When and why do countries break their national fiscal rules?

Wolf Heinrich Reuter
(Staff of the German Council of Economic Experts, Wiesbaden, Germany)

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[1]Staff of the German Council of Economic Experts, Germany.

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Abstract

This paper identifies determinants of compliance with various types of national numerical fiscal rules. Based on 51 fiscal rules in 20 EU member states from 1995 to 2015, the analysis identifies determinants among specific rule characteristics and their fiscal frameworks, as well as their political, (socio-)economic and supranational environments. While the average compliance across all rules and countries is around 50%, compliance with rules constraining stock (rather than flow) variables, set out in coalitional agreements, as well as rules covering larger parts of general government finances is significantly higher. Furthermore, independent monitoring and enforcement bodies (issuing real-time alerts) turn out to be significantly associated with a higher probability of compliance. Several theories of the deficit bias of governments due to government fragmentation, decentralization and political budget cycles are also significant with regards to compliance with fiscal rules. However, neither the economic environment or business cycle, nor forecast errors (except for an unexpectedly higher primary balance) on average seem to play a significant role.

Keywords: National Numerical Fiscal Rules · Compliance · Fiscal institutions · Deficit Bias

JEL Classification: E62 · H60 · H11

1 Introduction

In recent years, the EU member states decided to significantly strengthen their supranational and national fiscal frameworks. This has been especially true for the "so called" Six-pack[1] and Two-pack regulations[2] at the EU level, as well as the Fiscal Compact[3] at the national level, which introduced new measures designed to lead to more fiscal sustainability. Key elements of this new EU fiscal framework are numerical fiscal rules, also at the national level, restricting the discretion of governments. The following quotes show that the new legislation emphasizes specific characteristics and supporting measures, such as the legal basis of fiscal rules or the institutions monitoring and enforcing them.

> "Each Member State shall have in place numerical fiscal rules.."
> (Council Directive 2011/85/EU, Article IV.5)
>
> "... effective and timely monitoring of compliance with the rules, based on reliable and independent analysis carried out by independent bodies ..."
> (Council Directive 2011/85/EU, Article IV.6.1b)
>
> "... consequences in the event of non-compliance."
> (Council Directive 2011/85/EU, Article IV.6.1c)
>
> "Member States shall have in place independent bodies for monitoring compliance with: [..] numerical fiscal rules ..."
> (Regulation EU 473/2013, Article III.5.1)
>
> "The rules [..] shall take effect in the national law [..] through provisions of binding force and permanent character, preferably constitutional ..."
> (Treaty on Stability, Coordination and Governance, Article III.3.2)

The new initiatives shifted the optimal design of fiscal rules and their effects into the focus of public and academic debate. The theoretical rationale for introducing fiscal rules is well established and based on the theory of the deficit bias of politicians and governments (see e.g. Wyplosz, 2012 or Debrun et al., 2008 for an overview).

In empirical studies, the general effects of fiscal rules on public finances seem widely accepted. Various papers show that the introduction of fiscal rules leads among other factors to lower fiscal deficits (see e.g. Heinemann et al., 2016, for a meta-analysis), lower sovereign interest rate spreads (e.g. Heinemann et al., 2014; Iara and Wolff, 2014), lower output volatility (e.g. Fatas and Mihov, 2006) or more fiscal space (e.g. Nerlich and Reuter, 2015). Those and similar studies analyse the effects of introducing or strengthening fiscal rules (depending on various characteristics of those rules) on macroeconomic and fiscal variables independent of the countries' compliance with its fiscal rules.

This paper does not analyse the effects of (the introduction of) fiscal rules, but contributes to the literature by providing one of the first analysis of actual

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[1] EU regulations 1173/2011 to 1176/2011, EU directive 2011/85/EU
[2] EU regulations 472/2013 and 473/2013
[3] Treaty on Stability, Coordination and Governance in the Economic and Monetary Union

compliance with various types of national numerical fiscal rules in an empirical framework. Although, as shown in Reuter (2015), actual compliance with fiscal rules might not necessarily be needed for their economic effects, the analysis of the determinants of compliance can shed light on the optimal design and framework of fiscal rules. Assuming fiscal rules were introduced for good reasons (e.g. to overcome the deficit bias of the government or to reduce spillover costs of excessive fiscal deficits) and the numerical limits were set at optimal levels, then compliance with fiscal rules becomes an important issue. Based on a sample of 51 of these rules in 20 of the EU28 member states from 1995 to 2015, this paper analyses which features of fiscal rules and their fiscal framework, as well as their political or economic environment are associated with higher probabilities of compliance.

To the best of the authors knowledge, there are only two other studies that analyse the compliance with fiscal rules in a larger sample of countries (Delgado-Téllez et al., 2017, analyse compliance on the subnational level in Spain). Cordes et al. (2015) describe features of compliance with 31 expenditure rules in advanced and emerging economies. By looking at averages of compliance, they find expenditure rules to be complied with more often than other types of fiscal rules, especially if they are set out in coalition agreements or statutory law and entail specific nominal targets. Nevertheless, they do not use their data on compliance with expenditure rules in an econometric framework or to identify determinants of compliance. Frankel and Schreger (2013) look at the (forecast) compliance with the supranational EU rules set out in the Maastricht treaty. They find that the forecasts of governments are biased when a country is in danger of non-compliance with the 3% deficit rule. Furthermore, they show that this bias is smaller in countries with strong national rules as well as independent forecasting institutions.

The remainder of the paper is organized as follows: Section 2 introduces the sample of fiscal rules and the potential determinants analysed in this paper. In Section 3, some general observations regarding the average compliance statistics of various sub-samples and correlations between fiscal rule characteristics are presented. Section 4 introduces the econometric frameworks which are employed in Section 5 to identify the determinants of compliance. Section 6 concludes.

2 Data

2.1 Compliance with fiscal rules

There are two major datasets on numerical fiscal rules published by the European Commission (2014) and the International Monetary Fund (2015) respectively. The European Commission (2014) dataset contains 179 national numerical fiscal rules on all government levels of the EU28 member states from 1990 to 2014. The International Monetary Fund (2015) dataset, on the other hand, provides data for a larger sample of 89 countries from 1985 to 2014, but not at the regional or local government level (Budina et al., 2012).

Both datasets include basic information on the rules (such as type, legal basis, coverage, etc.), the characteristics of the rules' environment (including media visibility, monitoring institutions, etc.), but also longer descriptions of the actual rules. This paper analyses those longer descriptions to calculate the

variables which are constrained by the fiscal rule and the numerical limits set out in the rule. Based on this data, a dummy variable ($c_{i,j,t}$) is constructed indicating if country i complied with its fiscal rule j in a specific year t, or not. The rule-specific characteristics provided in the databases are then used as potential determinants of compliance.

Tables 1 and 2 present the 51 national numerical fiscal rules (which are or have been in force in 20 countries) included in the sample of this paper, covering the general (67% of the rules in the sample) or central (33%) government respectively. Fiscal rules covering the local or regional levels are not included due to data availability, but an empirical exercise in Section 5.4 tests whether the existence of rules at lower government levels influences the results. The sample includes rules that are enshrined in statutory law or constitution (68%), but also about a third that are only set out in coalitional agreements or political commitments (32%). In terms of the type of rule, the sample includes 25 balanced budget rules (49%), 11 debt rules (22%), 15 expenditure rules (29%) and no revenue rules. Tables 1 and 2 also show transformations of the explanatory information collected from the two databases into mathematical formulas, which are used to calculate the compliance variable ($c_{i,j,t}$). The rules are very heterogeneous and even if they are constraining the same fiscal variable, they are not always setting the same numerical limits. Many of the national fiscal rules included in this sample were introduced during or after the financial crisis (53% since 2008), but about half of the rules (47%) were already in force before 2008. The sample does not include any rules that were introduced in 2014 or later, since they could not be used in the empirical analysis of this paper.

Table 1: Sample of fiscal rules covering the general government

Ctry.	Type	From	To	Rule	Condition
Legal basis: Statutory Law or Constitution					
BG	BBR	2012	-	$bb_t^c \geq -2\%$	
BG	DR	2003	-	$d_t \leq d_{t-1}$	if $d_{t-1} > 60\%$
BG	ER	2012	-	$e_t \leq 40\%$	
DK	BBR[1]	2012	-	$sb_t \geq -0.5\%$	
ES	BBR	2002[3]	2005	$bb_t \geq 0$	
ES	BBR	2006	2011	$bb_t \geq 0$	otherwise
				$bb_t \geq -2\%$ (10-11: -1%)	if $\delta Y_t < 2\%$
				$bb_t > 0\%$	if $\delta Y_t > 3\%$
ES	ER[4]	2011	-	$\delta(PE_t - U_t^{ndisc}) \leq \oslash_9 \delta Y_t$	
HR	ER[5]	2011[6]	2013[7]	$\Delta e_t \leq -1\%$	if $pb_{t-1} < 0$
				$pb_t^{cyc} \geq 0$	if $pb_{t-1} \geq 0$
HU	BBR	2004[8]	2009[9]	$pb_t > 0$	
HU	BBR[2]	2010	2011	$bb_t > bb_{t-1}$	
HU	DR	2012[10]	-	$d_t \leq d_{t-1}$	if $d_{t-1} > 50\%$
HU	ER[2]	2010	2011	$\delta PE_t^r \leq 0.5\delta Y_t^r$	
IE	DR[1]	2013	-	$d_t \leq d_{t-1}$	if $d_{t-1} > 60\%$
IE	BBR[11]	2013	-	$sb_t \geq -0.5\%$	
LV	BBR	2013	-	$sb_t \geq -0.5\%$	if $sb_{t-1} > -1\%$
				$sb_t \geq sb_{t-1} + 0.5\%$	if $sb_{t-1} < -1\%$
LV	DR[1]	2013	-	$d_t \leq 60\%$	
PL	DR	1999[12]	2013	$BB_t/R_t \geq BB_{t-1}/R_{t-1}$	if $d_{t-1} > 50\%$
				$d_t \leq d_{t-1}$	if $d_{t-1} > 55\%$
PT	DR[1]	2013	-	$\Delta d_t \leq -\frac{1}{20}(d_{t-1} - 60\%)$	if $d_{t-1} > 60\%$
RO	DR[2]	2013	-	$d_t \leq 60\%$	
RO	ER[2]	2010	2012	$\delta E_t \leq \oslash_{-3}\delta Y_t$	if $bb_{t-1} \leq 0$
SE	BBR	2007	-	$sb_t \geq 1\%$	
SK	DR	2012	-	$d_t \leq 60\%$	
SK	BBR	2013[13]	-	$sb_t \geq -0.5\%$	if $d_{t-1} > 60\%$
				$sb_t \geq -1\%$	if $d_{t-1} \leq 60\%$
UK	BBR	1997	2008	$bb_t^{cur,cyc} \geq 0$	
UK	BBR	2010[14]	-	$bb_t > bb_{t-1}$	
UK	DR	1997	2008	$nd_t \leq 40\%$	
Legal basis: Coalitional agreement or Political Commitment					
BG	BBR	2011	2011	$bb_t^c \geq -2\%$	
BG	ER	2006	2009[15]	$e_t \leq 40\%$	
DK	ER	1994	2006	$\delta C_t^r \leq 0.5\%$ ($\leq 1\%$ in 2002-2005)	
DK	BBR	1992	2006[16]	$sb_t \geq -0.5\%$	
EE	BBR	1993	2011[17]	$bb_t \geq 0$	
EE	BBR	2012	-	$sb_t \geq 0$	
SE	BBR	2000	2006	$sb_t \geq 2\%$	
SI	DR	2000	2009[18]	$d_t \leq 40\%$	

Notes: [1] Not mentioned in International Monetary Fund (2015) dataset, only in European Commission (2014), [2] Not mentioned in EC dataset only in IMF, [3] in IMF only from 2003, [4] in IMF only covering central not general government, [5] in IMF dataset, split into two rules, one expenditure and one balanced budget rule, [6] in IMF only from 2012, [7] in EC in force also past 2013, [8] in EC only from 2007, [9] in EC only until 2008, [10] in IMF only from 2016, [11] not as mentioned as rule in IMF, but mentioned in text as future rule, [12] in EC only from 2014, [14] in IMF from 2009, [15] according to EC until 2011, but "discontinued in 2010 and 2011" according to IMF, [16] in IMF still in force, [17] in IMF until 2007/2008, [18] according to IMF only until 2004.
Economic symbols: δ growth rate, Δ difference, $\oslash_t$ average over past t years (forecast years if t is negative), ^{r} real values (using BIP deflator), ^{cur} current figures, ^{c} on cash basis, ^{cyc} cyclically adjusted, ^{ndisc} non-discretionary; BB_t Budget balance, bb_t Budget balance (% of GDP), C_t Government final consumption, d_t Gross debt (% of GDP), E_t Total expenditure, e_t Total expenditure (% of GDP), inv_t Investment expenditures (% of GDP), nd_t net debt (% of GDP), pb_t Primary balance (% of GDP), PE_t Primary expenditure, $Pensions_t$ Pension expenditure, R_t Total revenue, sb_t Structural balance (% of GDP), U_t Unemployment expenditures, Y_t GDP, Yp_t Potential GDP.

Nevertheless, the original European Commission (2014) and International Monetary Fund (2015) databases include a range of additional fiscal rules which are not part of the sample of this paper. The rules which were excluded are presented in Section A.2 in the Appendix. The four main reasons not to include those fiscal rules were: i) data availability (some rules only constrain very small parts of government finances or generally use variables which were not available

in the Eurostat datasets). ii) They become effective only in the future (some rules were included in the databases but will only be in force in some future years), iii) they set no quantified target (some rules especially with a lower legal basis do not have quantifiable or clear targets in their definitions), and iv) they were classified ambiguously (some rules are medium term expenditure frameworks rather than numerical fiscal rules with regularly changing targets). Interestingly, many of those rules which could not be included in the sample of this paper were also missing in either of the two original datasets, which might point to some unclear definition or interpretation of those rules.

Table 2: Sample of fiscal rules covering the central government

Ctry.	Type	From	To	Rule	Condition
Legal basis: Statutory Law or Constitution					
DE	BBR	1990[3]	2010	$inv_t + bb_t \geq 0$	
DE	BBR	2011	-	$sb_t \geq -0.35\%$	
FR	ER[4]	2011	-	$\max(\delta E_t, \delta(PE_t - Pensions_t)^r) \leq 0$	
HR	DR	2009	-	$\Delta d_t \leq 0\%$	
HU	BBR[1,5]	2009	2011	$pb_t \geq 0\%$	
HU	DR	2009	2011	$\Delta d_t \leq 0\%$	
LT	ER	2008	-	$\delta E_t \leq \oslash_5(\delta R_t) + 0.5\%$	if $\oslash_5 BB_t^{GG} \leq 0$
PL	ER	2011	2014	$\delta E_t^{cyc,r} \leq 1\%$	
PT	BBR[1]	2002	-	$bb_t \geq 0$	
Legal basis: Coalitional agreement or Political Commitment					
BE	ER	1993	1998	$\delta PE^r \leq 0\%$	
DE	ER	1990[6]	2007	$\delta E_t \leq 1\%$	
DE	ER	2008	-[7]	$\delta E_t \leq \delta R_t$	
FI	BBR	1999	2002	$bb_t \geq -2.75\%$	
FI	BBR	2003	2008	$bb_t \geq -2.5\%$	
FI	BBR[8]	2011	-	$bb_t \geq -1\%$	
FR	ER[9]	1998	2010	$\max(\delta E_t, \delta(PE_t - Pensions_t)^r) \leq 0$	
PL	BBR	2006	2007	$BB_t \leq 30Bio.$	

Notes: [1] Not mentioned in International Monetary Fund (2015) dataset, only in European Commission (2014), [2] Not mentioned in EC dataset, only in IMF, [3] in IMF from 1969, [4] in IMF only one rule enshrined in statutory law and political commitment, [5] in EC mentioned as debt rule, [6] in EC debt rule instead of balanced budget rule, [7] in EC still in force in 2014, [8] in IMF from 1982, [9] in IMF same as statutory rule from 2011
Economic symbols: δ growth rate, Δ difference, $\oslash_t$ average over past t years (forecast years if t is negative), ^{r} real values (using BIP deflator), ^{cur} current figures, ^{c} on cash basis, ^{cyc} cyclically adjusted, ^{ndisc} non-discretionary; BB_t Budget balance, bb_t Budget balance (% of GDP), C_t Government final consumption, d_t Gross debt (% of GDP), E_t Total expenditure, e_t Total expenditure (% of GDP), inv_t Investment expenditures (% of GDP), nd_t net debt (% of GDP), pb_t Primary balance (% of GDP), PE_t Primary expenditure, $Pensions_t$ Pension expenditure, R_t Total revenue, sb_t Structural balance (% of GDP), U_t Unemployment expenditures, Y_t GDP, Yp_t Potential GDP.

The calculation of a country's compliance with its fiscal rules ($c_{i,j,t}$) according to the formulas in Tables 1 and 2 from 1995 to 2015 is based on the Eurostat Government Finance Statistics dataset and Eurostat's AMECO database (a more detailed data description can be found in Section A.1 in the Appendix). This implies that on the one hand, the resulting compliance calculated in this paper might differ (slightly) from the compliance observed at the national level, as this paper analyses national fiscal rules which usually are evaluated at the national level but uses EU data. On the other hand, the advantage of using EU level data might be that it is less prone to be manipulated by national politicians and thus draws a more realistic picture of actual compliance. Nevertheless, Section 5.6 performs robustness checks of the results taking into account the uncertain difference between EU and national statistics, as well as the calculated compliance in this paper and the observed compliance on the national level.

Another caveat is that the paper can only analyse ex-post and annual com-

pliance with fiscal rules. Thus, it is not possible to infer if governments at the time, thought that they complied with fiscal rules ex-ante and only broke their rules because of unexpected shocks. Nevertheless, one exercise in Section 5.5 tests if changes in macroeconomic forecasts significantly influence the probability of compliance. Furthermore, the observed compliance in this paper might differ from the compliance observed in the respective years due to data revisions (which can be quite substantial as shown e.g. in Castro et al., 2013). Unfortunately real-time data is not available for all variables necessary for the calculation of compliance of all rules, but Section 5.6 also checks the robustness of the results with real-time data for the rules where data is available.

The calculation of compliance in this paper does not take into account any escape clauses that might cause the fiscal rules to be not applicable in the respective year. However, the existence of escape clauses (30 % of the rules in this paper's sample have escape clauses) is controlled for within the rule-specific variables $R_{i,j,t}$ in the econometric exercises and the robustness of the results is tested based on the subsample of rules without escape clauses (Table 15).

2.2 Rule-specific, country-specific and supranational determinants

The European Commission (2014) dataset provides the most comprehensive additional information on the characteristics and frameworks of fiscal rules. Thus, the main empirical analysis in this paper concentrates on the variables provided in this dataset and summarized in Table 3 (additional summary statistics are given in Table 11 in the Appendix). As a robustness check, Section 5.6 also shows the results for the additional rule-specific information provided in the International Monetary Fund (2015) dataset.

Table 3 presents the rule specific variables together with the distribution of their values in the original European Commission (2014) database, on the one hand, and the sample of fiscal rules used in this paper, on the other hand. Since the European Commission (2014) database claims to include all numerical fiscal rules in the EU28 member countries since 1990, a comparison of the two distributions shows how far the smaller sample of 51 rules used in this paper is representative for the population of 98 fiscal rules in the EU28 (covering the general or central government and coming into force before 2014). For most of the variables, the two distributions are very similar or even identical, larger differences can only be observed regarding the monitoring body (rules in this paper have stronger and more independent monitoring institutions) and media visibility (the sample of this paper includes rules which are more visible in the media).

Table 3: Description of rule-specific Variables ($R_{i,j,t}$)

Variable	Description and possible values	% in EC(2014)	% in this paper
Debt Rule	1 if rule type is debt rule,	22%	22%
	0 otherwise	78%	78%
Expenditure Rule	1 if rule type is expenditure rule,	38%	29%
	0 otherwise	62%	71%
Coverage GG finances	Share of general government finances covered	73%	79%
Autom. sanctions / corrections	1 Automatic correction and/ or sanction mechanisms	11%	15%
	0 otherwise	89%	85%
Statutory base	If rule is based on political commitment (1),	8%	13%
	coalition agreement (2),	29%	20%
	legal act (3),	53%	50%
	constitution (4)	10%	18%
Adjustment margin	Room for changing objectives: complete freedom (1),	5%	5%
	some but constrained margin (2),	44%	48%
	no margin for adjustment (3)	51%	48%
Monitoring body	Institution monitoring compliance: no regular monitoring (1),	9%	5%
	government body, including MoF (2),	49%	35%
	independent authority or national parliament (3)	42%	60%
Alert mechanism	1 if real-time alert mechanism of risk of non-compliance exists,	50%	48%
	0 otherwise	50%	53%
Enforcement body	Institution enforcing the rule: no specific body (1),	14%	20%
	government body, including MoF (2),	67%	65%
	independent authority or national parliament (3)	19%	15%
Non-compl. actions	Enforcement mechanisms of rule: no ex-ante defined actions (1),	45%	50%
	obligation to present corrective proposals (2),	27%	20%
	automatic correction and possibility of sanctions (3),	18%	15%
	automatic correction or sanctions (4)	10%	15%
Escape clauses	1 if escape clauses are foreseen and clearly specified,	27%	30%
	0 otherwise	73%	70%
Media visibility	Visibility of rule: no or modest interest (1),	42%	28%
	high interest, but unlikely public debate if non-compliance (2),	23%	30%
	closely monitored and non-compliance sparks public debate (3)	35%	43%

Notes: Source of variable description is European Commission (2014) and percentages refer to share of fiscal rules in total European Commission (2014) database (only rules which cover general or central government and came into force before 2014) and sample of fiscal rules in this paper with specific value described on the left.

In addition to the rule-specific characteristics, the compliance with fiscal rules could also be influenced by a country's political, socio-economic and economic environment ($V_{i,t}$). In this respect, the analysis of this paper is based on the following variables: i) output gap (of the previous period), ii) inflation rate (represented by the harmonised consumer price index), iii) general government debt to GDP ratio (of previous period), iv) implied interest rate (i.e. interest expenditures of the general government as share of its gross debt), v) government fragmentation, vi) decentralization (i.e. the average share of revenues and expenditures received or spend at the regional and local government level compared to the general government), vii) ideology (conservatism) index, viii) military expenditure (as share of GDP), ix) election year (for the legislative chambers). Those country-specific variables are taken mainly from Eurostat, IMF and the Database on Political Institutions. Summary statistics and the sources of those variables are also presented in Table 11 in the Appendix.

Finally, the supranational fiscal framework, especially because of changes in monitoring and awareness, could also be important for the compliance with national fiscal rules in the EU28. Thus, this paper includes dummy variables

for the years i) before joining the European Monetary Union (EMU), ii) the membership in the EMU, iii) the strengthened Stability and Growth Pact (SGP) (after the Six-/Two-pack legislation and Fiscal compact), iv) an interaction between the former two, as the strengthened SGP might have a stronger effect for EMU countries, and v) an IMF support programme. These supranational variables are also included to control for any changes in supranational fiscal rules or supranational monitoring/ auditing of national fiscal rules.

3 Descriptive Statistics

3.1 Average compliance statistics

This section analyses the distribution of the variable of main interest of this paper, the compliance with fiscal rules, and the links between the various characteristics of those rules. Table 4 shows the average compliance for various sub-samples of rules, countries and time periods. The 51 national numerical fiscal rules included in the sample of this paper were overall complied with in 51% of the years across all rules and countries. The statistics show that debt rules are complied with much more often than expenditure or balanced budget rules (88% compared to 45% and 35%). The reason might be that many debt rules constrain stock rather than flow variables and the former show a much higher average compliance (74%). The average absolute distance between the constrained variable and the numerical limit is also much larger for stock variables (6.68% of GDP) than for flow variables (1.86% of GDP).

The legal basis of the rules does not seem to play an important role for compliance when comparing rules in statutory law or constitution with rules that are mere coalitional agreements or political commitment. If anything, coalitional agreements seem to be complied with slightly more and mere political commitments slightly less often. Fiscal rules covering the general government are complied with almost twice as often as rules covering only the central government, while combining central or general government rules with rules on the local or regional level does not seem to make a difference. Even splitting the sample between countries with high or low levels of fiscal decentralization, does not change this fact significantly.

The stricter the actions set out in case of non-compliance, the higher is the average compliance with fiscal rules: While almost two thirds of the rules with automatic sanctions or correction mechanisms are complied with, the rules with no pre-defined actions are complied with only in 43% of the years. Non-Euroarea and former transition economies comply with their fiscal rules significantly more often than the other EU28 member states. One reason is that most of the debt rules (9 of the 11 in this paper) in the EU28 are or were in force in former transition countries and debt rules have a much higher average ratio of compliance. Furthermore, when splitting the sample time period into five-year sections, no significant difference in the compliance with fiscal rules across time can be observed, although compliance seems to increase slightly over time until the sovereign debt crisis (from 46% before 2000 to 56% between 2006 and 2010).

Table 4: Average compliance with national numerical fiscal rules in sample

Rule Type:	All Rules	BBR	DR	ER
Avg. Compliance	51%	35%	88%	45%
Observations	316	150	78	88

Constrained Var.:	Stock	Flow		
Avg. Compliance	74%	43%		
Observations	84	232		

Legal basis:	PC	CA	L	C
Avg. Compliance	43%	56%	51%	53%
Observations	46	73	144	53

Coverage:	CG	GG	Combined w. LG/ RG rules	
Avg. Compliance	37%	60%	51%	
Observations	115	201	210	

In case of non-compliance:	Autom. sanct. / corr. mech.	Oblig. to respond/ justify	No pre-defined action	
Avg. Compliance	61%	55%	43%	
Observations	61	73	168	

Countries:	Euroarea	Non-Euroarea	Former transition	Not form. tran.
Avg. Compliance	42%	62%	69%	39%
Observations	165	151	130	186

Time periods:	1995-2000	2001-2005	2006-2010	2011-2015
Avg. Compliance	46%	52%	56%	50%
Observations	48	73	81	114

Notes: Average compliance in % of years in subsample indicated above horizontal line. BBR - Balanced Budget Rule; DR - Debt Rule; ER - Expenditure Rule; PC- Political Commitment; CA - Coalitional Agreement; L - Statutory Law; C - Constitution; GG - General Government Level; CG - Central Government Level; RG - Regional Government Level; LG - Local Government Level; Euroarea countries: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia, Spain; Former transition economies: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.

3.2 Correlation of potential determinants

There is a range of other interesting observations, when analysing the correlation between the various features of fiscal rules (described in Table 3). The upper panel of Table 5 presents the correlation-matrix of the rule-specific variables $R_{i,j,t}$. None of the correlation coefficients seems to be too large as to suggest not including the variables alongside each other in econometric regressions. Nevertheless, some modestly high correlations show which features occur together and which do not. Rules covering larger shares of general government finances are correlated with more real-time alert mechanisms (correlation 0.37) and stricter non-compliance actions (0.34). This might be the reason why rules covering only the central government finances are significantly less complied with (Table 4).

Rules on a higher legal basis have stronger and more independent monitoring of the rule (0.41) and stricter non-compliance actions (0.36). On the other hand, the existence of escape clauses seems highly correlated (0.58) with higher levels of the legal basis, the monitoring of the rule (0.57) and non-compliance actions

(0.42). This suggests that if governments adopt their rules on a higher legal basis and improve the monitoring, they also seem to introduce more escape clauses, thus giving more negotiation room for governments. The same seems to be true for stronger non-compliance actions which are positively correlated with stronger enforcement institutions (0.43). The room for adjusting the objectives is associated with rules enforced by more independent institutions (0.33) and those independent enforcement institutions issue more real-time alerts (0.28) regarding the compliance with the rule.

Table 5: Correlation between rule- $(R_{i,j,t})$ and country-specific $(V_{i,t})$ variables

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	Stock variable	1.00										
(2)	Coverage GG finances	0.17	1.00									
(3)	Autom. sanctions / corrections	0.02	0.14	1.00								
(4)	Statutory base	0.28	0.23	0.03	1.00							
(5)	Adjustment margin	−0.09	0.24	0.15	0.14	1.00						
(6)	Monitoring body	−0.02	0.06	−0.27	0.41	0.09	1.00					
(7)	Alert mechanism	−0.08	0.37	0.22	−0.02	0.07	−0.03	1.00				
(8)	Enforcement body	0.08	0.21	0.33	0.18	0.34	−0.06	0.30	1.00			
(9)	Non-compl. actions	−0.05	0.34	0.55	0.36	0.21	0.05	0.28	0.43	1.00		
(10)	Escape clauses	0.16	0.00	−0.09	0.58	0.12	0.57	−0.01	0.20	0.42	1.00	
(11)	Media visibility	−0.01	0.02	0.23	0.22	−0.13	0.20	0.15	0.05	0.14	0.26	1.00
(12)	Output Gap (-1)	0.02	0.06	−0.05	−0.23	−0.23	−0.05	0.12	−0.04	−0.02	−0.04	−0.02
(13)	Inflation	0.02	−0.08	0.05	0.25	0.38	0.00	−0.18	0.12	−0.12	−0.06	−0.10
(14)	GG Debt (-1)	−0.13	−0.34	−0.35	0.25	0.10	0.23	−0.42	−0.14	−0.22	0.03	−0.05
(15)	Impl. interest rate (-1)	0.19	0.21	−0.25	−0.03	−0.09	0.07	0.12	0.01	0.04	0.15	−0.21
(16)	Gov. fragmentation	−0.20	−0.10	0.22	−0.25	0.05	−0.26	0.33	−0.01	−0.15	−0.22	−0.04
(17)	Decentralization	−0.10	−0.64	−0.15	−0.07	−0.14	−0.06	−0.26	−0.28	−0.28	−0.09	0.00
(18)	Ideology (conservatism)	−0.14	−0.13	0.07	−0.11	−0.01	−0.13	0.00	0.05	−0.04	−0.22	−0.02
(19)	Military expenditure	−0.04	0.02	−0.05	−0.21	−0.19	0.05	0.05	−0.11	0.25	0.00	0.10
(20)	Election Year	0.02	0.00	0.02	0.01	−0.01	−0.05	0.00	0.00	0.02	−0.01	−0.04

Notes: Correlations between variables described in rows and variables as numbered in rows. The sample includes 316 observations for which compliance data is available in this paper.

Looking at the correlation matrix between the rule-specific $(R_{i,j,t})$ and country-specific $(V_{i,t})$ variables (lower panel of Table 5), three main distinctions are possible based on: i) the general government debt, ii) the decentralization of government and iii) the fragmentation of the government. Higher general government debt levels are associated with smaller coverage of the general government finances (-0.34), less real-time alert mechanisms (-0.42) and less automatic sanctions or correction mechanisms (-0.35). All of those features point to loopholes allowing the general government debt to rise. The decentralization of government finances seems to determine the share of general government finances covered by the rules. The more decentralized the public finances of a country are the lower is this share (-0.64) associated with the fiscal rule. Confirming this finding, two thirds (68%) of the countries with a decentralization measure above the median also have fiscal rules at the regional or local government level, while only half of the less decentralized countries (48%) have such rules. Furthermore, the non-compliance actions (-0.28) seem to be less strict the more decentralized the government finances are. Finally, higher fragmentation of the government is associated with more real time alert mechanisms (0.33).

4 Econometric Framework

The calculation of compliance with the sample of fiscal rules described in Section 2, leads to 316 observations between 1995 and 2015. The binary variable $c_{i,j,t}$ of compliance is one, if country i complied with its fiscal rule j in year t and zero if not. Variable $c_{i,j,t}$ can only be observed in years when the fiscal rules were actually in force. The exercises in Section 5 try to identify the determinants of compliance in econometric models similar to the following:

$$c_{i,j,t} = \alpha + \beta R_{i,j,t} + \gamma V_{i,t} + \theta S_{i,t} + \varepsilon_{i,j,t} \qquad (1)$$

where vector $R_{i,j,t}$ includes the characteristics of fiscal rule j of country i in year t, vector $V_{i,t}$ the economic, political and socio-economic variables of country i in year t, and vector $S_{i,t}$ the supranational fiscal framework of country i in year t. All three sets of variables were introduced in Section 2. Whenever additional variables or subsets of either of the vectors are analysed, the other vectors are also included to control for rule- and country-specific properties. $\varepsilon_{i,j,t}$ is the idiosyncratic error term. Since the dependent variable is a binary variable, Equation 1 is estimated based on a panel logistic-regression and the tables show average marginal effects with robust standard errors.

Country fixed effects are not included in the baseline estimations, as the calculated effects would only represent conditional effects. The calculated effects would only be representative for rules which were complied with and not complied with at least once over the sample period, respectively (thus rules in Belgium, Portugal, Slovenia and Slovakia would not be included in an estimation with fixed effects). Nevertheless, the tables presented in Section 5 always also include a column based on the estimation with country fixed effects and robustness checks in Section 5.6 show that qualitative results do not change significantly when estimating Equation 1 with country- or time-fixed effects or leaving out control variables.

Two main concerns regarding endogeneity could be raised in this setting. First, there is a potential concern that the preferences of voters or the society are an omitted variable biasing the results. For example, if voters prefer compliance with their fiscal rules, they would also elect politicians that introduce strict rules with independent institutions and strong sanctions in the case of non-compliance. Dafflon and Pujol (2001) and Krogstrup and Wälti (2008) show that voter preferences are largely time-invariant (without significant electorate changes), i.e. they are controlled for when using country fixed-effects estimations. Additionally, various control variables from political economy are included to control for voter preferences, like ideology, government fragmentation or decentralization.

Second, there are possible concerns regarding reverse causality, i.e. governments introduce specific features of fiscal rules because they comply or do not comply with their fiscal rules. This kind of reverse causality is not possible in the setting of this paper, since every change of fiscal rules or introduction of new fiscal rules leads to a new rule $j + 1$ of country i and no compliance with this fiscal rule can be observed before the change or introduction. Furthermore, the change or introduction of fiscal rules (especially when enshrined in statutory or constitutional law) is a long and cumbersome process, restricting the possibility of an instantaneous effect from compliance to the fiscal rules in the same year.

5 Results

5.1 Rule-specific characteristics

Table 6 presents regression results for the rule-specific characteristics $R_{i,j,t}$. All estimations (Columns 1 to 14) in Table 6 also include the full vectors $V_{i,t}$ of country-specific and $S_{i,t}$ of supranational controls. The coefficients can, therefore, be interpreted as the effects of the rule-specific characteristics while controlling for country characteristics and changes in the supranational framework. Effectively investigating the effect of rule characteristics in similar countries and economic environments. Column 1 includes the full vector of rule-specific variables, Columns 2 to 12 include each variable separately and Column 13 presents the final selection of variables when consecutively excluding insignificant variables following the general-to-specific approach by Hendry (surveyed in Campos et al., 2005). Column 14 estimates the last column including country-fixed effects to investigate conditional effects.

The results suggest that, as already seen in Section 2, the probability of complying with fiscal rules increases by around 70% if the rule constrains a stock rather than a flow variable. While, as also noted above, the average distance of the constrained variable to the limit set out by the rules is larger for rules constraining stock variables, also the initial distance at the time the rule was coming into force is slightly larger (-5.6% of GDP for stock variables and -4.8% for flow variables). But what is more striking is that constrained stock variables tend to remain on one side of the limit for a much longer time. The standard OLS auto-correlation coefficient for the compliance variable for rules constraining stock variable is 0.88 and for flow variables 0.36. However, excluding rules which are always complied with or never complied with, i.e. adding country fixed-effects to the estimation (Column 14 in Table 6) does not change the results qualitatively. Also estimating the same equations just for balanced budget and expenditure rules or just for rules constraining flow variables (Columns 2 and 3 in Table 15 in the robustness section) results in similar qualitative conclusions. Hence, the other determinants of compliance are generally not different between rules constraining stock or flow variables, but there seems to be a level shift upwards in compliance for rules constraining stock variables.

Compliance is also significantly higher if rules cover larger shares of the general government finances. The estimated average marginal effect is 0.61, i.e. a 1% larger coverage of total general government finances is associated with a 0.6% higher probability of compliance. 57 % of observations are constrained by a fiscal rule which covers more than 90% of the general government finances and only 20% cover less than 50% (the latter are rules in Belgium, Germany, Denmark, Finland, France and Lithuania). First, it could be harder to comply with a rule covering only small parts of government's finances as policy makers have a smaller range of options to achieve compliance. Second, a rule covering smaller parts of the general government might be less interesting for media and public and thus receive less attention. While the correlation between media visibility and coverage of GG finances observed in Section 3.2 was almost zero, e.g. the average media visibility variable is slightly higher for rules covering more than 90% (2.4) as compared to rules covering less than 90% (2.1).

The probability of complying with fiscal rules decreases with an increase

Table 6: Estimation results for the fiscal rule-specific characteristics $R_{i,j,t}$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Stock variable	0.68*** (0.14)	0.49** (0.19)											0.69*** (0.12)	0.52*** (0.12)
Coverage of GG finances	0.52** (0.23)		0.47 (0.30)										0.61*** (0.20)	0.88** (0.36)
Automatic sanctions/ corrections	−0.00 (0.17)			−0.07 (0.25)										
Statutory base	−0.24*** (0.08)				−0.02 (0.12)								−0.26*** (0.07)	−0.23*** (0.07)
Adjustment margin	0.08 (0.10)					0.23 (0.14)								
Monitoring body	0.19* (0.10)						0.08 (0.17)						0.17** (0.08)	0.18 (0.12)
Alert mechanism	0.27*** (0.09)							0.32*** (0.11)					0.29*** (0.09)	0.24* (0.13)
Enforcement body	0.44*** (0.14)								0.37*** (0.07)				0.47*** (0.08)	0.27** (0.11)
Non-compliance actions	0.02 (0.06)									0.06 (0.06)				
Escape clauses	−0.08 (0.13)										0.09 (0.20)			
Media visibility	−0.01 (0.06)											−0.04 (0.12)		
Country fixed effects	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Observations	280	297	283	280	280	280	280	280	238	280	280	280	280	247

Notes: Each column presents a separate panel logistic regression with a country i's compliance $c_{i,j,t}$ with its fiscal rule j at year t as dependent variable. Country-specific controls ($V_{i,t}$) and supranational controls ($S_{i,t}$) are included in all regressions, but not reported. Only column 14 also includes country-fixed effects. The selection of variables in column 13 emerges after consecutively excluding insignificant variables following the general-to-specific approach by Hendry (surveyed in Campos et al., 2005). The coefficients present average marginal effects and robust (except for column 14) standard errors are in parentheses. * denotes significance at 10 percent level, ** denotes significance at 5 percent; *** denotes significance at 1 percent.

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in the statutory base of the rules. This means that, for example, coalitional agreements are more often complied with than rules enshrined in statutory law. Ownership of fiscal rules seems to play an important role. If the elected parties agree on fiscal rules in their coalitional agreement, then they might be more willing to comply with those than with legal fiscal rules which might have been introduced by their predecessors.

Strong and independent bodies to monitor and enforce the fiscal rules show a strong positive association with an increased probability of compliance. While the monitoring of rules in half of the sample is associated with independent bodies (like fiscal councils, courts or the national parliament), for enforcement of the rule this is only the case in 13% of the observations. In two thirds of the observations the institution in charge of enforcement is a government body, like the ministry of finance.

Furthermore, stronger alert mechanisms seem to be correlated with a higher probability of compliance. If there is a mechanism in place that involves real time monitoring of rules and an alert if there is a risk of non-compliance, the probability of compliance increase on average by 29%. Section 5.5 investigates the relationship between forecast errors and compliance. Interestingly there seems to be no significant correlation between primary balances that are lower than forecast and compliance with fiscal rules. One reason might be that if governments see the risk of non-compliance, they try to act against it and change their policies accordingly. An alert mechanism helps to warn the government of such a risk. Indeed, of all the observations in which the primary balance turned out to be worse than forecast, but the country complied with its fiscal rules anyway, 61% had a respective alert mechanism in place (only 32% for observations in non-compliance).

Neither stricter non-compliance actions nor escape clauses seem to increase compliance probabilities. Both seem to be a bit puzzling. The former as stricter sanctions or automatic correction mechanisms are usually introduced to especially increase compliance. The latter as escape clauses would give governments the opportunity to not comply with the rules more often. But, although 32% of the observations have automatic correction mechanisms with at least the possibility of sanctions, and 28% have well-specified escape clauses, both turn out to be not significant. Also when only looking at the subsample of rules which do not have escape clauses (Columns 4 in Table 15 in the robustness section), there seems to be no qualitative difference in the determinants of compliance. The reason could be that sanctions and automatic correction mechanisms, as well as escape clauses are not enforced systematically and thus not showing a significant effect. One could think of the supranational fiscal rules at the European level which by definition also have a sanction mechanism and well defined escape clauses. Nevertheless both are not enforced in a clear systematic way.

5.2 Economic and political environment

Table 7 presents the estimation results for the country-specific variables $V_{i,t}$. All columns include the full set of rule-specific ($R_{i,j,t}$) and supranational ($S_{i,t}$) characteristics and, as above, Columns 11 and 12 show the final set of variables after sequential elimination according to the general-to-specific approach by Hendry. Again the last column also includes country fixed effects to analyze conditional coefficients.

Table 7: Estimation results for the country-specific characteristics $V_{i,t}$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Output Gap (-1)	-0.87 (0.63)	-0.37 (0.55)										
Inflation	-0.59 (0.49)		0.14 (0.43)									
GG Debt (-1)	-0.00 (0.19)			-0.28 (0.23)								
Implied interest rate (-1)	-2.31 (4.09)				0.93 (3.07)							
Government fragmentation	-1.56*** (0.44)					-1.07** (0.47)					-1.42*** (0.52)	-1.28** (0.55)
Ideology (conservatism)	-1.15 (1.31)						0.37 (1.31)					
Decentralization	-1.04*** (0.32)							-0.88*** (0.33)			-1.08*** (0.34)	-2.75 (1.91)
Military expenditure	-0.04 (0.10)								-0.12 (0.10)			
Election Year	-0.08 (0.05)									-0.10** (0.05)	-0.09** (0.04)	-0.10* (0.05)
Country fixed effects	No	No	No	No	No	No	No	No	No	No	No	Yes
Observations	280	296	299	296	280	299	299	299	299	299	299	265

Notes: Each column presents a separate panel logistic regression with a country i's compliance $c_{i,j,t}$ with its fiscal rule j at year t as dependent variable. Rule-specific controls ($R_{i,j,t}$) and supranational controls ($S_{i,t}$) are included in all regressions, but not reported. Only column 12 also includes country-fixed effects. The selection of variables in Column 11 emerges after consecutively excluding insignificant variables following the general-to-specific approach by Hendry (surveyed in Campos et al., 2005). The coefficients present average marginal effects and robust (except for column 12) standard errors are in parentheses. * denotes significance at 10 percent level, ** denotes significance at 5 percent; *** denotes significance at 1 percent.

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The results show that generally the country-specific macroeconomic environment does not seem to matter for the compliance with fiscal rules. Neither output gap or inflation nor general government debt or interest payments, turn out to be significant for the probability to comply with fiscal rules.

However, several theories on the deficit bias of governments due to government fragmentation, decentralization and elections seem to also play a role for the compliance with fiscal rules. With respect to the latter two, the results confirm the findings of Delgado-Téllez et al. (2017) for the compliance with fiscal deficit targets in Spanish regions.

A wide range of studies (e.g. Schaltegger and Feld, 2004; Fabrizio and Mody, 2006; Besley and Case, 2003) showed that more fragmented governments, run higher public deficits and find it harder to agree on policies or consolidations. Hence, it is probably also harder for more fragmented governments to adhere to rules or agree on measures to ensure compliance. This can be observed in the results as well, as a one standard deviation (0.09) increase in the fragmentation of governments is associated with a 13% lower probability of compliance.

Also the degree of vertical organization of government finances seems to be a significant determinant of compliance with fiscal rules. A one standard deviation increase in decentralization (0.19) is associated with a 21% lower probability of compliance. This result is also in line with the literature (e.g. Oates, 2006; Afonso and Hauptmeier, 2009; Baskaran and Feld, 2013) suggesting that fiscal decentralization comes with coordination problems. As the degree of decentralization of government finances is rather constant over time, the coefficient becomes insignificant if country-fixed effects are included (Column 12 in Table 7).

Also in line with literature on political budget cycles, the probability of compliance with fiscal rules is around 10% lower in years in which a legislative election on the national level is held. Several papers (surveys can be found e.g. in Drazen, 2000; Klomp and de Haan, 2013) suggest that governments tend to reduce taxes and increase spending before elections, which would also make it harder for the government to comply with its fiscal rules. In turn, compliance with fiscal rules seems to play a minor role for election outcomes in the present sample. In around a third of the elections the governing parties changed, when the government did not comply with its fiscal rules in the previous two years.

5.3 Supranational framework

The supranational fiscal framework of the EU28 member states, due to increased monitoring, public and institutional awareness and auditing, might also play an important role for the compliance with national fiscal rules. Table 8 presents the results for the supranational variables $S_{i,t}$ (again including the rule- and country-specific variables, and country-fixed effects in the last column).

Overall, the results suggest that only the membership in the European Monetary Union (EMU) has a significant effect and this effect is negative. Membership in the EMU might entail a bailout expectation and thus lead to less fiscal discipline. The latter observation is also made e.g. in Jalles et al. (2016). Furthermore, Bergman et al. (2016) show that supranational fiscal rules do not have an effect on the effectiveness of national fiscal rules. Aside from the membership in the EMU, neither the years before joining the EMU, nor the reform of

the stability of growth pact or an IMF programme seem to significantly change compliance probabilities.

Table 8: Estimation results for the supranational framework $S_{i,t}$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EMU Membership	−0.34** (0.13)	−0.21** (0.10)					−0.24** (0.12)
EMU convergence	−0.07 (0.08)		0.08 (0.08)				
Reformed Stability & Growth Pact	−0.13 (0.12)			−0.03 (0.13)			
EMU Membership × Reformed SGP	0.25 (0.19)				0.04 (0.16)		
IMF support programme	−0.11 (0.11)					−0.11 (0.13)	
Country fixed effects	No	No	No	No	No	No	Yes
Observations	280	280	280	280	280	280	247

Notes: Each column presents a separate panel logistic regression with a country i's compliance $c_{i,j,t}$ with its fiscal rule j at year t as dependent variable. Rule- ($R_{i,j,t}$) and country- ($V_{i,t}$) specific controls are included in all regressions, but not reported. Only column 7 also includes country-fixed effects. The coefficients present average marginal effects and robust (except for column 7) standard errors are in parentheses. * denotes significance at 10 percent level, ** denotes significance at 5 percent; *** denotes significance at 1 percent.

5.4 Combinations and history of fiscal rules

Additional potential explanations for (non-)compliance with fiscal rules based on combinations of fiscal rules and their history are explored in the following paragraphs. Table 9 presents the estimation results for various additional variables, while every column represents a separate regression which includes all the rule-($R_{i,j,t}$) and country-($V_{i,t}$) specific and supranational ($S_{i,t}$) variables.

Combinations of fiscal rules do not seem to significantly influence the compliance probability. In addition, having fiscal rules at the regional or local government level or combinations of balanced budget and expenditure or debt rules also do not turn out to be significant. Furthermore, the number of fiscal rules which are in force simultaneously is not significant. These results are reassuring to look at the compliance of each fiscal rule independently. It does not seem promising to always introduce more rules of various types and at various government levels to increase compliance.

Table 9: Additional potential determinants of compliance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Also rule at RG or LG level	−0.03 (0.13)								
Combination BBR & ER		0.07 (0.09)							
Combination BBR & DR			−0.02 (0.14)						
No. of rules in force simultaneously				−0.01 (0.06)					
No. of years since introduction of rule					0.00 (0.01)				
Diff. gov. parties than at introduction						0.04 (0.08)			
Initial distance to numerical limit							−0.09 (0.13)		
Distance (abs) to numerical limit (-1)								0.10 (0.10)	
Dist. (only compl.) num. limit (-1)									0.08 (0.10)
Dist. (only non-compl.) num. limit (-1)									−7.88*** (2.54)
Observations	280	280	280	280	280	280	229	218	218

Notes: RG - Regional Government, LG - Local Government, BBR - Balanced Budget Rule, ER - Expenditure Rule, DR - Debt Rule. Each column presents a separate panel logistic regression with a country i's compliance $c_{i,j,t}$ with its fiscal rule j at year t as dependent variable. Rule-($R_{i,j,t}$), country-($V_{i,t}$) specific and supranational ($S_{i,t}$) controls are included in all regressions, but not reported. The coefficients present average marginal effects and robust standard errors are in parentheses. * denotes significance at 10 percent level, ** denotes significance at 5 percent; *** denotes significance at 1 percent.

Although an increasing tendency of compliance with fiscal rules over time could be observed in Section 3, it seems that the number of years a rule is in force is not important for compliance with it. Also the parties in power at the time of introduction of the fiscal rule does not seem to play an important role.

Furthermore, when looking at the years after the introduction and neither the compliance in the previous year (lagged dependent variable) nor the general distance between the constrained variable and the numerical limit (in the previous year) set out in the fiscal rule turn out to be significant. The latter distance is significant, though, if the variable is restricted to only values in years of non-compliance with the fiscal rule. In the case of non-compliance in the previous year, the probability to comply with the fiscal rule in this year is lower the further away the constrained variable was from the numerical limit.

5.5 Forecast errors

One reason why governments do not comply with their fiscal rules might be that despite their best intentions, an unexpected economic shock happened and pushed the fiscal variables into non-compliance. Table 10 tries to test this by analysing the effect of forecast errors on the compliance probability. Forecast errors are calculated as the percentage of nominal GDP difference of a variable from the forecasts in the autumn of $t-2$ vintage of the AMECO database to the spring $t+1$ vintage (the results remain very similar if instead of the autumn $t-2$ vintage the vintage of autumn $t-1$ is used). These forecast errors are

calculated for the variables nominal GDP and the general government's primary balance, and split into only positive (forecast in $t-2$ was above value in $t+1$) and only negative values.

On the one hand, the results suggest that generally unexpected macroeconomic shocks or forecast errors of nominal GDP do not significantly influence the compliance with fiscal rules. On the other hand, forecast errors regarding the primary balance do change the compliance probabilities. Interestingly though, only the negative forecast errors, i.e. where the actual value was above the forecast value, significantly change compliance and in the expected positive direction. Thus forecast errors or macroeconomic shocks generally do not seem to influence compliance with fiscal rules, with the exception that if there is an unexpected increase in the primary balance it significantly increases the probability of complying with fiscal rules. The opposite is not true, i.e. an unexpected decrease in the primary balance does not lead to a significant decrease in the compliance probability, probably because, in this case, governments try to counteract the shock.

Table 10: Forecast errors

	(1)	(2)	(3)	(4)
Forecast error of nominal GDP	−0.48 (0.55)			
Forecast error of nominal GDP (only negative)		−1.08 (1.26)		
Forecast error of nominal GDP (only positive)		−0.24 (0.39)		
Forecast error of GG primary balance			−4.07*** (1.17)	
Forecast error of GG primary balance (only negative)				−6.27*** (2.25)
Forecast error of GG primary balance (only positive)				−2.24 (1.88)
Observations	246	246	234	234

*Notes:*Each column presents a separate panel logistic regression with a country i's compliance $c_{i,j,t}$ with its fiscal rule j at year t as the dependent variable. Rule-($R_{i,j,t}$), country-($V_{i,t}$) specific and supranational ($S_{i,t}$) controls are included in all regressions, but not reported. Forecast errors are calculated as % of nominal GDP difference of variable from AMECO vintage autumn $t-2$ to vintage spring $t+1$. The coefficients present average marginal effects and robust standard errors are in parentheses. * denotes significance at 10 percent level, ** denotes significance at 5 percent; *** denotes significance at 1 percent.

5.6 Robustness

To investigate the robustness of the results presented in Sections 5.1 to 5.4, this section re-estimates Column 13 of Table 6 focusing on the uncertainty regarding the calculation of the dependent variable, the sample and the econometric specification.

The calculation of the variable of interest in this paper, the compliance of countries with its fiscal rules, might differ from the actual compliance observed by national institutions or governments. Either because this paper does not use national, but European data, or because some specificities of the variables used in the descriptions of the fiscal rules might be ambiguously defined or described. Nevertheless, it can be assumed that the difference between the actual value of the variable constrained by the fiscal rules (as well as its numerical limit)

observed by national institutions and those observed in this paper are small in terms of percentage points of GDP. Table 14 in the Appendix shows the results when calculating the compliance ($c_{i,j,t}$) based on the constrained variable being 0.25 percentage points of GDP higher or lower, 5 percent higher or lower and a quarter of a standard deviation higher or lower than in the baseline calculations. The qualitative (and more or less quantitative) results remain similar throughout almost all specifications.

With regards to subsamples, Table 15 shows the results splitting the sample by three dimensions: i) rule characteristics, ii) countries and iii) time. As the indicator that the constrained variable is a stock variable is significant in all estimations, Column 2 of Table 15 looks only at balanced budget and expenditure rules (there are not enough observations to estimate the equation just for debt rules) and Column 3 only at rules constraining flow variables. The main conclusions seem to hold. Splitting the sample into Euroarea and non-Euroarea countries reveals virtually the same results as in the baseline, with the exception of alert mechanism which seems to play a role only in non-Euroarea countries. Finally, splitting the sample into before and after the financial crisis 2007 reveals that especially the independence and strength of monitoring bodies has become significant only in the later period.

To test the robustness of the results with regards to the inclusion of the country-specific ($V_{i,t}$) and supranational ($S_{i,t}$) variables, and country- and time-fixed effects, Table 5.6 presents the estimation results for different combinations of those control variables. The qualitative results remain relatively stable, except for the specification with additional time- and country-fixed effects which might just be due to the resulting small number of degrees of freedom.

6 Conclusions

Instead of focusing on the effects of fiscal rules, this paper is one of the first to analyse the determinants of a country's compliance with its national numerical fiscal rules. Based on a sample of 51 fiscal rules in 20 EU member states from 1995 to 2014, the paper looks for potential explanations of higher or lower compliance probabilities among specific rule characteristics and their fiscal frameworks, as well as their political and (socio-)economic environments.

While the average compliance across all rules and countries is found to be around 50%, compliance with rules constraining stock (rather than flow) variables, set out in coalitional agreements and rules covering larger parts of the general government finances is significantly higher. In econometric exercises, independent and strong monitoring and enforcement bodies (with real-time alert mechanisms) turn out to be significantly associated with a higher probability of compliance. Several theories of the deficit bias of government due to government fragmentation, decentralization and political budget cycles are also significant with regards to compliance with fiscal rules. However, neither the economic environment or business cycle, nor forecast errors (except for an unexpectedly higher primary balance) seem to play a role in determining compliance with fiscal rules.

While this paper can be a starting point to analyse the optimal design and framework of fiscal rules, one of the most important questions remains which actual numerical limits the rules are setting. If those limits are not optimal,

then compliance with those rules is also not optimal as well. Furthermore, a combined analysis of compliance and the effects of fiscal rules might draw a more differentiated picture e.g. of binding versus non-binding fiscal rules.

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Appendix

A.1 Data description

Table 11: Summary Statistics

Variable	Obs.	Mean	Std.Dev.	Min.	Max.	Source
Compliance	316	0.51	0.50	0.00	1.00	Various
Stock variable	316	0.27	0.44	0.00	1.00	EC / IMF
Coverage of GG finances	302	0.78	0.27	0.23	1.00	EC
Automatic sanctions/ corrections	302	0.20	0.40	0.00	1.00	EC / IMF
Statutory Base	299	2.64	0.92	1.00	4.00	EC
Adjustment margin	299	2.23	0.59	1.00	3.00	EC
Monitoring body	299	2.48	0.56	1.00	3.00	EC
Alert mechanism	299	0.51	0.50	0.00	1.00	EC
Enforcement body	299	1.91	0.59	1.00	3.00	EC
Non-compliance actions	299	1.89	1.10	1.00	4.00	EC
Escape clauses	299	0.29	0.45	0.00	1.00	EC
Media visibility	299	2.24	0.81	1.00	3.00	EC
Output Gap (% GDP)	313	−0.29	2.92	−10.49	14.45	Eurostat
Inflation (HICP)	316	87.04	11.71	38.14	102.72	Eurostat
Gross GG Debt (% GDP)	313	52.39	26.26	3.66	130.60	Eurostat
Implied Interest Rate	297	5.06	1.57	1.07	11.39	Eurostat
Gov. Fragmentation	316	0.79	0.09	0.54	0.95	WB DPI
Decentralization	316	37.37	18.67	4.39	72.57	Eurostat
Ideology (conservatism)	316	2.47	2.71	0.00	8.00	WB DPI
Election Year	316	0.27	0.44	0.00	1.00	WB DPI
EMU Membership	316	0.39	0.49	0.00	1.00	
EMU Convergence	316	0.09	0.29	0.00	1.00	
Reformed SGP	316	0.29	0.46	0.00	1.00	
IMF Programme	316	0.14	0.35	0.00	1.00	

Notes: EC . . . European Commission (2014); IMF . . . International Monetary Fund (2015); Eurostat . . . Eurostat Government finance statistics; WB DPI . . . World Bank Database on Political Institutions as updated by Cruz et al. (2016); IMF GFS . . . IMF Government Finance Statistics. Descriptive Statistics for observations where compliance variable is available

A.2 Excluded fiscal rules

Table 12: Fiscal rules covering general government not included in sample

Ctry.	Type	Cov.	From	To	Description	Reason to not include
AT	ER [2]	CG	2009	-	Expenditure ceilings	MTEF (ceilings changed every year)
BE	BBR [2]	GG	2014	-	Target for structural balance	after 2013
CY	DR [8]	GG	2014	-	Adjustment path for gross government debt	after 2013
CY	BBR	GG	2013 [14]	-	Target for structural balance	No quantified target in text
DE	BBR [2]	GG	2013	-	Target for structural balance	No quantified target in text
DK	BBR	GG	2007	2020	Target for structural balance	MTBF (target changed regularly)
DK	ER	GG	2007	2011 [12]	Real public consumption below 26.5% by 2015	Future
DK	ER	GG	2014	-	Rolling expenditure ceilings	after 2013
DK	RR	GG	2001	2010	Tax rates cannot be raised	Data
EL	BBR	GG	2014	-	Target for structural balance	after 2013
EL	BBR [2]	GG	2012	-	Primary balance targets by Troika	No quantified target in text
ES	DR	GG	2020 [1]	-	Debt below 60%	Future
ES	BBR	GG	2020 [1]	-	Structural deficit fixed by EU	Future
FR	BBR	GG	2013 [13]	-	Targets for structural balance	No quantified target in text
HR	ER [8]	GG	2014	-	Real primary expenditure growth	after 2013
HR	BBR [8]	GG	2014	-	Change in structural balance	after 2013
IE	ER [2]	GG	2013	-	Expenditure ceilings	MTEF (voted on every year)
IT	BBR [2]	GG	2014	-	Targets for structural balance	after 2013
IT	DR [2]	GG	2014	-	Public debt in compliance with fiscal compact	after 2013
IT	ER [2]	GG	2014	-	Annual expenditure growth target	after 2013
LU	DR	GG [3]	2004 [4]	2014	Debt substantially below SGP limits	No quantified target
LU	BBR [2]	GG	2013	2018	Structural deficit limit until 2018	Future
LT	DR	CG	1997	-	Limits for net borrowing	MTBF (Limits change annually)
LV	ER [2]	GG	2014	-	Target for real expenditure growth	after 2013
MT	BBR [8]	GG	2014	-	Structural budget balance rule	after 2013
NL	BBR [8]	GG	2014	-	Structural budget balance rule	after 2013
NL	ER	GG	1994	-	Real expenditure ceilings for each electoral period	MTEF
NL	RR	GG	1994	-	Allocation of higher-than-expected revenues	Data
PL	ER	GG	2015	-	Expenditure growth lower than medium term GDP growth	Future
PT	BBR	GG	2015	-	Structural balance above MTO	Future
RO	BBR [8]	GG	2013	-	Structural balance adjustments to achieve MTO	Future
SI	ER [2]	GG	2010	2011	Expenditure ceilings for next 5 years	MTEF
UK	DR	GG	2010	2016	Change in net debt (% GDP) in 2015/16	Future

Notes: [1] in EC from 2012, [2] not in IMF only in EC, [3] in IMF before 2004 CG, [4] in IMF from 1990, [6] in IMF from 1997, [7] not in force between 2007 and 2011, [8] not in EC, only in IMF, [10] in IMF since 1990, [11] in IMF since 2003, [12] in IMF until 2014, [13] in IMF from 2012, [14] in IMF from 2014

Table 13: Fiscal rules covering central government not included in sample

Ctry.	Type	Cov.	From	To	Description	Reason to not include
AT	BBR	CG	2017	-	Structural balance limit	Future
AT	BBR	CG	1999	-	Multi-annual deficit targets	MTEF (as also in IMF)
AT	ER [2]	CG	2009	-	Expenditure ceilings	MTEF (ceilings changed every year)
BE	RR	CG	1992	1999	Revenue growth in line with GDP growth	Unclear meaning (different interpretations of coalition partners)
BG	BBR[8]	CG	2006	2011	Deficit rule to progressively bring below 3%	No quantified target in text
CZ	ER	CG	2005	-	Two-year nominal expenditure ceiling	MTEF (as in IMF)
EE	DR[2]	CG	2010	-	$nd_t Y_t \leq 0.4 R_t$	Data (no net debt for Central government)
EL	ER[8]	CG	2011	-	Spending ceilings for line ministries	MTEF (as in IMF)
FI	DR	CG	1995[7]	-	Reduction of debt over legislative period	No annual compliance
FI	ER	CG	1999[11]	-	Real expenditure ceilings	MTEF (adjusted every year)
FR	RR	CG	2011	-	Target for net impact of new revenue measures	Data
FR	RR	CG	2006	-	Allocation of higher-than-expected revenues	Data
IE	ER[2]	CG	2004	-	Rolling 5-year limits for capital investment	MTBF
IE	ER[2]	CG	2000	-	1% of GDP into pension reserve fund	Data
IT	ER[2]	CG	2001	2007	Limit for expenditure on pharmaceutical products	Data
LU	ER	CG	1999[10]	2014	Expenditure growth compatible with economic growth prospects	No quantified target
LT	DR	CG	1997	-	Limits for net borrowing	MTBF (Limits change annually)
LT	RR	CG	2008	-	Allocation of higher-than-expected revenues	Data
LT	BBR	CG	2015	-	Structural budget balance rule	Future
LV	RR[2]	CG	1994	-	Special budgets financed by earmark revenues	Data
SE	ER	CG	1996[6]	-	Expenditure ceilings	MTEF (rolling addition of years)
SK	ER[2]	CG	2002	-	Expenditures outside of State budget	Data

Notes: [1] in EC from 2012, [2] not in IMF only in EC, [3] in IMF before 2004 CG, [4] in IMF from 1990, [6] in IMF from 1997, [7] not in force between 2007 and 2011, [8] not in EC, only in IMF, [10] in IMF since 1990, [11] in IMF since 2003, [12] in IMF until 2014, [13] in IMF from 2012, [14] in IMF from 2014

A.3 Robustness Results

Table 14: Regression results based on dependent variable (compliance with fiscal rules) uncertainty

	(1) Base-line	(2) +0.25% GDP	(3) -0.25% GDP	(4) +5%	(5) -5%	(6) +0.25 Std. Dev.	(7) -0.25 Std. Dev.
Stock variable	0.69*** (0.12)	0.38** (0.16)	0.52*** (0.15)	1.42*** (0.31)	0.49*** (0.11)	0.63*** (.10)	0.72*** (0.14)
Coverage of GG finances	0.61*** (0.20)	0.20 (0.21)	0.46 (0.29)	0.65** (0.27)	0.78*** (0.25)	0.51*** (0.17)	0.50*** (0.17)
Statutory base	−0.26*** (0.07)	−0.21*** (0.07)	−0.27*** (0.08)	−0.44*** (0.08)	−0.13** (0.06)	−0.20*** (0.07)	−0.23*** (0.07)
Monitoring body	0.17** (0.08)	−0.09 (0.08)	0.28*** (0.10)	0.01 (0.13)	0.02 (0.16)	0.19*** (0.07)	0.15*** (0.06)
Alert mechanism	0.29*** (0.09)	0.32*** (0.10)	0.18 (0.13)	0.16 (0.15)	0.60*** (0.13)	0.22*** (0.08)	0.21*** (0.08)
Enforcement body	0.47*** (0.08)	0.41*** (0.06)	0.68*** (0.10)	0.75*** (0.20)	0.75*** (0.14)	0.45*** (0.08)	0.50*** (0.08)
Observations	280	280	280	280	280	280	280

Notes: Each column presents a separate panel logistic regression with a country i's compliance $c_{i,j,t}$ with its fiscal rule j at year t as dependent variable. Country-specific (Vi, t) and supranational ($S_{i,t}$) controls included in all regressions, but not reported. The coefficients present average marginal effects and robust standard errors are in parentheses. * denotes significance at 10 percent level, ** denotes significance at 5 percent; *** denotes significance at 1 percent.

Table 15: Regression results based on subsamples

	(1) Base-line	(2) Only BBR & ER	(3) Only flow variable	(4) Only without Escape clauses	(5) Real-time data	(6) Only Euroarea	(7) Only Non-Euroarea	(8) Before 2007	(9) After 2007
Stock variable	0.69*** (0.12)	0.38** (0.16)		0.52*** (0.15)	1.19*** (0.33)	1.42*** (0.31)	0.49*** (0.11)	2.22*** (0.84)	0.72*** (0.11)
Coverage of GG finances	0.61*** (0.20)	0.20 (0.21)	0.34 (0.26)	0.46 (0.29)		0.65** (0.27)	0.78*** (0.25)	−0.26 (0.59)	0.70** (0.28)
Statutory base	−0.26*** (0.07)	−0.21*** (0.07)	−0.19* (0.11)	−0.27*** (0.08)	−0.29* (0.16)	−0.44*** (0.08)	−0.13** (0.06)	−0.53* (0.28)	−0.32*** (0.11)
Monitoring body	0.17** (0.08)	−0.09 (0.08)	−0.13 (0.10)	0.28*** (0.10)	0.75** (0.36)	0.01 (0.13)	0.02 (0.16)	−0.17 (0.50)	0.19*** (0.07)
Alert mechanism	0.29*** (0.09)	0.32*** (0.10)	0.35*** (0.11)	0.18 (0.13)	0.59*** (0.20)	0.16 (0.15)	0.60*** (0.13)	1.15*** (0.30)	0.38*** (0.12)
Enforcement body	0.47*** (0.08)	0.41*** (0.06)	0.48*** (0.09)	0.68*** (0.10)	0.97*** (0.29)	0.75*** (0.20)	0.75*** (0.14)	1.21** (0.58)	0.48*** (0.08)
Observations	280	205	201	196	122	156	124	120	160

Notes: BBR - Balanced Budget Rule, ER - Expenditure Rule. Each column presents a separate panel logistic regression with a country i's compliance $c_{i,j,t}$ with its fiscal rule j at year t as dependent variable. Country-specific (Vi, t) and supranational ($S_{i,t}$) controls included in all regressions, but not reported. The coefficients present average marginal effects and robust standard errors are in parentheses. * denotes significance at 10 percent level, ** denotes significance at 5 percent; *** denotes significance at 1 percent.

Table 16: Regression results depending on fixed effects and controls inclusion

	(1)	(2)	(3)	(4)	(5)	(6)
Stock variable	0.69***	0.66***	0.58***	0.52***	0.56***	0.69***
	(0.12)	(0.15)	(0.13)	(0.12)	(0.12)	(0.15)
Coverage of GG finances	0.61***	0.65***	0.31*	0.88**	1.25***	0.63***
	(0.20)	(0.21)	(0.16)	(0.36)	(0.42)	(0.23)
Statutory base	−0.26***	−0.24***	−0.17***	−0.23***	−0.22***	−0.26***
	(0.07)	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)
Monitoring body	0.17**	0.22**	0.16*	0.18	0.17	0.17*
	(0.08)	(0.09)	(0.09)	(0.12)	(0.11)	(0.09)
Alert mechanism	0.29***	0.26***	0.20**	0.24*	0.17	0.28***
	(0.09)	(0.08)	(0.09)	(0.13)	(0.12)	(0.09)
Enforcement body	0.47***	0.44***	0.32***	0.27**	0.25**	0.48***
	(0.08)	(0.08)	(0.07)	(0.11)	(0.10)	(0.09)
Country-specific variables	Yes	Yes	No	Yes	Yes	Yes
Supranational variables	Yes	No	No	Yes	Yes	Yes
Time fixed effects	No	No	No	No	Yes	Yes
Country fixed effects	No	No	No	Yes	Yes	No
Observations	280	280	299	247	247	280

Notes: Each column presents a separate panel logistic regression with a country i's compliance $c_{i,j,t}$ with its fiscal rule j at year t as dependent variable. Country-specific ($V_{i,t}$) and supranational ($S_{i,t}$) controls, country-fixed effects and time-fixed effects included in the regressions according to the middle panel, but not reported. The coefficients present average marginal effects and robust (except for columns with fixed effects) standard errors are in parentheses. * denotes significance at 10 percent level, ** denotes significance at 5 percent; *** denotes significance at 1 percent.