Determinants of Budget Deficits in Europe:

The role and relations of fiscal rules, fiscal councils, creative accounting and the Euro

Abstract

We analyze the determinants of the budget balance of 27 EU countries from 1991 to 2011 with panel approach. Our focus is on the effectiveness of fiscal rules and fiscal councils as well as the impact of EMU membership and creative accounting, approximated by stock-flow-adjustments. We especially contribute to the literature by analyzing the joint influence of these variables measured by their interaction terms. We find a significant influence for the mentioned variables (as well as for some control variables, as yield spreads, unemployment and election-year-dummy). Also interaction variables display influence, at least in some settings.

1 Introduction

Excessive fiscal deficits are considered to be one of the fundamental causes of the European debt crisis. The future handling of deficits has huge impact on the further financial, economic and political integration of Europe. This leads to the question which are determinants of deficits and which measures can be applied to efficiently fight excessive fiscal deficits. For several – understandable – reasons European governments agreed to help troubled countries with providing funds at comparably low interest rates. This means, however, that a market-based solution, where high interest rates set strong incentives to run lower deficits, will not work efficiently. Governments agreed instead (in the Fiscal Compact) that countries should install fiscal rules to prevent government from running excessive public deficits. This brings about several issues for scientific research. First, one may ask how effective fiscal rules are. Here one may distinguish between internal fiscal rules, which were installed by the country's own decision, and external fiscal rules, country is subject to because of international contracts (especially the Stability and Growth Pact with the well-known Maastricht criteria are to be named in this context). Which type of fiscal rules is more effective? In addition, it is important to know, how fiscal rules interact with other institutional arrangements that are meant to ensure sustainable budgets, especially fiscal councils. Inspired by findings of the recent literature (see von Hagen and Wolf, 2006) that concludes that stock-flow-adjustments are used systematically for creative accounting one has to ask how this influences the fiscal budget and how it interacts with fiscal rules and fiscal councils.

We tackle these questions by analyzing empirically whether there significant relations between the fiscal budget as the dependent variable and indices describing (the strength of) fiscal rules and fiscal councils. We contribute to the literature in several ways. First, we apply indices that have not been applied so far. Second, we focus on and sheet light on how the interaction between (internal) fiscal rules, the membership in the EMU (including external

fiscal rules resulting from the Stability and Growth Pact) and fiscal councils influences budget deficits. Third**, w**e include measures for creative accounting in our analysis. As von Hagen and Wolff (2006) have shown, creative accounting, measured by stock-flow-adjustments, is strongly related to fiscal rules. Thus, one should consider creative accounting in analyzing the influence of fiscal rules. What is more, we ask how creative accounting interacts with fiscal rules and fiscal councils in influencing the fiscal budget.

The influence of fiscal rules on fiscal deficits is an often discussed and analyzed topic in political economy and a number of studies on this issue have been published so far. Most quantitative analyses on the effect of fiscal rules focused on the US states and the European Union, even though other regions, such as Swiss cantons or Latin America, have been covered, too. In general, most of the studies find a significant, positive influence of fiscal rules on fiscal aggregates. For a detailed survey of the relevant literature see Table A-1 in the Annex.

As mentioned above, we explicitly consider whether the interaction between fiscal rules and fiscal councils influences fiscal budgets. Wyplosz (2012) argues here that time inconsistency makes fiscal rules potentially ineffective as politicians face the incentive to violate the rules when they stand in the way of their policy objectives. Performing case studies he finds that fiscal councils can help to mitigate this problem if they are given a formal advisory and monitoring role, thus ensuring that the fiscal rule is not manipulated or overridden. This finding is, however, not verified empirically. All in all, interplays between fiscal rules and fiscal councils have attracted surprisingly little attention in the empirical literature so far. Debrun (2007) and Debrun and Kumar (2007b; 2007a) provide bivariate analysis on the relationship between the restrictiveness of fiscal councils and the strength of fiscal rules. However, they find that the relationship between both is rather weak and that there is even some evidence for a negative relationship between them. This allows for the counterintuitive assumption that fiscal rules and councils might be substitutes rather than

complements. The reason therefore could be “that countries that feel the need for relatively restrictive fiscal rules, may be reluctant to allow for additional external influence on the policymaking process, possibly because they value discretion per se” (Debrun and Kumar, 2007b). Finally, Nerlich and Reuter (2013) set out to test the relationship between fiscal rules and fiscal councils in a multivariate context. Analyzing the EU-27 from 1990 to 2012 they find – in contrast to Debrun (2007) and Debrun and Kumar (2007b; 2007a) – that the effectiveness of fiscal rules can indeed be strengthen by fiscal councils, especially when they are independent from the government regarding the nomination of staff and resources. We enhance this interesting literature by using indices to measure the strength of fiscal rules and fiscal councils with higher precision than with dummy variables used in these papers. Instead we use an interval-scaled index in order to measure different characteristics of fiscal rules and councils.

The remainder is organized as follows. In the next section we describe our empirical analysis in more detail. We explain the variables used as well as the regression approach and the data sample. In the third section we provide our results and the fourth section concludes.

2 Description of the Empirical Analysis

In the empirical analysis we perform panel regressions where the primary budget balance as the dependent variable is related to several explaining variables. A detailed description of the data and the data sources can be found in Table A-2 in the appendix. The primary budget balance is the difference between government’s revenues and expenditures excluding interest payments for outstanding debt. We use this measure because it pictures better the current situation and the work of the actual government. This is because interest payments are typically contracted years ago (unless for very short-term debt) when loans were taken up or

bonds were issued. Also the amount of outstanding debt is piled up in former years and only to a small amount is under the control of the current government.

We include different groups of explaining variables. First of all, we include measures for the variables that are our primary concern, i.e. indices that describe the existence and strength of fiscal rules and fiscal councils. In addition, we consider how the EMU membership (which implies external fiscal rules) influences the fiscal budget. As mentioned above we include additionally stock-flow-adjustments as a measure of creative accounting. What is more, we include interaction terms for these variables. In addition, we include economic and socio-political control variables.

Our fiscal rules index is based on data of the 2011 version of the European Commission's fiscal rule index (European Commission, 2006, and Table A-3 in the appendix), which reflects whether fiscal rules are in place as well as the characteristics of these rules, such as the statutory basis of the rule, the possibility to set and revise objectives, the nature of the institutions which monitor and enforce the rules, the enforcement mechanisms, the media visibility of the rules, how many rules a country employed at a given time, and how much of the government sector they covered.

In addition to fiscal rules fiscal councils may influence the budget process. Such councils have been in place in several countries for many years. A measure for the existence of fiscal councils should be included as a control variable, i.e. to measure the influence of fiscal rules precisely. Beyond that, we are also interested in how effectively fiscal councils influence the budget balance and, as explained above, in the interaction between fiscal councils and fiscal rules with respect to the fiscal balance. To analyze this issue, we constructed a fiscal council index along three dimensions: the scope, the independence, and the influence of the fiscal council (for more details on the index construction see Table A-2 in the appendix)

The existence of fiscal rules and the stability and growth Pact related to EMU membership (besides other issues) may set incentives for “creative accounting”, i.e. manipulating public accounts in a way that rules are not broken (Milesi-Ferretti, 2003).. Such manipulations are, of course, hard to measure when we work with public numbers. An interesting approach to approximate creative accounting is the use of stock-flow-adjustments, which has been firstly suggested by von Hagen and Wolff (2006). The basic idea relies on the fundamental relation for public finances, which is

$$B_t = B_{t-1} + D_t \quad \rightarrow \quad 0 = B_t - B_{t-1} - D_t \tag{1}$$

i.e., the debt level at time t, B_t, should be the debt level from the last year plus the current budget deficit, D_t, which is the difference between total revenues and total expenditures. This textbook definition of public debt is often not fulfilled in practice, which leads to a residual, called stock-flow adjustment, SFA:

$$SFA = B_t - B_{t-1} - D_t \tag{2}$$

Usually these stock-flow adjustments have been regarded as random residuals resulting “primarily from financial operations, for example, debt issuance policy to manage public debt, privatisation receipts, impact of exchange rate changes on foreign denominated debt. In general these should tend to cancel out over time” (European Commission 2003, 82), i.e. to appear randomly and by mistake. However, von Hagen and Wolff (2006) could show that this is not true. Instead stock-flow adjustments are systematically used by policymakers for creative accounting. As suggested by von Hagen and Wolff (2006) we include stock-flow-adjustments in our analysis.

While the fiscal rules index explained above measures mostly internal rules, i.e. rules that were imposed on the country's own initiative without relation to external relations, also the existence of fiscal rules that result from external relations, namely because the country covenant to consider certain limits. In the case of EMU countries here especially the stability and growth pact with the well-known 'Maastricht' criteria is to name. Our analysis includes an EMU dummy, which partly accounts for this fact. The EMU dummy may also reflect, however, other issues of EMU membership, as lower incentives to operate economically, losses of competiviness that cannot be compensated by currency devaluation and so on. So, we can expect both a positive as well as a negative influence on the fiscal balance.

In addition to the variables explained so far, which reflect our primary interest, we apply several control variables for political and social features of countries that are supposed to be related strongly to public finances. We follow Krogstrup and Wälti (2008) and include a variable that measures the ratio of 65-year-old or older people to the rest of the society. This relies on the rationale that in many countries pensions have to be paid out of the public budget. Even in countries with an insurance-based system the government often subsidizes the pension system. With a higher number of retired people this requirements tent to be higher.

In addition, we consider an election dummy. This dummy variable takes the value 1 if there was a legislative or executive election in a given country in a given year and 0 otherwise. The source is the CIA World Fact Book. As shown in the literature on political business cycles political decision makers tend to increase (deficit) spending in election years.

We also analyze the influence of the state structure by including a federalism dummy, which displays whether the country is governed in a centralized way, where the central government and parliament decide over a centralized budget, or whether it is a federal country, were –besides a central government – several state governments and parliaments run

their own budgets. Clearly, this state structure may influence the overall budget balance – either positively or negatively.

Finally we account for the political orientation of the government. Usually left parties are considered to be more in favor for public deficit spending than conservative parties. To control for this issue we include a variable that reflects the cabinet composition, i.e. the share of social democratic and other left-wing parties as a percentage of parliamentary seats of all governmental parties. This variable is also thought as instrumental variable in order to deal with the potential endogeneity problem: one could argue that the use of fiscal rules and fiscal councils is an endogenous result of (high) deficits, i.e. deficits lead to fiscal rules (and councils) and not as presumed here that deficits depends on fiscal rules.[1] More precisely, high deficits lead to greater reluctance of people to deficits, which increases the probability to impose fiscal rules (and councils). More generally, one could argue that preferences of the people within a country regarding deficits influence both the value of deficits that governments run as well as the existence of fiscal rules and councils. We aim to control for these preferences - no matter whether they are exogenous given for different countries or a results of actual (excessive) deficits – by including the variable on political orientation, since it is supposed to reflect the peoples propensity for or reluctance to deficits, as explained above.

In addition to these socio-political variables we include several variables that control for economic conditions. First of all, we include the current debt level. High debt may reduce the propensity to run deficits. Since we use the primary balance where interest rates are excluded the opposite direction, which results since higher debt usually leads to higher

[1] It should be mentioned that the supposed direction of influence, i.e. the sign of the regression coefficient, is different for different directions of causality. While we suppose that fiscal rules (and councils) as explaining variable reduce deficits (as dependent variable), i.e. a negative relation between deficits and rules, deficits (as explaining variable) increase fiscal rule (as dependent variable), i.e. a positive relation between rules and deficits.

interest rates and, thus to a higher deficits, is rather unlikely. Similar things can be said for the interest rate level itself, which we consider in addition to the debt level. As measure for the interest rate level we include the 10-year sovereign bond yield. Here we also suppose that reduction of deficits for higher interest rates, since higher capital costs may reduce the propensity to increase indebtedness, while lower interest rates may increase the propensity for deficits.

Furthermore we consider real GDP growth as an indicator for the overall economic situation. In boom times it may be easier to have low deficits as in recession times, where public spending is needed to stabilize the economy, while taxes are reduced. A special variable in this context is the unemployment rate since spending for unemployment benefits is higher. Even in countries where these benefits are made by an insurance-based system there are often (co-) financing requirements to the government.

We aim to exploit the (panel) data structure in the best possible way. Since several of our explaining variables show no or almost no variation over time, we refrain from including country fixed effects. We do, however, include period fixed effects in order to account for unobserved heterogeneity and changes over time, which we can suppose to be present because of the considerable changes in economic conditions over time (booming years, crisis times). We include period weights and report White robust standard errors in order to account for heteroscedasticity. We perform panel regressions for 27 EU countries. Our time series include annual data for the time span from 1991 to 2011. We use annual data since most of the variables are not available in higher frequency. The panel is unbalanced since for some countries, especially new East- and Central-European EU members, the required data are available for later years.

3 Results

We start with discussing the results for regression estimated for a model without interaction terms. These results are displayed in Table 1. Because of autocorrelation in the primary balance we include a lagged value of the dependent variable, which is strongly significant. For the resulting estimations we observe no evidence for autocorrelation in the residuals as the Durbin-Watson statistic suggests.

In interpreting the results one has to consider that the primary balance is defined in a positive way and not in terms of deficits, which our discussion is focused on. Hence a positive value of primary balance indicates a surplus and a negative value indicates a deficit. Thus, the signs of the coefficients of the significant depending variables display the expected sign.

The amount of outstanding debt is significant with a positive sign. This means that higher debt improves the budget balance and reduces deficits, maybe because high debt implies higher incentives against spending, while low debt levels enable countries to run higher deficits. Note that our dependent variable is the primary balance, which excludes interest payments. Thus, higher deficits because of higher interest (because of higher debt) are not considered here. In contrast to indebtedness the unemployment rate has a significant negative impact, which means that government deficit spending is higher for higher unemployment rates. We also detect a significant negative impact of the election dummy. This confirms the major findings of the political business cycle theory. In election years governments tend to increase spending in order to increase chances of being reelected. Also the share of retired people (measured by the population share of 65 years and older) has the expected negative influence on the budget balance.

Table 1: Regression Results for Time Fixed Effects without Interaction Terms

Dependent Variable: PRIMEBAL
Sample: 1991-2011
Periods included: 21
Cross-sections included: 27
Total panel (unbalanced) observations: 426

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.327281	0.358175	-0.913745	0.3614
PRIMEBAL(-1)	0.684760	0.041839	16.36650	0.0000
GDP	-0.037556	0.052395	-0.716783	0.4739
YIELD	0.055445	0.083384	0.664933	0.5065
DEBT	0.012376	0.005407	2.288948	0.0226
INFLATION	-0.048203	0.044935	-1.072723	0.2841
UNEMPLOYMENT	-0.031528	0.008164	-3.861664	0.0001
POP-SHARE: 65	-6.91E-05	2.57E-05	-2.687247	0.0075
ELECTION-DUMMY	-0.638998	0.160118	-3.990783	0.0001
POL	-0.002944	0.001876	-1.569198	0.1174
FED	0.215349	0.241234	0.892697	0.3726
SFA	0.034017	0.014508	2.344745	0.0195
FRI	0.458633	0.097190	4.718948	0.0000
FCI	-0.022007	0.039975	-0.550513	0.5823
EURO	0.099527	0.219091	0.454274	0.6499

Effects Specification
Period fixed (dummy variables)

Weighted Statistics			
R-squared	0.796396	F-statistic	44.98216
Adjusted R-squared	0.778691	Prob(F-statistic)	0.000000
S.E. of regression	1.816817		
Durbin-Watson stat	1.995813		

The variable for political orientation is not significant at a usual level, but close to the 10% level of significance. For the other control variables, as GDP growth, bond yields and the federalism dummy, we do not find a significant influence. The lacking influence of bond yields indicates, e.g., that incentives by market forces, were not strong enough to reduce deficits. These results should be interpreted with care, however, since we do find significant influence yield spreads and GDP if we exclude time dummies and run a pooled estimation (see Table A-5 in the appendix), while political orientation and federalism remain insignificant. The inclusion of time effects renders the cyclical variables insignificant. This

may result from multi-colinearity. It means that an influence may be given and we cannot be sure to exclude it by mistake when we consider pooled regressions only.

Now we turn our attention to the variables that reflect our our primary intrest: fiscal rules, fiscal councils and stock-flow-adjustments: Table 1 shows that the fiscal rules index, FRI, has a significant positive sign. The existence of fiscal rules reduces deficits significantly. For membership in the EMU (and the implicit external fiscal rules given by the stability and growth pact) we find, by contrast, no significant influence on budget deficits. This may occur since the positive and negative influences explained above, cancel each other out. Also the fiscal council index shows no significant influence, i.e. the existence of fiscal councils seems not to improve the fiscal budget.

Our indicator for creative accounting – the stock-flow-adjustments – shows a positive relation to the budget balance. This is what we expect as the following consideration demonstrates: As shown in Equation 1 positive stock-flow-adjustments mean that the observed budget balance is higher than it should be, given the actual change in the debt. Or to put it the other way the observed deficit is lower than the actual deficit (since there is negative sign between the (reported) deficit and the stock-flow adjustments in Equation 2. Our analysis finds a significant relation between the budget process and stock-flow adjustments. This is in line with the findings of von Hagen and Wolff (2006) and Milesi-Feretti (2003) that stock-flow-adjustments, which – as shown there – can be interpreted as indicator for creative accounting, reduce deficits. So it is important to include stock flow adjustments as control variable when analyzing the influence of fiscal rules. In addition one may ask for the interactive influence of fiscal roles and stock-flow-adjustments on the fiscal budget, which we discuss below.

Our results discussed so far provide additional evidence to the findings of several other papers already discussed and undergird the strand of the literature that advocates a

positive impact of fiscal rules on the fiscal budget. Our paper contributes to this literature by founding the results on more recent data that include the crisis years. Our primary concern is, however, how fiscal rules, EMU membership and fiscal councils as well as creative accounting interact in influencing the fiscal balance, i.e. whether there is a collective influence on the budget. In order to analyze this issue we include interaction terms in the regression explained above. The results are displayed in Table 2.

Table 2: Regression Results for Regression with Time Fixed Effects including Interaction Terms

Dependent Variable: PRIMEBAL
Sample: 1991 2011
Periods included: 21
Cross-sections included: 27
Total panel (unbalanced) observations: 426

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.504906	0.379649	-1.329929	0.1843
PRIMEBAL(-1)	0.674535	0.038614	17.46879	0.0000
GDP	-0.025556	0.049709	-0.514100	0.6075
YIELD	0.055941	0.082257	0.680072	0.4969
DEBT	0.013287	0.005071	2.620286	0.0091
INFLATION	-0.035672	0.043356	-0.822784	0.4111
UNEMPLOYMENT	-0.030520	0.008074	-3.779856	0.0002
POP-SHARE: 65	-7.15E-05	2.19E-05	-3.256082	0.0012
ELECTION-DUMMY	-0.607976	0.151551	-4.011679	0.0001
POL	-0.001815	0.001883	-0.964081	0.3356
FED	0.307649	0.205064	1.500260	0.1344
SFA	0.029441	0.012276	2.398185	0.0169
FRI	0.305508	0.136740	2.234232	0.0260
FCI	-0.046672	0.032521	-1.435110	0.1521
EURO	0.132316	0.209436	0.631771	0.5279
FCIxFRI	0.073104	0.034811	2.100032	0.0364
SFAxFRI	0.029340	0.011312	2.593638	0.0099

Effects Specification
Period fixed (dummy variables)

Weighted Statistics			
R-squared	0.804073	F-statistic	44.34541
Adjusted R-squared	0.785941	Prob(F-statistic)	0.000000
Durbin-Watson stat	2.001958		

Also in the estimation with interaction terms we observe a significant influence of the control variables that are significant in the estimation without interaction terms in the respective direction. Including the interaction terms also renders to federalism dummy significant. Again we find no significant influence of bond yields, GDP and political orientation on the budget balance. And again GDP and yield spreads are significant in the pooled estimation (see Table A-6) in the appendix.

The inclusion of interaction terms does not change the results for fiscal the rules index and stock flow adjustments, which are still significant, while EMU membership as well as fiscal councils are insignificant.

However, we find a significant joint influence of fiscal rules and fiscal councils on the budget balance. This means fiscal councils help to improve the situation significantly if fiscal rules are in place and vice versa. It is interesting to see that also fiscal rules and stock-flow-adjustments have a significant interactive influence on the budget. This could be interpreted as evidence that the existence of fiscal rules leads to incentives for creative accounting.

4 Conclusion

Huge fiscal deficits and their role in causing the current European debt crisis lead to the question of effective measures against such deficits. Since European politicians decided to apply fiscal rules (introduced by the fiscal pact) as major tool to fight deficits it is necessary to ask how effective fiscal rules have been working. A broad body of literature provided results on this issue so far, of which the majority confirms significant positive influence on fiscal budgets, whereas also some papers exist that do not find a significant influence.

We contribute to this literature in several ways. We reexamine the issue by considering a broad dataset that includes data observed in the current crisis. Our major

contribution is, however, the analysis of how fiscal rules interact in influencing the budget balance with other variables, namely the existences and strength of fiscal councils, the amount of creative accounting, approximated by stock-flow adjustments, and the membership in the EMU.

We run panel regressions for 27 EU countries from 1991 to 2011 where the primary budget balance is related to different explaining variables. Besides the variables mentioned above we consider several control variables. These are several economic and socio-political variables. Out of the set of control variables the unemployment rate, the population share over 65 years and an election dummy show a significant negative influence on the fiscal budget, i.e. they tend to increase deficits. The outstanding debt, by contrast, has a positive influence. The results for bond yield spreads and GDP growth are mixed; while these cyclical variables show a positive influence in pooled estimation, their influence is insignificant if we include time dummies.

In regressions without interaction terms we confirm findings of the major strand of the literature on this issue by providing evidence for a significant positive influence of fiscal rules on the fiscal budget. Also stock-flow-adjustments show the expected positive sign. The influence of fiscal councils and EMU membership, by contrast, is not significant. The latter may result since the positive influences, e.g. given by external fiscal rules agreed on in the Stability and Growth Pact, are outbalanced by negative effects, as lowered incentives to operate economically or reduced competiveness.

It is interesting to see that the interaction of stock-flow adjustments and fiscal rules has an influence on the primary budget. The positive sign implies that stock-flow-adjustments are higher if (stronger) fiscal rules exist. This can be interpreted as a clear indication for creative accounting.

Our most striking result is the positive joint influence of fiscal rules and fiscal councils. This means the effectiveness of internal fiscal rules is significantly improved by the existence of fiscal councils, since their interaction term has a significant positive influence. To put it another way: fiscal councils seem to work in countries with (stronger) fiscal rules. Since the Fiscal Compact implies internal laws to fulfill certain stability rules, one could argue that its effectiveness could be improved by introducing (strong) fiscal councils.

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Appendix

Table A-1: **Empirical Studies on the Influence of Fiscal Rules on Fiscal Performance**

The table below reviews the most important studies on the empirical effect of fiscal rules on the sustainability of government finances. Studies which include fiscal rules as dependent variables are not reviewed here. Likewise, we have ignored studies that mainly use fiscal rules as regressors for dependent variables not directly related to fiscal sustainability, e.g. output volatility (Bayoumi and Eichengreen, 1995; Fatás and Mihov, 2006; Badinger, 2009) or the response to fiscal shocks (Alt and Lowry, 1994; Poterba, 1994). Furthermore, we incorporated only papers which test *explicitly* for fiscal rules, studies where fiscal rules are only one of several items in a composite index of fiscal governance (e.g. Gleich, 2003; Mulas-Granados et al., 2007) are excluded here, too.

Author(s) and scope	**Type of fiscal rules considered**	**Measurement of fiscal rules**	**Dependent variable(s)**	**Evaluation of the impact of fiscal rules on the dependent variable(s)**
Studies on U.S. states				
ACIR (1987) 50 U.S. states	Balanced-budget rules	*Stringency Index* • Additive index which covers the legal basis of the BBR, whether a balanced budget must only be submitted or also passed, and in how far a deficit can be carried over to other periods • Ranges from 0 to 10, whereby 0 indicates no balanced-budget rule at all and 10 the strictest one possible	Deficits and long-term debt	The more stringent the balanced-budget rule, the lower the governmental deficits and the long-term debt
Alesina and Bayoumi (1996) 50 U.S. states	Balanced-budget rules	Stringency Index (see ACIR, 1987)	Ratio of primary and total surplus to state product	The more stringent the balanced-budget rules, the higher the surpluses

Author(s) and scope	Type of fiscal rules considered	Measurement of fiscal rules	Dependent variable(s)	Evaluation of the impact of fiscal rules on the dependent variable(s)
Bohn and Inman (1996) 47 U.S. states	Balanced-budget rules; debt limits	• Dummy variables indicating whether (1) the government must submit a balanced budget, (2) the legislature must pass a balanced budget, (3) a carried-over deficit must be corrected in the next year, (4) carried-over deficits are prohibited, (5) gubernatorial line-item vetoes are possible, and (6) there are referendum restrictions to raise debt • Stringency Index (see ACIR, 1987)	General fund deficit	Balanced-budget rules and gubernatorial line-item vetoes reduce governmental deficits; debt limits have no influence if balanced-budget rules are controlled for
Clingermayer and Wood (1995) 48 U.S. (mainland) states	Taxing and expenditure limits; debt limits	Dummy variables for (1) the existence of taxing and expenditure limits and (2) the existence of debt limits	Change in government indebtedness (1961-1989)	No significant effect of fiscal rules on the dependent variable, weak evidence that taxing and expenditure limits may even increase debt
Hagen (1991) 50 U.S. states	Balanced-budget rules; debt limits	• Dummy variables indicating whether a state has (1) a constitutional debt limit and (2) special legislative requirements (e.g. referenda) to raise debt • Stringency Index (see ACIR, 1987)	Debt per capita; debt growth (1975-1985); debt mix (ratio of nonguaranteed to guaranteed debt); debt-income ratio	States with debt limits and strict balanced-budget rules have less debt per capita and smaller debt-income ratios; however, they also issue more nonguaranteed debt
(Eichengreen and Bayoumi) (1994) US states (different number and time spans)	Balanced-budget rules	• Stringency Index (see ACIR, 1987) • Dummy variable indicating whether it is prohibited to carry over a deficit into the next year • Dummy variable indicating whether a balanced-budget is statutory or constitutionally required	Budget balance; bond yields; stabilization over the cycle	Fiscal restraints, especially the stronger ones, reduce the size of budget deficits and the borring costs. however, the diminish the government's ability to stabilize over the cycle

Author(s) and scope	Type of fiscal rules considered	Measurement of fiscal rules	Dependent variable(s)	Evaluation of the impact of fiscal rules on the dependent variable(s)
Kiewiet and Szakaly (1996) 50 U.S. states	Constitutional debt limits	Dummy variables indicating whether (1) the issuance of bonds must be approved in a referendum, (2) the issuance of bonds is subject to a supermajority requirement in the legislature, (3) the issuance of guaranteed debt is prohibited and (4) there is a limit of the debt-to-revenue ratio	Guaranteed, nonguaranteed, total state, as well as total state and local debt	States with prohibitions of guaranteed debt and referendum requirements have less debt than states with supermajorities and revenue-based debt limits
Nice (1991) 50 U.S. states	Balanced-budget rules; debt limits	• Annual amount of debt permitted according to the prevailing debt limit and given the current economic data • Dummy variable indicating whether a constitutional or statutory BBR prevails or not	Debt per capita; debt growth per capita (1962-1982)	Balanced-budget rules do neither significantly affect debt growth nor per capita debt levels; debt limits seem to influence the kind but not the amount of borrowing
Studies on EU members				

Author(s) and scope	Type of fiscal rules considered	Measurement of fiscal rules	Dependent variable(s)	Evaluation of the impact of fiscal rules on the dependent variable(s)
Ayuso-i-Casals et al. (2009) and Debrun et al. (2008) EU-25	Deficit rules, debt rules, expenditure rules, revenue rules	• *Fiscal rule coverage index* indicating how many fiscal rules are in place in each country in every year and which share of the general government finances is covered by them • *Index of strength of fiscal rules* calculated for each fiscal rule; taking into account its legal basis, the bodies in charge of monitoring and enforcing it, the enforcement mechanisms and the rule's media visibility • *Fiscal rule index* calculated for each country in each year; taking into account the number of fiscal rules each country had, their strength and the share of government finances covered by the rule Indices originally developed by the European Commission (2006); for more details see Annex 3 in this thesis An *expenditure rule coverage index* and an *expenditure rule index* are also calculated with the same procedures as above. However, with samples restricted to expenditure rules only. • *Fiscal rule cyclicality index* indicating if each country's fiscal rules are calculated in a way that is likely to have pro- or countercyclical impact	Cyclically adjusted primary balance, primary expenditure	The stronger a country's fiscal rules, the higher its cyclically adjusted primary balance. However, deficit and debt rules seem to be more effective with regard to that than expenditure rules

Author(s) and scope	Type of fiscal rules considered	Measurement of fiscal rules	Dependent variable(s)	Evaluation of the impact of fiscal rules on the dependent variable(s)
Broesens and Wierts (2009) EU-15	Deficit rules, debt rules, expenditure rules, revenue rules	• Fiscal rule index (see Debrun et al., 2008; Ayuso-i-Casals et al., 2009) • Variable for the EU's fiscal rule according to the SGP (see Golinelli and Momigliano, 2006 for details)	Primary and nominal balance	EU and national fiscal rules are significantly and positively correlated with the budget balance
Debrun (2007) and Debrun and Kumar (2007b; 2007a) 14 EU countries	Deficit rules, debt rules, expenditure rules, revenue rules	• Fiscal rule coverage index • Fiscal rule index See above Ayuso-i-Casals et al. (2009) and Debrun et al. (2008)	Cyclically adjusted primary balance	Fiscal rules seem to reflect more a general governmental and societal commitment to fiscal discipline rather than an effective limit on discretionary fiscal policymaking
Deroose et al. (2006) EU-15	Expenditure rules	*Index on the strength of national expenditure rules* which indicates how much percent of total expenditure is covered by the rule, what the rule's legal basis is, how much media report on rule-compliance, how closely the rule is monitored, how strongly it is enforced, and what the degree of compliance is	Change in public expenditure	As expected, expenditure rules have a significant, negative impact on public expenditure
Hagen (1992) EU-12	Multi-annual deficit, debt, expenditure, and revenue targets	*Index of long-term constraint* indicating if there is a multi-annual fiscal target which is backed by strong political commitment and consistent economic projections, if the budget is transparent, and if the parliamentary amendment power as well as the flexibility in budget execution are limited	Debt-to-GDP, net lending-to-GDP, and primary net lending-to-GDP ratio	Long-term fiscal constraints are almost always not significant when regressed on the dependent variables. If at all, fiscal rules can only be effective when combined with efficient budget procedures

Author(s) and scope	Type of fiscal rules considered	Measurement of fiscal rules	Dependent variable(s)	Evaluation of the impact of fiscal rules on the dependent variable(s)
Hagen (2006) and Hallerberg et al. (2009a) EU-15; Japan[2]	Deficit, debt, and expenditure rules	*Fiscal rule index*, which covers "the time horizon of a government's multi-annual fiscal program, the degree of commitment to annual fiscal targets, the anchoring of fiscal targets in the coalition agreement, the connection between the national budget and the national stability program, the existence of clear rules for dealing with shocks to expenditures or revenues during the year, and the strength of the finance minister to enforce the budget law" (Hagen, 2006)	Annual growth rate of debt-to-GDP ratio	Countries with hard fiscal rules perform significantly better with regard to a reduction of the debt-to-GDP ratio than states with soft rules
Hallerberg et al. (2009b) EU-15	Multi-annual deficit, expenditure, and revenue targets	• *Targets index* which captures the type of target, its time horizon, the quality and regularity of the multi-annual planning, and the degree of commitment to the target • Dummy variable indicating whether there are borrowing restraints for sub-central entities or not	Change of gross government debt-to-GDP ratio	Fiscal rules and sub-central borrowing restraints reduce the growth of public debt, especially when the governing parties are ideologically very divers or when the fiscal procedures are modeled according to the contract or delegation approach.
Heinemann et al. (2013) 16 EU members	Deficit rules, debt rules, expenditure rules, revenue rules	*Fiscal rule index* of European Commission (2006). See also Iara and Wolff (2011) below.	Sovereign risk premia	Fiscal rules are more effective in countries with a lower reputation of financial stability, whereas in countries with a history of financial stability fiscal rules are rather seen as a further illustration of commitment to fiscal discipline.

[2] Japan is only included in the analysis of Hagen ((2006))

Author(s) and scope	Type of fiscal rules considered	Measurement of fiscal rules	Dependent variable(s)	Evaluation of the impact of fiscal rules on the dependent variable(s)
Iara and Wolff (2011) 10 Eurozone members	Deficit rules, debt rules, expenditure rules, revenue rules	*Fiscal rule index* of European Commission (2006): Strength of fiscal rules is measured along five dimensions: (1) legal base, (2) room for setting or revising objectives, (3) monitoring and enforcement body, (4) enforcement mechanism, and (5) media visibility.	Sovereign risk premia	Fiscal rules are effective in keeping risk premia low, especially in times of uncertainty when investors become risk averse. The most important features for a rule to be effective are the legal base and the enforcement mechanisms.
Nerlich and Reuter (2013) EU-27	Balanced-budget, debt, expenditure and revenue rules	Dummy variables indicating whether a fiscal rule was in place and which characteristics it exhibits (legal status, type of fiscal rule, enforcement mechanism, and coverage, i.e. if the rule covers general/central government, regional/local government or social insurances	Primary balance, primary expenditure, primary revenues (all cyclically adjusted)	Fiscal rules reduce both revenues and expenditures, all in all, however, also the primary balance. Particularly successful are balanced-budget rules and rules that are legally grounded in the constitution or law. Further the rules' effectiveness can be strengthened by combining them with (independent) fiscal councils
Other studies				
Guichard et al. (2007) 24 OECD countries	Balanced-budget and expenditure rules	Dummy variables indicating (1) whether a balanced-budget rule is in place and (2) whether it is supplemented by an expenditure rule	Duration and size of fiscal consolidation episodes	Especially when balanced-budget rules are substituted with expenditure rules fiscal consolidation episodes were longer and more successful

Author(s) and scope	Type of fiscal rules considered	Measurement of fiscal rules	Dependent variable(s)	Evaluation of the impact of fiscal rules on the dependent variable(s)
Alesina et al. (1999) 20 Caribbean and Latin American countries	Deficit limits	*Borrowing constraint sub-index* which captures the existence of constitutional deficit limits, the importance of previously approved macroeconomic programs for the budget draft, the government's borrowing autonomy, the legislature's power to modify the budget draft, and the government's possibility to cut spending after the budget is passed. This sub-index is also integrated in an overall index that captures also fiscal transparency and procedural rules.	Central government primary deficit-to-GDP ratio	From all the sub-indices the borrowing constraint sub-index has the most significant and clear-cut impact on deficit. The tighter the deficit limits the smaller the deficit-to-GDP ratio
Hagen and Eichengreen (1996) 16 federal countries world-wide	Deficit limits on the sub-central level	*Index of stringency of sub-central borrowing restraints* which takes the value 0 if no restraints are in place, 1 if a golden rule prevails or congressional approval is necessary, 2 if there are self-imposed restraints, 3 if central government approval is necessary, and 4 if sub-central borrowing is completely prohibited	Debt exposure (ratio of central government debt to central government tax revnues)	In countries where strong sub-central borrowing restraints are in place, the central government is more exposed to debt
Feld and Kirchgässner (2006) 26 Swiss cantons	Balanced-budget rules; debt limits	*Index of statutory fiscal restraints* which ranges from 0 to 3, where 0 means no and 3 the strongest fiscal rule	Deficit per capita; debt per capita	Fiscal restraints reduce the deficit but not the debt-per-capita ratio
Feld et al. (2013) 18 Swiss cantons		*See* Feld and Kirchgässner (2006)	Yield spreads between cantonal and Swiss federal bonds	Both the existence and the strength of fiscal rules lead to lower risk premia
Krogstrup and Wälti (2008) 25 Swiss cantons	Deficit limits	Dummy variable indicating whether a canton has a fiscal rule or not	Real budget balance per capita	Fiscal rules have a positive impact on a canton's budget balance

Source: Own synopsis

Table A-2: Description of Variables

Variable	Definition	Source
Primebal: Primary balance	Net lending (+) or net borrowing (-) excluding interest calculated as the difference between general government revenue and general government expenditures excluding interest	AMECO
GDP: Real GDP growth	Change of real GDP in percent	IMF Economic Outlook Database
Unemployment: Change in unemployment rate	$\frac{u_{i,t} - u_{i,t-1}}{u_{i,t-1}} \times 100$ where $u_{i,t}$ is the unemployment rate in country i at time t	AMECO; own calculations
Yield	Sovereign Bond Yield (10 year maturity)	Datastream
Pop-Share 65: Share of population over 65	Inhabitants which are 65 year old or older divided by total population multiplied with 100	AMECO; own calculations
Election-Dummy	Dummy variable which takes the value 1 if there was a legislative or executive election in a given country in a given year and 0 if otherwise	Beck et al. (2001); own calculations
Pol	Political Orientation of the government: Percentage share of government posts that were held by social democratic or other left parties whereby the percentaged share is weighted by the number of days the government was in office in a given year	Armingeon et al. (2010); own calculations
Euro	Dummy variable which takes the value 1 if a country was a member of the Eurozone in a given year and 0 if otherwise	European Central Bank[3]
FRI (Fiscal Rule Index)	See Table A-3	EU Fiscal Rules Database[4]; own calculations
FCI: Fiscal Council Index	Each fiscal council is scored as 1 respectively if it (1) provides analysis on fiscal policy developments without normative judgement, (2) provides independent macroeconomic and/or budgetary forecasts, (3) issues normative statements (involving judgement) on fiscal policy, or (4) issues recommendations (considering policy alternatives) in the area of fiscal policy. If one country posses more than one council in a given year, the councils are added, whereby the highest ranked council is weighted with 1, the second highest with 1/2 , the third highest with 1/3 etc. Construction based on European Commission (2011, 117).	EU Fiscal Institutions Database[5]; own calculations
SFA: Stock-flow adjustments	Stock-flow adjustments in percent of total general government expenditures, whereby stock-flow adjustments are calculated as the sum of the general government budget balance and the difference of general government consolidated gross debt from year t and t-1 (see Equation 2)	AMECO; own calculations

[3] http://www.ecb.int/euro/intro/html/map.en.html
[4] http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/fiscal_rules/index_en.htm
[5] http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/independent_institutions/index_en.htm

Table A-4: Criteria and Scores for the Construction of the Fiscal Rule Index

Criterion 1: Statutory base of the rule

4 Constitutional base

3 The rule is based on a legal act (e.g. Public Finance Act, Fiscal Responsibility Law)

2 The rule is based on a coalition agreement or an amendment reached by different general government tiers (and not enshrined in a legal act)

1 Political commitment by a given authority

Criterion 2: Room for setting and revising objectives

3 There is no margin for adjusting objectives (they are encapsulated in the document underpinning the rule)

2 There is some but constrained margin in setting or adjusting objectives

1 There is complete freedom in setting or adjusting objectives (the statutory base of the rule merely contains broad principles or the obligation for the government or the relevant authority to set targets)

Criterion 3: Nature of body in charge of monitoring respect and enforcement of the rule

The score of this criterion index is constructed as a simple average of the two elements below:

Nature of the body in charge of monitoring respect of the rule

3 Monitoring by an independent authority (Fiscal Council, Court of Auditors or any other Court) or the national parliament

2 Monitoring by the ministry of finance or any other government body

1 No regular public monitoring of the rule (there is no report systematically assessing compliance)

The score of this sub-criterion is augmented by 1 if there is real time monitoring of compliance with the rule, i.e. if alert mechanisms of risk of non-respect exist.

Nature of the body in charge of enforcement of the rule

3 Enforcement by an independent authority (Fiscal Council or any Court) or the national parliament

2 Enforcement by the ministry of finance or any other government body

1 No specific body in charge of enforcement

Criterion 4: Enforcement of mechanisms of the rule

4 There are automatic correction and sanction mechanisms in case of non-compliance

3 There is an automatic correction mechanism in case of non-compliance and the possibility of imposing sanctions

2 the authority responsible is obliged to take corrective measures in case of non-compliance or is obliged to present corrective proposals to Parliament or the relevant authority

1 There is no ex-ante defined actions in case of non-compliance

The score of this variable is augmented by 1 if escape clauses are foreseen and clearly specified.

Criterion 5: Media visibility of the rule

3 Observance of the rule is closely monitored by the media; non-compliance is likely to trigger public debate

2 High media interest in rule compliance, but non-compliance is unlikely to invoke public debate

1 No or modest interest of the media

Source: Fiscal Rules Database; see also European Commission (2006, 163–4)

Table A-5: Regression Results for Pooled Regression without Interaction Terms

Dependent Variable: PRIMEBAL
Sample: 1991 2011
Periods included: 21
Cross-sections included: 27
Total panel (unbalanced) observations: 426

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.607308	0.420438	-3.822933	0.0002
PRIMEBAL(-1)	0.710319	0.034207	20.76536	0.0000
GDP	0.164716	0.040571	4.059965	0.0001
YIELD	0.134350	0.067632	1.986492	0.0476
DEBT	0.019014	0.005285	3.597648	0.0004
INFLATION	-0.100970	0.038248	-2.639856	0.0086
UNEMPLOYMENT	-0.031569	0.008055	-3.919146	0.0001
POP-SHARE: 65	-3.47E-05	2.09E-05	-1.660304	0.0976
ELECTION-DUMMY	-0.588203	0.162196	-3.626504	0.0003
POL	-0.001811	0.001699	-1.066029	0.2870
FED	0.151760	0.274454	0.552953	0.5806
SFA	0.032479	0.013927	2.332121	0.0202
FRI	0.402674	0.104757	3.843891	0.0001
FCI	0.040999	0.057059	0.718536	0.4728
EURO	-0.102960	0.197451	-0.521447	0.6023

Weighted Statistics

R-squared	0.736358	F-statistic	81.99522
Adjusted R-squared	0.727378	Prob(F-statistic)	0.000000
Durbin-Watson stat	1.860697		

Table A-6: Regression Results for Pooled Regression with Interaction Terms

Dependent Variable: PRIMEBAL
Sample: 1991 2011
Periods included: 21
Cross-sections included: 27
Total panel (unbalanced) observations: 426

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.729593	0.416062	-4.157054	0.0000
PRIMEBAL(-1)	0.704059	0.031772	22.16003	0.0000
GDP	0.170572	0.037966	4.492790	0.0000
YIELD	0.138070	0.064319	2.146653	0.0324
DEBT	0.019468	0.005100	3.817200	0.0002
INFLATION	-0.094351	0.038783	-2.432804	0.0154
UNEMPLOYMENT	-0.030593	0.007921	-3.862102	0.0001
POP-SHARE: 65	-3.72E-05	1.80E-05	-2.067383	0.0393
ELECTION-DUMMY	-0.577192	0.153361	-3.763629	0.0002
POL	-0.000763	0.001820	-0.419048	0.6754
FED	0.235001	0.253257	0.927917	0.3540
SFA	0.028626	0.011530	2.482780	0.0134
FRI	0.252712	0.149035	1.695657	0.0907
FCI	0.021226	0.051686	0.410676	0.6815
EURO	-0.090776	0.189865	-0.478105	0.6328
FCIxFRI	0.061776	0.040384	1.529717	0.1269
SFAxFRI	0.027128	0.009659	2.808511	0.0052

Weighted Statistics

R-squared	0.744245	F-statistic	74.38657
Adjusted R-squared	0.734240	Prob(F-statistic)	0.000000
Durbin-Watson stat	1.869109		