	(0.192)
Enlargement	-	-2.027	-0.954	-2.333
		(1.711)	(4.077)	(1.921)
EMU	-	6.502***	6.519*	5.923***
		(1.373)	(3.355)	(1.623)
SGP2	-	3.103	4.377***	3.152
		(2.960)	(1.396)	(2.984)
_cons	47.57***	38.56***	36.50***	39.30***
	(0.852)	(3.309)	(3.398)	(3.463)
N	94	94	94	79
R2	0.316	0.543		0.539
adj. R2	0.293	0.511		0.501
Hausman test	NO	NO	YES	NO
Endogeneity	NO	NO	NO	YES

Note: Standard errors are reported in parentheses, the level of significance is reported as follows * p < 0.10, ** p < 0.05, *** p < 0.01. the FRI is taken from the EC data set and the instrumental variables used in the 2SLS regression is the ERI own lag.

Table 4: The impact of FRI in 10-years bond yield

Dependent variable	10-Years Bond Yield		
	(1) OLS	(2) OLS	(3) 2SLS
Δdebt	0.00870	0.00753	0.0150
	(0.0110)	(0.0102)	(0.0129)
FRI	-0.453***	-0.453***	-0.540***
	(0.152)	(0.150)	(0.160)
CIP	-0.00972	-0.00803	-0.0129
	(0.0149)	(0.0142)	(0.0162)
REER	-0.0293**	-0.0268*	-0.000938
	(0.0142)	(0.0146)	(0.0128)
IP	-0.0476***	-0.0580***	-0.0169**
	(0.00874)	(0.00875)	(0.00800)
I	0.683***	0.705***	0.587***
	(0.0743)	(0.0699)	(0.0819)
GDPgr	-0.250***	-0.234***	-0.258***
	(0.0403)	(0.0395)	(0.0428)
CA	0.0240	0.105***	-0.0773***
	(0.0316)	(0.0339)	(0.0250)
vix	-0.0385**	-0.0304**	-0.0485***
	(0.0161)	(0.0151)	(0.0188)
_cons	12.39***	12.70***	7.158***
	(2.016)	(2.008)	(1.849)
N	313	313	313
R^2		0.662	0.519
adj. R^2		0.635	0.504
Hausman Test	NO	YES	NO
Endogeneity Test	NO	NO	YES

Standard errors are reported in parentheses, the parameter, significance are reported as follows * p < 0.10, ** p < 0.05, *** p < 0.01. The instrumental variables in the 2SLS model is the FRI own lag.

Table 5: Descriptive statistics

Variables	Sample: 1990-2018	Mean	Median	Std.dev	Skewness	Kurtosis	Observations
Cyclically adjusted Primary balance	CAPB	0.443	0.443	2.325	2.325	2.325	265
Debt-to-GDP	DEBT	56.03	56.03	33.00	33.00	33.00	652
EC's FRI	FRI	-0.00	-0.00	1.000	1.000	1.000	812
Consumer price index	CIP	77.04	77.04	23.69	23.69	23.69	799
Real Effective Exchange rate	REER	101.5	101.5	11.46	11.46	11.46	432
Industrial Production	IP	92.17	92.17	22.99	22.99	22.99	715
10-Year bond Yield	yield	5.137	5.137	3.197	3.197	3.197	660
Short-term Interest rate	I	4.935	4.935	7.494	7.494	7.494	708
Debt-to-GDP growth	GDPgr	2.437	2.437	3.717	3.717	3.717	783
Current Account Balance	CA	1.003	-1.003	5.742	5.742	5.742	601
Debt-to-GDP variation	ΔDebt	2.580	2.580	12.39	12.39	12.39	678
Output Gap	outputgap	-0.0896	-0.0896	3.126	3.126	3.126	714
Dummy for the 10 Countries entering the EU	Enlargement	0.357	0.357	0.479	0.479	0.479	812
Dummy for the run-up to EMU	EMU	0.536	0.536	0.499	0.499	0.499	812
Dummy for the introduction of SGP	SGP2	0.724	0.724	0.447	0.447	0.447	812
Primary Expenditure	PE	42.51	42.51	6.678	6.678	6.678	693
EC's Expenditure Rule index	ERI	4.031	4.031	3.376	3.376	3.376	94
Chicago Board Options Exchange Market Volatility Index	vix	19.33	19.33	5.770	5.770	5.770	812