

Fiscal Rules, Fiscal Space and their Macroeconomic Effects*

Carolin Nerlich^{†1} and Wolf Heinrich Reuter^{‡2}

¹European Central Bank, Fiscal Policies Division

²Vienna University of Economics and Business, Department of
Economics

January, 2015

Abstract

In this paper we analyse the interaction of fiscal rules and fiscal space. We find that fiscal rules have a significant positive impact on fiscal space. Furthermore, the analysis shows that countries with more fiscal space increase discretionary expenditures, but that this effect is significantly reduced if fiscal rules are in place. This can be interpreted such that fiscal space makes fiscal policy more pro-cyclical while fiscal rules seem to counteract this pro-cyclicity. Regarding the different types of fiscal rules, we find strong effects from expenditure rules and to a lesser extent from balanced budget rules, but none from debt rules.

JEL-Classification: E61, E62, H60

Keywords: Fiscal Space, Fiscal Rules, Fiscal Policy, Government Expenditures

*The views expressed in this paper are exclusively those of the authors and do not necessarily reflect those of the European Central Bank.

[†]e-Mail: carolin.nerlich@ecb.int

[‡]e-Mail: wolf.reuter@wu.ac.at.

1 Introduction

This paper analyses the impact of fiscal rules on the countries' available fiscal space and how their interaction determines the cyclicity of fiscal policy.

Generally, it can be argued that fiscal rules have a positive impact on fiscal space, i.e. the fiscal room for manoeuvre is higher in countries which have established credible fiscal rules. In fact, fiscal rules help to keep primary balances under control and by fostering credibility they reduce the country's interest expenditure. By reducing the actual debt level and lifting the debt limit, beyond which debt turns unsustainable, they increase the fiscal space of a country.

Although it is widely acknowledged that fiscal rules are essential for limiting the deficit bias, they are sometimes criticised for increasing the pro-cyclicality of fiscal policy, in particular if defined in nominal terms. More precisely, it is argued that during a boom phase fiscal rules do not prevent fiscal policy to turn expansionary, while at times of a recession fiscal policy is potentially restrictive as governments need to comply with the rules' requirements. This effect is assumed to be particularly pronounced in periods of limited fiscal space, while the interaction between fiscal rules and fiscal space is less obvious in an environment of high fiscal space. This suggests that fiscal rules, if they are in place for several years, by increasing fiscal space will turn less pro-cyclical.

Our paper addresses the criticism of the pro-cyclicality of fiscal rules. We first estimate the impact of fiscal rules on fiscal space. In a second step we examine how the interaction of fiscal rules and fiscal space is affecting discretionary expenditures. Among others, it is tested whether fiscal rules limit the responsiveness of discretionary expenditures to fiscal space. Concretely it is tested whether fiscal rules help to lower the increase in discretionary measures in times of high fiscal space, while their impact on discretionary measures would be lower during times of no fiscal space. In case fiscal rules turn out to have a dampening impact on discretionary expenditures, this would support the view that fiscal rules would not increase output volatility, as discretionary expenditure would react less to cyclical developments. We use output volatility as a proxy for the pro-cyclicality of fiscal policy given that output volatility tends to increase if fiscal policy is pro-cyclical. Thus, if fiscal rules have an adverse impact on discretionary expenditure and thereby output volatility, this would support the conclusion that fiscal rules would help to reduce the cyclicity of fiscal policy rather than to increase it. We also try to address the question whether it matters which kind of fiscal rules are in place. Thus, we estimate the impact for different kinds of fiscal rules, i.e. the balanced budget, debt and expenditure rules.

We use an updated version of the dataset developed in Nerlich and Reuter (2013) to account for the latest improvements of national fiscal frameworks in the EU27. We calculate fiscal space using the methodology by Ghosh et al. (2013) for the period 1990 to 2013. In fact, fiscal space is defined as the difference between actual debt and a debt limit, with the debt limit being calculated by the reaction function of the primary balance to past debt levels. Thereby, we account for the fact that fiscal space can vary over time, for example due to interest rate changes or institutional settings such as the introduction of fiscal rules.

While the impact of fiscal rules is widely discussed in the literature, to our knowledge it has not yet been analysed how fiscal rules are affecting fiscal space and how the interaction between the two influences public policy.

The paper finds that fiscal rules tend to have a positive impact on fiscal space, i.e. the fiscal room for manoeuvre is higher in those countries that have fiscal rules in place. Furthermore, the analysis shows that more fiscal space leads to increased discretionary expenditures, but that this effect is significantly reduced if fiscal rules are in place. This can be interpreted such that fiscal space allows fiscal policy to be more pro-cyclical while fiscal rules seem to counteract this pro-cyclicality. Regarding the different types of fiscal rules, we find strong effects from expenditure rules and to a lesser extent from balanced budget rules, but none from debt rules. One possible explanation is that expenditure rules and balanced budget rules are mostly defined in structural terms, while debt rules are usually expressed in nominal terms.

The paper is organised as follows. Section 2 describes the data used, i.e. the calculation of the fiscal space and the update of the fiscal framework database. Section 3 estimates the impact of fiscal rules on fiscal space. In section 4 the impact of fiscal rules on discretionary expenditures is analysed, with a particular view on the available fiscal space. Section 5 looks more broadly at the impact of fiscal rules and limited fiscal space on output volatility.

2 Data

2.1 The definition of fiscal space

Fiscal space, which is a relatively new concept, tries to quantify a country's room for manoeuvre for fiscal policy. The literature offers various ways on how to define and calculate the fiscal space of a country, taking into account the reaction of the primary balance to the debt level, (potential) tax revenues or implicit liabilities.

A first attempt to calculate fiscal space goes back to Bohn (1998, 2008) who analyses the dynamics of US debt-to-GDP data. In this approach fiscal space can either be zero or infinite, depending on the reaction of the primary fiscal balance to public debt in the past (controlling for other determinants of the primary balance). It is infinite if the reaction of the primary balance is sufficiently strong and zero otherwise, assuming a linear relationship for any amount of debt. This definition of fiscal space has been extended by Ostry et al. (2010) and Ghosh et al. (2013)¹, by taking into account the work of Abiad and Ostry (2005), and Mendoza and Ostry (2008), which propose to use squared and cubic debt terms when calculating the response term.

Others have chosen a different approach by calculating the fiscal space on the basis of various measures of tax revenues (including potential, maximum or structural tax revenues). Aizenman and Jinjark (2010) define fiscal space as

¹This definition of fiscal space has been applied e.g. by Zandi et al. (2011) and Hajnovic and Zeman (2012).

the number of years of tax revenues that are necessary to repay a country's debt, i.e. the public debt divided by the de facto tax base of a country. Brun et al. (2006) calculate fiscal space as the ratio of the current level of revenues to potential tax revenues, based on structural indicators such as GDP per capita and income sectors. Similarly, Bi (2012) uses a general equilibrium model to derive dynamic Laffer curves of taxation and create country specific (depending on size and degree of countercyclical policy responses) stochastic fiscal limits as a measure of the ability and willingness of governments to service their debts. Park (2012) employs a (standard neoclassical) model to generate a Laffer curve of public revenues. He defines fiscal space as the distance between current tax revenues and the peak of the Laffer curve (i.e. the maximum tax revenues possible) and investigates how population aging trends affect fiscal space.

A third stream of the literature links fiscal space to implicit liabilities, such as ageing costs. Mario (2013) uses the S1 indicator², which captures the required fiscal adjustment to reach a debt level of 60% of GDP by 2030. A more short-term definition of fiscal space is given by Schick (2009, 2012). He defines fiscal space as the financial resources available to the government for fiscal policy, namely growth-enhancing investment in physical and human capital that governments can finance with borrowed funds without prejudicing the long-run sustainability of its fiscal position.

In this paper we follow the approach used in Ghosh et al. (2013). Fiscal space is defined as the difference between current debt levels and the debt limit. The latter is estimated using historical, but marginal decreasing, responses of the primary balance to increases in debt and by taking various levels of interest-rate growth differentials into account. The debt limit is the point beyond which either extraordinary (more than historical) efforts are necessary or a country defaults. Appendix A.4 gives a more detailed description of the concept and details of the calculations performed in this paper.

We calculate the fiscal space for the EU27 countries.³ In contrast to previous studies, we also calculate fiscal space for different points in time, covering the period 1990 to 2013 (depending on data availability). This way we also account for the fact that fiscal space can vary over time, as can be seen in Figure 1 which shows the development of the average fiscal space in the EU27.

Figure 5 in Appendix A.3 shows the full country specific developments of fiscal space, which is different across countries, as well as over time. In particular, some countries (Belgium, Finland, France, Italy, Portugal) had episodes of very low or no fiscal space during the mid-1990s, which in most cases recovered in the run-up to EMU. In fact, the steep decline in interest rates in the run-up to EMU are likely to have contributed to the improvement in fiscal space in the countries joining the Euro Area. With the financial and sovereign debt crisis unfolding, the fiscal space diminished in many countries, in some of them sharply, from 2007 onwards. Seven countries (Cyprus, Czech Republic, Spain, Greece, Italy, Portugal, Slovenia) still have very low or no fiscal space in 2013. Moreover,

²For the definition of the S1 indicator see European Commission (2012*b*).

³Due to data availability we do not calculate the fiscal space for Croatia.

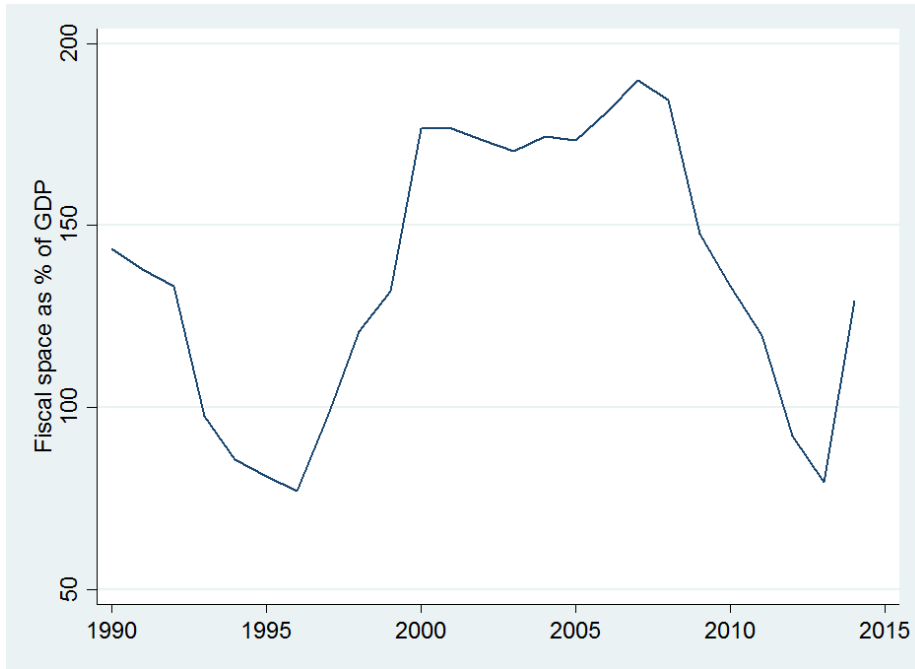


Figure 1: Average fiscal space (as % of GDP) for EU27 from 1990 to 2014 (country composition per year change due to data availability, see Figure 5 in Appendix A.3)

Italy stands out as the only country which had no or very low fiscal space throughout the whole sample period. In turn, in a number of countries, such as Austria, Germany, Estonia, Luxembourg, Malta, Netherlands and Sweden, the fiscal space remained relatively stable at a high level throughout the full period, as these countries were less affected by the sovereign debt crisis.

2.2 Update of the fiscal rules dataset

We update the dataset of Nerlich and Reuter (2013) to account for the latest changes in the fiscal frameworks of the EU27. The dataset contains information about various characteristics of national numerical fiscal rules and national fiscal councils in the EU27 from 1990 to 2014. It combines data from the European Commission (2012a), the OECD (2003, 2008), the IMF (2013) and an ESCB-internal dataset on national fiscal frameworks (2011, 2012, 2014). Appendix A.2 shows the updated full dataset of national numerical fiscal rules.

The updated dataset confirms that the number of fiscal rules, including those in law or constitutions, continued to increase in recent years (see Figure 2). While in 1990 only six out of the 27 EU countries analysed in this paper had some kind of fiscal rule in place, the number increased to 25 countries in 2014. By now, most countries anchored their fiscal rules in law or constitution and in more and

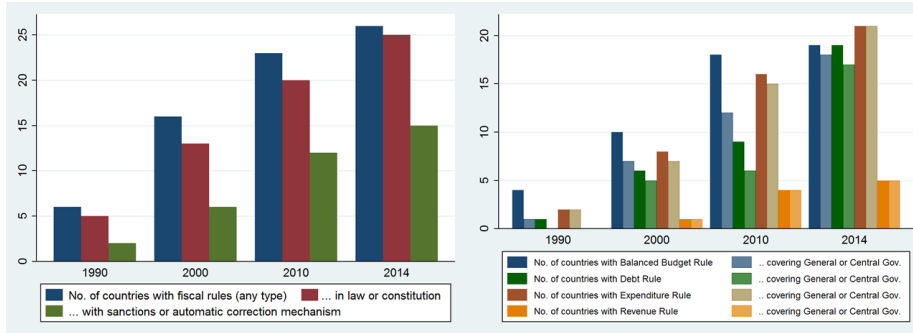


Figure 2: Number of countries having specific kinds of fiscal rules in 1990, 2000, 2010 and 2014

more countries are the fiscal rules linked to a sanction or automatic correction mechanism. This is likely to foster the credibility of the fiscal rules. Moreover, most countries have different kind of fiscal rules in place. In particular, balanced budget rules, debt rules and expenditure rules covering the general or central government are wide-spread, while revenue rules continue to be of marginal importance.

3 Fiscal Rules and Fiscal Space

Fiscal rules and fiscal space are closely linked with each other in the sense that the room for manoeuvre seems to be higher in countries with fiscal rules, that foster fiscal discipline. There are two main arguments supporting this view: First, fiscal rules help to decrease public deficits and debt levels (e.g. Debrun et al., 2008). By widening the difference between the actual debt level and the debt limit this increases the fiscal space of a country. Second, fiscal rules help fostering the trust of investors and financial markets in the soundness of a country's public finances (e.g. Iara and Wolff, 2011). This should have a decreasing impact on the risk premia and interest rates of government bonds, which lifts the debt limit, lowers the actual debt and thereby increases fiscal space.

We test the effect of fiscal rules on fiscal space in a simple econometric framework (Equation 1) for the EU27 countries covering the period 1990-2013:

$$S_{i,t} = \beta_1 F_{i,t} + X'_{i,t} \gamma + \mu_i + \epsilon_{i,t} \quad (1)$$

where $S_{i,t}$ is the average fiscal space over the past ten years of country i at time t and $F_{i,t}$ is the share of the past 10 years where a (specific) fiscal rule was in place. $X_{i,t}$ captures a set of control variables (also expressed in ten year averages) which could potentially influence fiscal space (such as the size of the government, financial openness or the fragmentation of government). Important macroeconomic variables, such as interest rates, the output gap and the debt

level, have not been used as control variables as they have been already directly included in the calculation of the fiscal space measure. Furthermore we include country fixed effects μ_i and a normally distributed error term $\epsilon_{i,t}$. The data sources for the various variables are given in Appendix A.1.

Table 1: *Regression results (10 year averages, Dependent variable: Fiscal Space)*

	(1) All Rules	(2) Balanced Budget Rules	(3) Debt Rules	(4) Expenditure Rules
Fiscal Rule	31.271*** (6.440)	25.840** (9.353)	-7.560 (13.593)	44.968*** (9.977)
GDP per Capita	53.111 (114.250)	48.344 (110.614)	83.148 (122.403)	7.849 (79.057)
Government Size	6.438*** (1.982)	4.380** (2.135)	3.727 (2.589)	10.020*** (2.475)
Financial Openness	-7.337 (7.580)	-4.593 (7.929)	-6.475 (10.149)	-23.248* (12.569)
Trade Openness	1.144*** (0.120)	1.221*** (0.114)	1.212*** (0.157)	1.344*** (0.161)
Oil Price (for oil exporters)	0.164 (0.186)	0.334** (0.160)	0.509** (0.204)	0.032 (0.182)
Share of Young	5.271 (5.105)	5.275 (5.386)	3.930 (5.083)	1.664 (3.392)
Share of Old	-16.877*** (3.210)	-17.669*** (3.644)	-16.638*** (5.108)	-17.101*** (2.832)
Election Years	-1.818 (1.483)	-1.957 (1.650)	-2.107 (1.260)	-0.474 (1.449)
Ideology	0.127*** (0.012)	0.132*** (0.012)	0.123*** (0.021)	0.104*** (0.015)
Ideological Range	0.162*** (0.016)	0.181*** (0.023)	0.139*** (0.022)	0.096*** (0.024)
Government Fragmentation	3.212*** (0.537)	3.036*** (0.530)	2.688*** (0.554)	1.802*** (0.485)
Political Stability	3.112*** (1.080)	3.883*** (0.931)	5.204*** (0.975)	4.436*** (0.611)
IMF Arrangement	-0.797* (0.438)	-0.749 (0.459)	-0.515 (0.554)	-0.567 (0.548)
N	235	235	235	235
Groups	25	25	25	25
R ² (within)	0.766	0.745	0.713	0.808

Notes: Dependent Variable is 10 year average of fiscal space. All variables are averages of past 10 years. Columns indicate different definitions of "Fiscal Rule" variable. All regressions include country fixed effects. Heteroscedasticity robust standard errors are in parentheses. * indicate significance at 10% level, ** at 5% level and *** at 1% level.

As shown in Table 1, fiscal rules have a significant positive impact on the fiscal space of a country. If a country had a fiscal rule in place for the past ten years this increased the average fiscal space for those years by around 31% of GDP.

The impact is proportional to the number of years in which a fiscal rule has been in place. The coefficients of the control variables are in line with general expectations: Countries with more conservative governments, a more sizeable government with a larger tax base, more fragmented governments or a larger difference between ideologies in the government, more political stable, with a smaller share of old population and more open trade, tend to have more fiscal space. Moreover, we introduced several control variables such as government fragmentation or ideological distance between parties in governments but also e.g. ideology to capture the potential impact of voter preferences on fiscal space and fiscal rules. For example, it can be argued that if voters have a strong preference for sound public finances, they are likely to support fiscal rules and have a strong preference for high fiscal space.

Moreover, the impact of fiscal rules on fiscal space depends on the type of fiscal rules in place. The strongest effect can be attributed to expenditure rules, followed by balanced budget rules, while no significant effect was found for debt rules. Previous studies (e.g. Debrun et al. (2008) or Nerlich and Reuter (2013)) already highlighted the significant effect of balanced budget rules (and to a lesser extent debt rules) on public finances. Yet, they did not find significant effects for expenditure rules on the public deficits. This suggests that, while the positive effect of balanced budget rules on fiscal space could be mainly driven by their influence on the public balance, the effect of expenditure rules on fiscal space might be mainly due to higher credibility and lower interest rate expenditures. The results above might be biased, as the causality could also work in the reverse order. In fact, a country with either low or high fiscal space might have introduced fiscal rules in order to either increase the fiscal space in the future or preserve the good conditions. To minimise this bias, we used ten year averages, as this limits at least for low fiscal space the likelihood that the causality goes from fiscal space to fiscal rules. Yet we also did robustness checks using averages over shorter time periods (see Table 9 in Appendix A.5). This showed that the fiscal rule variable becomes less significant for averages with less years. But this might not be too surprising, as fiscal rules need some time to have a significant effect on the credibility of public finances or the actual debt level. Furthermore, averages over shorter time periods are also driven by other short-term factors like the business cycle or macroeconomic/ financial shocks. Overall, as fiscal rules remain significant also in the setting with 5-year averages, we are confident that taking longer averages show the effect of fiscal rules more clearly and do not significantly bias our results.

4 Fiscal Rules, Fiscal Space and Fiscal Policy

After we found support for our assumption that fiscal rules are enhancing the fiscal space of a country, we are in a next step interested in the effects of fiscal rules on fiscal policy variables in an environment of high or low fiscal space. Both, fiscal space and fiscal rules are often mentioned in relation to discretionary fiscal policy, as low fiscal space or stringent fiscal rules should both set

boundaries to the use of discretionary fiscal policy.

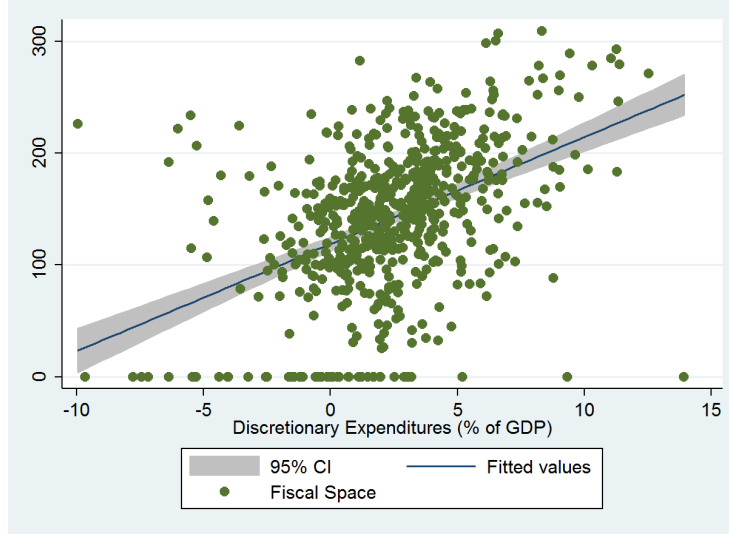


Figure 3: Current fiscal space vs. current discretionary expenditures, annually, 1990-2013. Sources: Eurostat, own calculations.

As we can already observe in the data, fiscal space and discretionary expenditures seem to be strongly positively correlated. Figure 3 plots fiscal space and discretionary expenditure for the 27 EU countries covering the period 1990-2013. It is shown that countries with high fiscal space tend to have a high share of discretionary expenditures in terms of GDP, while countries with no or only limited fiscal space need to reduce their discretionary expenditure.

To investigate the interplay between fiscal rules and fiscal space in determining the size of discretionary expenditures we estimate Equation (2) for the EU27 from 1990-2013:

$$E_{i,t}^{Disc} = \beta_1 E_{i,t-1}^{Disc} + \beta_2 S_{i,t} + \beta_3 F_{i,t} + \beta_4 S_{i,t} \cdot F_{i,t} + X'_{i,t} \gamma + \mu_i + \eta_t + \epsilon_{i,t} \quad (2)$$

In a dynamic setting we estimate the effect of fiscal space $S_{i,t}$, fiscal rules $F_{i,t}$, and the interaction between the two $S_{i,t} \cdot F_{i,t}$, on the discretionary government expenditures $E_{i,t}^{Disc}$ of country i at time t . Discretionary government expenditures are calculated using the cyclically adjusted public finance variables published in the AMECO database of the European Commission. We also include time (η_t) and country (μ_i) fixed effects and $\epsilon_{i,t}$ is the normally distributed error term.

Furthermore, we include a set of control variables $X_{i,t}$ which are standard determinants in the literature on fiscal reaction functions: i) debt level of the previous period, ii) output gap of the previous period, iii) share of old and young in the population, iv) trade openness, v) an election year dummy, vi) ideology, vii) ideological range of government, viii) fragmentation of government, ix) political

stability, and dummies for x) IMF arrangements, xi) the EU and xii) Eurozone membership.

Table 2: *Regression results (Dependent variable: discretionary expenditures)*

	(1) All Rules	(2) Balanced Budget Rules	(3) Debt Rules	(4) Expenditure Rules
Discret. Expenditures (-1)	-0.026 (0.120)	-0.003 (0.114)	0.012 (0.116)	-0.012 (0.127)
Fiscal Space	0.033*** (0.004)	0.029*** (0.004)	0.024*** (0.006)	0.029*** (0.004)
Fiscal Rule	1.499 (0.865)	1.457 (0.758)	-1.254 (1.133)	1.716 (0.911)
Fiscal Space x Fiscal Rule	-0.015** (0.006)	-0.012** (0.005)	0.005 (0.008)	-0.014** (0.007)
Debt (-1)	0.008 (0.018)	0.005 (0.018)	0.011 (0.019)	0.001 (0.018)
Output Gap (-1)	0.040 (0.044)	0.026 (0.040)	0.019 (0.041)	0.034 (0.044)
Share of Young	-17.160 (18.757)	-13.691 (21.396)	-13.045 (19.465)	-21.194 (17.598)
Share of Old	-62.237*** (21.583)	-56.973** (20.937)	-55.128*** (19.104)	-54.472** (20.813)
Trade Openness	0.018* (0.010)	0.016* (0.009)	0.018* (0.010)	0.021* (0.011)
Election Year	0.336* (0.197)	0.299 (0.205)	0.309 (0.209)	0.335 (0.201)
Ideology	-0.025 (0.069)	-0.020 (0.070)	-0.016 (0.066)	-0.005 (0.070)
Ideological Range	0.008 (0.104)	0.010 (0.106)	0.005 (0.093)	-0.003 (0.095)
Fragmentation of Government	-0.804 (2.040)	-1.044 (2.013)	-0.289 (2.177)	-0.729 (2.192)
Political Stability	14.776** (6.379)	13.944** (6.264)	13.880** (6.306)	14.462** (6.577)
IMF Arrangement	-2.272* (1.168)	-2.439** (1.162)	-2.431** (1.178)	-2.398** (1.175)
EU Membership	-0.363 (0.593)	-0.381 (0.610)	-0.606 (0.574)	-0.417 (0.587)
Eurozone Membership	0.097 (0.557)	0.181 (0.534)	0.300 (0.563)	0.019 (0.551)
N	464	464	464	464
Groups	27	27	27	27
R ² (within)	0.554	0.551	0.543	0.554

Notes: Dependent Variable is discretionary general government expenditures in percentage of GDP. Columns indicate different definitions of "Fiscal Rule" variable. All regressions include time and country fixed effects. Heteroscedasticity robust standard errors are in parentheses. * indicate significance at 10% level, ** at 5% level and *** at 1% level.

The estimation results of Equation (2) are presented in Table 2 for various types of fiscal rules. The main results are overall in line with intuition: Countries with more fiscal space tend to have higher discretionary expenditures. Discretionary expenditures are by 0.33 % of GDP higher if the fiscal space of a country were to be increased by 10 percentage points. This effect, however, is significantly reduced, by about a half, if governments have fiscal rules in place, as governments cannot fully use their fiscal space independently anymore. If the fiscal space is zero, for example following a sharp increase in actual debt or a confidence crisis lowering the debt limit, the effect of fiscal rules is no longer significant, which indicates that in those times the absence of fiscal space might be more restrictive than the impact of fiscal rules.

These results overall confirm the findings of the literature, namely that fiscal rules significantly reduce discretionary expenditures. Yet, the results add to the findings the observation that fiscal space increases discretionary expenditures, while fiscal rules might not be relevant anymore in times of no fiscal space.

When looking at the different types of fiscal rules, we find in line with our results in Section 3, that the strongest effect on discretionary expenditures can be attributed to expenditure rules.⁴ Yet, debt rules do not seem to be significant when looked at separately.

To check the robustness of our main findings we perform several additional exercises, some of which are presented in Table 10 in Appendix A.6. Overall the results stay qualitatively the same. For example, we do robustness checks without the lagged dependent variable, without any control variables, or without fixed effects.

The main results described above suggest that fiscal space and fiscal rules do have different effects on fiscal policy / discretionary expenditures depending on the level of fiscal space. Thus on the one hand, we performed several tests including squared or cubic versions of the fiscal space variable, but they were neither significant nor changed the baseline results. On the other hand, we tried different thresholds of fiscal space and split the fiscal space variable at various levels. Table 3 shows the results for the fiscal space and fiscal rule coefficients using the variables split at different fiscal space thresholds. In fact this confirms our main results, as we can see that the effect of fiscal space becomes stronger the less fiscal space a country has and the effect of fiscal rules is more significant the higher the fiscal space variable is. The threshold cannot be determined exactly, but the results suggest that only very low fiscal space, i.e. below 50 % of GDP, strongly increases the effect of fiscal space on discretionary expenditures.

In a next step we address the question whether the interaction of fiscal space and fiscal rules has an impact on the relative weight of discretionary expenditures versus cyclical expenditures. If so, this would imply that governments in the long term adjust the composition of their expenditures with fiscal rules in place, for example by reducing the share of automatic stabilizers. The difference between government primary expenditures and discretionary government expenditures

⁴This result is also in line with the findings of Nerlich and Reuter (2013), who show that expenditure rules do have an effect on government expenditures, while they do not have an impact on the fiscal balance suggesting that revenues are changed simultaneously.

Table 3: Regression results - thresholds of fiscal space (dependent variable: discretionary expenditures)

	(1)	(2)
Fiscal Rule	1.492 (0.876)	1.712 (1.020)
Fiscal Space < 100%	0.047*** (0.007)	
Fiscal Space < 100% x Fiscal Rule	-0.022* (0.013)	
Fiscal Space >= 100%	0.034*** (0.005)	
Fiscal Space >= 100% x Fiscal Rule	-0.014** (0.006)	
Fiscal Space < 50%		0.124*** (0.028)
Fiscal Space < 50% x Fiscal Rule		-0.091* (0.038)
Fiscal Space >= 50% < 150%		0.037*** (0.007)
Fiscal Space >= 50% < 150% x Fiscal Rule		-0.020** (0.009)
Fiscal Space >= 150%		0.034*** (0.005)
Fiscal Space >= 150% x Fiscal Rule		-0.015** (0.007)
N	464	464
Groups	27	27
R ² (within)	0.557	0.557

Notes: Dependent Variable is discretionary general government expenditures in percentage of GDP. All regressions include lagged dependent variable, control variables, time and country fixed effects. Heteroscedasticity robust standard errors are in parentheses. * indicate significance at 10% level, ** at 5% level and *** at 1% level.

is defined as the relative share of the cyclical component of expenditures ($E_{i,t}^{Cyc}$) of country i at time t :

$$E_{i,t}^{Cyc} = E_{i,t} - E_{i,t}^{Disc} \quad (3)$$

We investigate the effect of fiscal space and fiscal rules on the relative weight of the cyclical component in a similar setting to Equation 2. However, we take 10-year averages to disentangle the share of the cyclical component from cyclical developments. Moreover, changes in the cyclical component (e.g. reforms of the unemployment insurance) take longer to be implemented and materialize.

Table 4 shows the respective results. The results are in parts in line with the results for discretionary expenditures found above. Whereas more fiscal space increases discretionary expenditures, it decreases the relative weight of

Table 4: *Regression results (Dependent variable: 10 year average of cyclical component of expenditures)*

	(1) All Rules	(2) Balanced Budget Rules	(3) Debt Rules	(4) Expenditure Rules
Fiscal Space	-0.047*** (0.015)	-0.051*** (0.011)	-0.026*** (0.008)	-0.030*** (0.010)
Fiscal Rule	-5.435*** (1.363)	-4.404** (1.854)	2.883 (4.514)	-7.586*** (1.353)
Fiscal Space x Fiscal Rule	0.040*** (0.009)	0.042*** (0.010)	-0.008 (0.026)	0.044*** (0.009)
Debt	0.060** (0.023)	0.053** (0.021)	0.049 (0.034)	0.084*** (0.029)
Trade Openness	-0.069* (0.038)	-0.066* (0.037)	-0.064 (0.055)	-0.097** (0.035)
Share of Young	-32.815 (34.163)	-25.884 (24.654)	-71.977 (45.187)	-18.278 (28.260)
Share of Old	89.841** (34.575)	68.443* (35.603)	43.281 (47.204)	94.754** (40.138)
Election Year	0.592 (1.299)	0.856 (1.059)	1.987 (1.449)	-0.605 (1.111)
Ideology	-0.569*** (0.205)	-0.469** (0.183)	-0.455** (0.176)	-0.612*** (0.174)
Ideological Range	-0.683* (0.379)	-0.330 (0.361)	-0.522 (0.426)	-0.727** (0.302)
Fragmentation of Government	-25.271*** (9.100)	-25.204*** (8.509)	-27.395** (10.773)	-17.607** (7.593)
Political Stability	-28.330*** (8.331)	-31.272*** (9.295)	-29.565*** (9.450)	-26.867*** (9.315)
IMF Arrangement	7.694** (3.263)	4.780** (2.217)	7.011** (2.965)	6.965* (3.549)
EU Membership	-3.973** (1.732)	-4.744*** (1.494)	-4.024** (1.538)	-3.372** (1.266)
Eurozone Membership	-0.240 (0.741)	0.255 (0.713)	-0.065 (1.160)	0.859 (0.827)
N	261	261	261	261
Groups	26	26	26	26
R ² (within)	0.815	0.830	0.783	0.840

Notes: Dependent Variable is 10 year average of cyclical component of general government expenditures in percentage of GDP. All variables are 10 year averages. Columns indicate different definitions of "Fiscal Rule" variable. All regressions include country fixed effects. Heteroscedasticity robust standard errors are in parentheses. * indicate significance at 10% level, ** at 5% level and *** at 1% level.

the cyclical component. But this decrease almost fully disappears if fiscal rules are in force, i.e. if a country has fiscal rules in force the weight of the cyclical component is not determined by the level of fiscal space anymore. But fiscal rules (independently of the level of fiscal space) themselves decrease the relative

weight of the cyclical component significantly (by around 5% of GDP on average). Again the results split by different types of fiscal rules confirms previous findings that the strongest effect can be found for expenditure rules, some effect for balanced budget rules and none for debt rules.

5 Fiscal Rules, Fiscal Space and Output Volatility

In the following section we aim to contribute to the question whether fiscal rules are pro-cyclical or not, and how this interacts with fiscal space. Our results so far showed that discretionary expenditures increase with fiscal space, but that the increase is reduced if fiscal rules are in place. Thus, fiscal rules seem to have a dampening impact on discretionary expenditures, which is an indication that they might help to limit output volatility. This effect can be assumed to be particularly pronounced if fiscal multipliers are large. Therefore, we investigate this further by analysing the role of fiscal rules and fiscal space in reducing the volatility of the output. We use output volatility as a proxy for the pro-cyclicality of fiscal policy given that output volatility tends to increase if fiscal policy is pro-cyclical. Thus, if fiscal rules have an adverse impact on discretionary expenditures and thereby output volatility, this would support the view that fiscal rules help to reduce the cyclical volatility of fiscal policy.

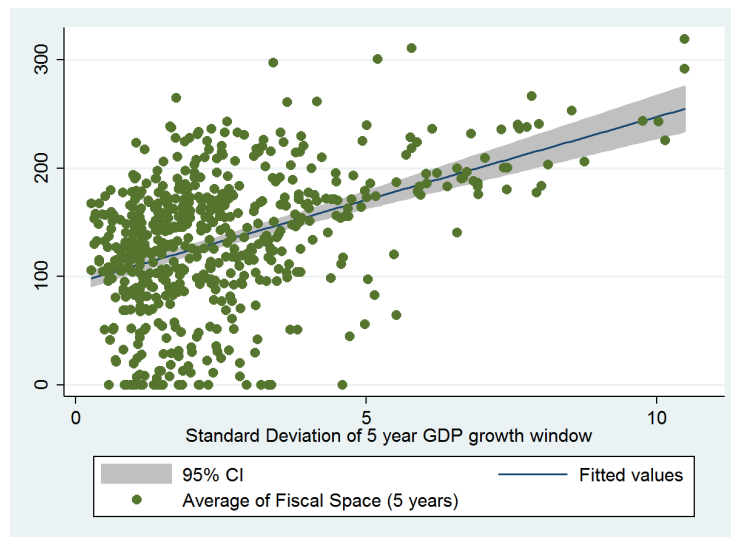


Figure 4: Average fiscal space over past 5 years vs. average output growth volatility over past 5 years

As can be seen in Figure 4 the data suggest a positive relation between fiscal space and output volatility, i.e. countries with a high fiscal space tend to have

higher output volatility. To test this in a controlled environment we estimate the following equation:

$$\sigma_{i,t} = \beta_1 S_{i,t} + \beta_2 F_{i,t} + \beta_3 S_{i,t} \cdot F_{i,t} + X'_{i,t} \gamma + \mu_i + \eta_t + \epsilon_{i,t} \quad (4)$$

where the dependent variable ($\sigma_{i,t}$) is the standard deviation of GDP growth in a five-year rolling window, $S_{i,t}$ the average fiscal space over the same period and $F_{i,t}$ the percentage of years in which a fiscal rule is in place during a particular five-years-window. Furthermore, we include the interaction between the average fiscal space and fiscal rule to test for the dampening effect of fiscal rules in a combination of both. A set of control variables $X_{i,t}$ is included, as well as time (η_t) and country (μ_i) fixed effect. $\epsilon_{i,t}$ is the idiosyncratic error term

The control variables $X_{i,t}$, all expressed in five-year averages, are in line with those used in the literature. They consist of: i) GDP per capita, ii) government size (measured as share of government consumption to GDP), iii) financial openness (the Chinn and Ito index of capital account openness), iv) terms of trade volatility (standard deviation of terms of trade over the past five years), v) young and old population (share of total population), vi) trade openness (as a share of exports plus imports over GDP), vii) elections (a dummy variable indicating whether there was a legislative election), viii) ideology (measure of conservatism of a government), ix) ideological range (ideological distance between the coalition parties in the government), and x) government fragmentation. The data sources and definitions of the variables can be found in Appendix A.1.

The results for estimating Equation (4) are presented in Table 5: We find a significant and positive effect of fiscal space on output volatility. Thus, countries with high fiscal space tend to have higher output volatility. Furthermore, consistent with our previous results in Section 4, we find that fiscal rules tend to dampen the effect of fiscal space on output volatility. Thus, fiscal rules seem to lower output volatility. Consequently, fiscal rules restrict the use of fiscal space and thus also the effect on output volatility.

Moreover, we estimated Equation (4) for different kinds of fiscal rules, with the results shown in the columns (2) to (4). We find that both, balanced budget rules (Column 2) and expenditure rules (Column 4), dampen the positive impact of high fiscal space on output volatility. This is in line with our previous findings that expenditure rules restrict discretionary expenditures and balanced budget rules do have a significant effect on the public balance. We do not find significant results for debt rules.

To check the robustness of our findings we conducted various robustness checks, such as estimating Equation (4) without control variables (see Table 11 in Appendix A.7), using lagged values of the fiscal rule variable to account for the time it takes until fiscal rules change the fiscal policy stance, excluding country and time fixed effects, and using 10-year instead of 5-year averages. Overall we find qualitatively the same results independently of the econometric setting used.

Table 5: Regression results (5 year rolling window, Dependent variable: Volatility of Output Growth)

	(1) All Rules	(2) Balanced Budget Rules	(3) Debt Rules	(4) Expenditure Rules
Fiscal Space	0.025** (0.010)	0.020** (0.009)	0.015* (0.008)	0.023** (0.010)
Fiscal Rule	1.331 (0.894)	1.001 (0.957)	-1.640 (2.185)	1.370* (0.718)
Fiscal Space X Fiscal Rule	-0.016** (0.005)	-0.011* (0.005)	0.001 (0.015)	-0.013* (0.005)
GDP per Capita	-1.935* (1.002)	-2.500** (1.067)	-1.925* (1.172)	-2.076* (1.101)
Government Size	-6.406 (13.057)	-6.643 (14.472)	-10.492 (12.707)	-5.363 (14.119)
Financial Openness	-0.368 (0.417)	-0.305 (0.429)	-0.453 (0.401)	-0.339 (0.421)
Terms of Trade Volatility	0.223 (0.162)	0.180 (0.162)	0.137 (0.143)	0.165 (0.162)
Share of Young	-50.813* (26.174)	-39.423* (22.970)	-39.059* (20.344)	-43.935* (25.740)
Share of Old	-11.059 (29.672)	-4.436 (29.027)	-1.163 (32.741)	-0.519 (32.215)
Trade Openness	-0.015 (0.016)	-0.014 (0.016)	-0.012 (0.015)	-0.014 (0.018)
Election Year	-0.599 (0.642)	-0.667 (0.621)	-0.599 (0.659)	-0.607 (0.694)
Ideology	-0.094 (0.091)	-0.100 (0.089)	-0.116 (0.090)	-0.088 (0.091)
Ideological Range	-0.375 (0.255)	-0.400 (0.255)	-0.352 (0.252)	-0.401 (0.266)
Government Fragmentation	7.206 (4.362)	6.909 (4.359)	7.500 (4.096)	7.783* (4.390)
N	370	370	370	370
Groups	27	27	27	27
R ² (within)	0.628	0.620	0.620	0.620

Notes: Dependent Variable is standard deviation of GDP growth of past 5 years. All variables are averages of past 5 years. Columns indicate different definitions of "Fiscal Rule" variable. All regressions include time and country fixed effects. Heteroscedasticity robust standard errors are in parentheses. * indicate significance at 10% level, ** at 5% level and *** at 1% level.

6 Conclusions

This paper analyses the interaction of fiscal rules and fiscal space. We calculate the fiscal space, based on the definition of Ghosh et al. (2013), for 27 EU member states for the period 1990-2013. In different econometric settings we estimate the link between fiscal rules and fiscal space as well as their interaction

in determining discretionary government expenditures and output volatility. We find that fiscal rules do significantly increase fiscal space. Furthermore, the analysis shows that high fiscal space leads to increased discretionary expenditures, but that this effect is significantly reduced if fiscal rules are in place. This can be interpreted such that fiscal space makes fiscal policy more pro-cyclical while fiscal rules seem to counteract this pro-cyclicality. Regarding the different types of fiscal rules, we find strong effects from expenditure rules and to a lesser extent from balanced budget rules, but none from debt rules.

This paper should be seen as the start of an in-depth investigation into the effects of fiscal space and its interplay with fiscal rules. Further research could concentrate on the various channels driving our overall results and a more detailed analysis of the specifics of fiscal rules which drive these results.

References

- Abiad, A. and Ostry, J. (2005), Primary surpluses and sustainable debt levels in emerging market countries. IMF Policy Discussion Paper 05/6 (Washington: International Monetary Fund).
- Aizenman, J. and Jinjark, Y. (2010), De facto fiscal space and fiscal stimulus: Definition and assessment. National Bureau of Economic Research Working Paper No. 16539.
- Beck, T., Clarke, G., Groff, A., Keefer, P. and Walsh, P. (2001), ‘New tools in comparative political economy: The database of political institutions’, *World Bank Economic Review* **15**(1), 165–176.
- Bi, H. (2012), ‘Sovereign default risk premia, fiscal limits and fiscal policy’, *European Economic Review* **56**(3), 389–410.
- Bohn, H. (1998), ‘The behavior of us public debt and deficits’, *Quarterly Journal of Economics* **113**(3), 949–963.
- Bohn, H. (2008), The sustainability of fiscal policy in the united states, in R. Neck and J.-E. Sturm, eds, ‘Sustainability of Public Debt’, Cambridge, MA: MIT Press, pp. 15–49.
- Brun, J.-F., Chambas, G., Combes, J.-L., Dulbecco, P., Gastambide, A., Guerinneau, S. and Rota Graziosi, G. (2006), Fiscal space in developing countries. concept paper. New York: UNDP, Bureau for Development Policy, Poverty Group.
- Chinn, M. D. and Ito, H. (2006), ‘What matters for financial development? capital controls, institutions, and interactions’, *Journal of Development Economics* **81**(1), 163–192.
- Debrun, X., Moulin, L., Turrini, A., Ayuso-i Casals, J. and Kumar, M. (2008), ‘Tied to the mast? National fiscal rules in the European Union’, *Economic Policy* **23**(54), 297–362.

- European Commission (2012a), Database on numerical fiscal rules. http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/fiscal_rules/index_en.htm.
- European Commission (2012b), Fiscal sustainability report 2012.
- Ghosh, A., Kim, J., Mendoza, E., Ostry, J. and Qureshi, M. (2013), ‘Fiscal Fatigue, Fiscal Space and Debt Sustainability in Advanced Economies’, *The Economic Journal* **123**, F4–F30.
- Hajnovic, F. and Zeman, J. (2012), Fiscal Space in the Euro zone. Working and Discussion Papers WP 5/2012, Research Department, National Bank of Slovakia.
- Iara, A. and Wolff, G. (2011), Rules and risk in the euro area. Bruegel Working Paper 10/2011, Brussels.
- IMF (2013), Fiscal Rules Dataset. <http://www.imf.org/external/datamapper/fiscalrules/map/map.htm>.
- Mario, M. (2013), ‘Budgeting for fiscal space and government performance beyond the great recession’, *OECD Journal on Budgeting* **13**(2), 9–47.
- Mendoza, E. and Ostry, J. (2008), ‘International Evidence on Fiscal Solvency: Is Fiscal Policy “Responsible”?’’, *Journal of Monetary Economics* **55**(6), 1081–1093.
- Nerlich, C. and Reuter, W. (2013), ‘The design of national fiscal frameworks and their budgetary impact’, *ECB Working Paper Series* **1588**, 1–30.
- OECD (2003), International Budget Practices and Procedures Database 2003 .
- OECD (2008), International Budget Practices and Procedures Database 2007/2008 .
- Ostry, J., Ghosh, A., Kim, J. and Qureshi, M. (2010), Fiscal Space. IMF Staff Position Note SPN/10/11 (Washington: International Monetary Fund).
- Park, S. (2012), Quantifying Impact of Aging Population on Fiscal Space. IMF Working Paper No. 12/164, Fiscal Affairs Department, IMF, Washington.
- Schick, A. (2009), ‘Budgeting for Fiscal Space’, *OECD Journal on Budgeting* **2009/2**.
- Schick, A. (2012), Lessons from the Crisis: Will the Great Recession Change Budgeting? Presentation at the 33th Annual Meeting of OECD Senior Budget Officials, Reykjavik, Iceland, 7-8 June 2012.
- Zandi, M., Packard, T. and Cheng, X. (2011), Fiscal Space: A New Gauge of Sovereign Risk: Moody’s Analytics.

A Appendix

A.1 Data Sources

Table 6: Data Sources

Variable Name	Description	Source
Age dependency	Ratio of population below 15 plus population above 64 to population between 15 and 64	UN (dependency ratio, medium variant)
Debt	General government gross debt	AMECO (UDGGL)
Discretionary Expenditures	Total primary government expenditures minus one-off and other temporary measures minus cyclical component of expenditures	AMECO (UUTGI, UOOMSE, UUCGCP)
Election Year	1 if there was election of legislative in respective year	DPI (legelec)
EU Membership	1 if country is member state of the EU in respective year	Authors input
Eurozone Membership	1 if country is member state of the Eurozone in respective year	Authors input
Financial Openness	Chinn-Ito index measuring capital account openness	Chinn and Ito (2006), updated version
Fiscal Rule	1 if fiscal rule of specific type was in place in respective year	Authors database, Table 7
Future age dependency	Same as age dependency, but projections for 20 years ahead	UN (dependency ratio, medium variant)
GDP per Capita	Ratio of nominal GDP to population	AMECO (UVGD, NPTN)
Gov. Expenditure Gap	Difference between actual real government consumption and potential (calculation using HP filter)	Author calculations using AMECO (UCTG0)
Government Fragmentation	probability that two randomly picked members of government are of different parties	DPI (govfrac)
Government Size	Final government consumption spending as share of nominal GDP	AMECO (UCTG0, UVGD)
Ideology	Sum of two main parties in government: 4 points for right party, 2 points for middle party and 0 for left	Author calculations using DPI (gov1rlc, gov2rlc)
Ideological Range	Coding as in "Ideology" but difference between maximum and minimum score in government	Author calculations using DPI (gov1rlc, gov2rlc, gov3rlc)
IMF Arrangement		
Inflation	Inflation rate based on national consumer price index (all items)	AMECO (ZCPIN)
Inflation (Average)	Three year average of past inflation rates	Author calculations using AMECO (ZCPIN)
Oil Price	Average of monthly oil price, only for oil exporters	IMF Primary Commodity Prices
Output Gap	Difference between actual real GDP and potential (calculation using HP filter)	Author calculations using AMECO (OVGD)
Parliament Fragmentation	probability that two randomly picked members of parliament are of different parties	DPI (frac)
Political Stability		
Population	Total population	AMECO (NPTN)
Share of Old	Ratio of population over age 64 to total population	AMECO (NPON)
Share of Young	Ratio of population below age 15 to total population	AMECO (NPCN)
Terms of Trade Volatility	Rolling Window Standard Deviation (5 years): Terms of trade, goods and services	AMECO (APGS)
Trade Openness	Share of exports plus imports to nominal GDP	AMECO (DMGT, DXGT, UVGD)
Volatility of Output Growth	Rolling Window Standard Deviation (5 years): Gross domestic product at current market prices	AMECO (UVGD)

Notes: AMECO: Annual macro-economic database of the European Commission, Vintage Autumn 2014; DPI: World Bank, Database of Political Institutions, Beck et al. (2001); UN: United Nations Population Divisions, World Population Prospects.

A.2 Dataset on national numerical fiscal rules

Table 7: *National numerical fiscal rules*

Ctry	Numerical Fiscal Rule	Ctry	Numerical Fiscal Rule	Ctry	Numerical Fiscal Rule
AT	BBR, GG, LC, NSCM (08-10) BBR, GG, LC, SCM (11-14) BBR, CG, LC, NSCM (99-04) BBR, CG, LC, SCM (05-12) BBR, RLG, LC, NSCM (99-04) BBR, RLG, LC, SCM (05-12) DR, GG, LC, SCM (14) ER, GG, LC, NSCM (09-14)	FI	BBR, RLG, LC, NSCM (95-13) BBR, GG, LC, NSCM (14) BBR, CG, PC, NSCM (99-13) RR, CG, PC, NSCM (14) DR, CG, PC, NSCM (95-07) DR, CG, PC, NSCM (11-14) ER, CG, PC, NSCM (03-14)	LV	BBR, GG, LC, NSCM (12) BBR, GG, LC, SCM (13-14) RR, CG, LC, NSCM (12-14) DR, GG, LC, NSCM (12-14) ER, GG, LC, NSCM (12-14) RR, GG, PC, NSCM (94-14) BBR, GG, LC, NSCM (14) ER, GG, PC, NSCM (94-14) BBR, CG, PC, SCM (06-07)
BE	BBR, RLG, LC, NSCM (82-14) DR, GG, PC, NSCM (14) RR, CG, PC, NSCM (95-99) ER, CG, PC, NSCM (93-98)	FR	BBR, RLG, LC, NSCM (83-13) BBR, GG, LC, SCM (13-14) RR, CG, LC, NSCM (06-14) DR, GG, LC, SCM (14) DR, SS, LC, NSCM (08-12)	PL	BBR, GG, LC, NSCM (12-14) BBR, CG, LC, NSCM (14) ER, CG, LC, SCM (11-13) BBR, GG, LC, NSCM (12-14) BBR, CG, LC, NSCM (02-11) BBR, RLG, LC, NSCM (03-06) BBR, RLG, LC, SCM (07-11) ER, CG, LC, NSCM (12-14)
BG	BBR, GG, LC, NSCM (12-14) BBR, GG, LC, NSCM (14) BBR, GG, PC, NSCM (06-11) DR, GG, LC, NSCM (03-14) RR, GG, LC, NSCM (14) ER, GG, LC, NSCM (12-14) ER, GG, PC, NSCM (06-11)	HU	BBR, GG, LC, NSCM (04-09) BBR, CG, LC, NSCM (10-11) BBR, SS, LC, NSCM (10-11) ER, CG, LC, NSCM (10-11) ER, SS, LC, NSCM (10-11) DR, GG, LC, NSCM (10-14) DR, CG, LC, NSCM (09-11)	PT	BBR, GG, LC, NSCM (12-14) BBR, CG, LC, NSCM (02-11) BBR, RLG, LC, NSCM (03-06) BBR, RLG, LC, SCM (07-11) ER, CG, LC, NSCM (12-14)
CY	ER, GG, LC, NSCM (14) DR, GG, LC, NSCM (14) BBR, GG, LC, NSCM (14)	RO	BBR, SS, LC, NSCM (10-11) ER, CG, LC, NSCM (10-11) ER, SS, LC, NSCM (10-11) DR, GG, LC, NSCM (10-14) DR, CG, LC, NSCM (09-11)	SE	BBR, GG, LC, NSCM (14) ER, GG, LC, SCM (10-14) BBR, RLG, LC, NSCM (07-14) BBR, LRG, LC, NSCM (00-14) BBR, GG, PC, NSCM (00-06) ER, CG, LC, SCM (10-14) ER, CG, PC, SCM (97-09) ER, SS, LC, SCM (10-12) ER, SS, PC, SCM (97-09)
CZ	ER, CG, LC, NSCM (05-14)	SI	ER, GG, LC, SCM (14) ER, CG, LC, NSCM (00-09) ER, CG, LC, SCM (10-13)	SK	DR, RLG, LC, NSCM (-90-14) DR, GG, PC, NSCM (00-04) BBR, GG, LC, NSCM (14) ER, GG, LC, NSCM (11-14) BBR, RLG, LC, SCM (02-08) BBR, RLG, LC, NSCM (09-13) BBR, GG, LC, NSCM (14) DR, GG, LC, NSCM (12-14) DR, RLG, LC, SCM (02-14) ER, CG, LC, SCM (02-14) BBR, GG, LC, SCM (97-08) BBR, GG, LC, NSCM (10-14) DR, GG, LC, SCM (97-08) DR, GG, LC, NSCM (10-14)
DE	BBR, CG, LC, NSCM (69-10) BBR, CG, LC, SCM (11-14) BBR, GG, LC, SCM (13-14) BBR, LRG, LC, SCM (90-14) BBR, SS, LC, SCM (09-12) ER, CG, PC, NSCM (82-12) ER, RLG, PC, NSCM (82-12) BBR, GG, PC, NSCM (92-13)	IE	BBR, RLG, LC, SCM (04-12) BBR, GG, LC, SCM (13-14) DR, GG, LC, SCM (13-14) ER, GG, LC, SCM (14) ER, CG, LC, NSCM (00-09) ER, CG, LC, SCM (10-13)	UK	BBR, RLG, LC, NSCM (11-14) BBR, GG, LC, NSCM (14) DR, GG, LC, NSCM (14) ER, CG, LC, SCM (01-07) ER, GG, LC, NSCM (14) ER, RLG, LC, SCM (99-14) BBR, RLG, LC, SCM (90-12) BBR, GG, LC, NSCM (14) RR, CG, LC, SCM (08-12) DR, CG, LC, NSCM (97-14) ER, CG, LC, NSCM (08-14) DR, GG, PC, NSCM (04-14) ER, CG, PC, NSCM (90-14)
DK	BBR, GG, PC, NSCM (92-13) BBR, GG, LC, NSCM (14) RR, GG, PC, NSCM (01-11) ER, GG, PC, NSCM (94-12) ER, CG, LC, SCM (14)	IT	BBR, RLG, LC, SCM (01-14) BBR, GG, LC, NSCM (14) DR, GG, LC, NSCM (14) ER, CG, LC, NSCM (14) ER, RLG, LC, SCM (99-14) BBR, RLG, LC, SCM (90-12) BBR, GG, LC, NSCM (14) RR, CG, LC, SCM (08-12) DR, CG, LC, NSCM (97-14) ER, CG, LC, NSCM (08-14)	GR	None
EE	BBR, GG, LC, NSCM (14) BBR, GG, PC, NSCM (93-13) DR, RLG, LC, NSCM (97-12) DR, RLG, LC, SCM (13-14)	LT	BBR, RLG, LC, NSCM (14) RR, CG, LC, SCM (08-12) DR, CG, LC, NSCM (97-14) ER, CG, LC, NSCM (08-14)	MT	None
ES	BBR, GG, LC, SCM (03-05) BBR, GG, LC, NSCM (06-09) BBR, GG, LC, SCM (10-14) ER, CG, LC, NSCM (11-14) ER, RLG, LC, NSCM (11-14)	LU	DR, GG, PC, NSCM (04-14) ER, CG, PC, NSCM (90-14)		

Notes: BBR: Balanced Budget Rule, DR: Debt Rule, ER: Expenditure Rule, RR: Revenue Rule; GG: General Government, CG: Central Government, RLG: Regional or Local Government, SS: Social Security; LC: Law or Constitution, PC: Political or Coalitional Agreement; [N]SCM: [no] (possibility of) sanctions and/or automatic correction mechanism. Years the rule has been in place are stated in brackets.

A.4 Calculation of fiscal space

When calculating the fiscal space of a country we follow almost exactly the approach described in Ghosh et al. (2013). For them fiscal space is defined as the scope for further increases in public debt without undermining the sustainability of debt. They calculate a debt limit assuming that the public balance reacts to different levels of debt differently. Fiscal space is then the difference between the current debt level and the debt limit. Ghosh et al. (2013) calculate the fiscal space for 23 advanced countries for the year 2015.

As Ghosh et al. (2013) we first estimate a fiscal reaction function for our sample of 27 EU member states (1985-2013) of the following form:

$$PB_{i,t} = \beta_1 D_{i,t-1} + \beta_2 D_{i,t-1}^2 + \beta_3 D_{i,t-1}^3 + X'_{i,t} \gamma + \mu_i + \epsilon_{i,t} \quad (5)$$

where the primary balance $PB_{i,t}$ of country i at time t is the dependent variable and the main focus is to estimate the reaction of this primary balance on the debt level of the previous period ($D_{i,t-1}$). To allow for different shapes of the reaction curve also the squared and cubic terms are included, as well as country fixed effect μ_i . The error term $\epsilon_{i,t}$ is assumed to follow an AR(1) process.

To control for other influences on the primary balance the following set of control variables $X_{i,t}$ is included: i) output gap; ii) government expenditure gap; iii) trade openness; iv) inflation (as average over the past three years); v) age dependency; vi) future age dependency; vii) oil price (only for oil exporters); viii) political stability; ix) IMF arrangement and x) fiscal rules (as published in the IMF data set and being one if country had at least any of the different national rules). The original study by the IMF (Ghosh et al., 2013) also included nonfuel commodity price for non-oil commodities exporters, but exclude this variable as the countries in our sample (EU27) are not big exporters of nonfuel commodities and those exports do not make up a large share of tax revenues.

Table 8 shows the respective results and for comparison the results published in Ghosh et al. (2013). Overall the significance and size of the coefficients of various variables is comparable to the IMF estimations, but differences emerge. In the IMF estimation the oil price is significant and future age dependency is not, which is the opposite in our case. The same is true for the variables political stability and IMF arrangements. Furthermore, the debt coefficients have a higher significance in our estimations, but the size of the lagged debt squared variable decreased a bit. Overall our significantly higher R^2 suggests that the estimation has a better fit in our more homogenous sample of EU27 countries.

After obtaining the coefficients of the fiscal reaction function, we calculate the interest rate-growth rate differentials for each of the countries and years. As in one of the "historical market approaches" by Ghosh et al. (2013) we calculate the average of the implied nominal interest rate on government debt (share of interest expenditures to debt at end of period), $i_{i,t}$, and the average of the growth rate of nominal GDP (over the past five years), $g_{i,t}$.

To calculate the debt limit, $\bar{D}_{i,t}$, for each country i and time period t , we

Table 8: Regression results (Dependent variable: Primary balance to GDP)

	(1) Own estimation (1985-2013) EU27	(2) Ghosh et al. (2013) (1985-2007) 23 countries
Lagged debt	-0.003 (0.041)	-0.086 (0.070)
Lagged debt squared	0.0011** (0.001)	0.0017* (0.001)
Lagged debt cubic	-0.00001** (2.2e-06)	-0.00001** (3.0e-06)
Output Gap	0.315*** (0.022)	0.441*** (0.053)
Gov. Expenditure Gap	-0.351*** (0.013)	-0.183*** (0.047)
Trade Openness	0.007 (0.008)	0.146*** (0.054)
Inflation (Average)	-2.938*** (1.055)	4.620** (2.008)
Age dependency	0.086 (0.061)	-0.072 (0.101)
Future age dependency	-0.125*** (0.047)	-0.015 (0.067)
Oil price (for oil exporters)	0.006 (0.006)	9.529*** (3.244)
Political Stability	0.025 (0.027)	0.068** (0.030)
IMF arrangement	-1.251*** (0.321)	-1.142 (0.999)
Fiscal Rules (IMF dataset)	0.419 (0.288)	0.300 (0.347)
Nonfuel Commodity price		3.005 (8.362)
N	596	491
Groups	27	23
R ² (within)	0.622	0.405
AR(1) coefficient	0.670	0.749

Notes: Dependent Variable is general government primary public balance in percentage of GDP. Country fixed effects are included but not reported. Error term assumed to follow AR(1) process. Heteroscedasticity robust standard errors are in parentheses. * indicate significance at 10% level, ** at 5% level and *** at 1% level.

calculate the largest root of the following equation:

$$(i_{i,t} - g_{i,t})\bar{D}_{i,t} = \beta_1\bar{D}_{i,t} + \beta_2\bar{D}_{i,t}^2 + \beta_3\bar{D}_{i,t}^3 + \phi_i \quad (6)$$

where β_1 , β_2 and β_3 are the coefficients estimated by Equation 5. ϕ_i is the part independent from the debt level and time (including the country fixed constant) for each country from Equation 5 assuming that the output gap and government

expenditure gap are closed.

Finally fiscal space $S_{i,t}$ for country i at time period t is defined as the difference between the debt limit at time t and the actual level of debt in the same time period. If this difference is negative then fiscal space is assumed to be zero:

$$S_{i,t} = \max(\bar{D}_{i,t} - D_{i,t}, 0) \quad (7)$$

Ghosh et al. (2013) also report estimates of fiscal space (based on the "historical market approach") for the countries in their sample for the year 2015. When comparing those values with the last observations of our fiscal space estimates (14 countries are included in both samples) we find a convincingly high correlation of 0.83 and an average absolute deviation of 22% of GDP.

A.5 Robustness: Fiscal Space and Fiscal Rules

Table 9: *Regression results (All fiscal rules, Dependent variable: Fiscal Space)*

	(1)	(2)	(3)	(4)
	10 year	7 year	5 year	3 year
	averages	averages	averages	averages
Fiscal Rule	31.271*** (6.440)	24.479** (9.643)	21.512* (11.410)	13.965 (10.141)
GDP per Capita	53.111 (114.250)	24.750 (55.508)	1.206 (45.562)	-11.555 (35.965)
Government Size	6.438*** (1.982)	2.589 (3.174)	-0.968 (3.320)	-3.101 (2.740)
Financial Openness	-7.337 (7.580)	-15.101 (8.965)	-13.875 (8.471)	-12.457* (7.010)
Trade Openness	1.144*** (0.120)	1.113*** (0.220)	1.121*** (0.267)	1.022*** (0.276)
Oil Price (for oil exporters)	0.164 (0.186)	0.329 (0.195)	0.325 (0.227)	0.266 (0.245)
Share of Young	5.271 (5.105)	1.214 (6.861)	-1.172 (7.224)	-3.109 (6.202)
Share of Old	-16.877*** (3.210)	-15.901*** (4.862)	-14.902*** (5.125)	-13.739*** (4.692)
Election Years	-1.818 (1.483)	-0.320 (1.410)	-0.030 (1.149)	-0.184 (0.640)
Ideology	0.127*** (0.012)	0.084*** (0.016)	0.052*** (0.018)	0.036** (0.018)
Ideological Range	0.162*** (0.016)	0.108*** (0.026)	0.081** (0.031)	0.052* (0.026)
Government Fragmentation	3.212*** (0.537)	1.462* (0.737)	0.537 (0.771)	0.249 (0.720)
Political Stability	3.112*** (1.080)	3.021** (1.233)	2.254 (1.414)	2.593** (1.253)
IMF Arrangement	-0.797* (0.438)	-0.596** (0.289)	-0.415** (0.198)	-0.424*** (0.125)
N	235	314	368	404
Groups	25	26	26	26
R ² (within)	0.766	0.563	0.459	0.395

Notes: Dependent Variable is fiscal space. All variables are averages of past years as indicated on top of columns. Fiscal Rule variable refers to all fiscal rules. All regressions include country fixed effects. Heteroscedasticity robust standard errors are in parentheses. * indicate significance at 10% level, ** at 5% level and *** at 1% level.

A.6 Robustness: Fiscal Rules, Fiscal Space and Discretionary Fiscal Policy

Table 10: *Regression results (dependent variable: discretionary expenditures)*

	(1) All Rules	(2) Not dynamic	(3) No controls	(4) No fixed effects
Discr. Exp. (-1)	-0.026 (0.120)		0.073 (0.116)	0.152 (0.136)
Fiscal Space	0.033*** (0.004)	0.032*** (0.005)	0.034*** (0.005)	0.036*** (0.005)
Fiscal Rule	1.499* (0.865)	1.440* (0.833)	1.535 (1.191)	0.872 (0.840)
Fiscal Space x Fiscal Rule	-0.015** (0.006)	-0.014** (0.005)	-0.012* (0.006)	-0.009* (0.005)
Debt (-1)	0.008 (0.018)	0.006 (0.017)		0.039*** (0.010)
GDP Gap (-1)	0.040 (0.044)	0.035 (0.031)		0.056 (0.058)
Share of Young	-17.160 (18.757)	-16.758 (18.797)		-11.601 (10.531)
Share of Old	-62.237*** (21.583)	-58.749** (23.235)		-17.804** (8.876)
Trade Openness	0.018* (0.010)	0.018* (0.010)		0.000 (0.003)
Election Year	0.336* (0.197)	0.340 (0.210)		0.372 (0.230)
Ideology	-0.025 (0.069)	-0.023 (0.064)		-0.007 (0.050)
Ideological Range	0.008 (0.104)	0.013 (0.103)		0.019 (0.083)
Fragmentation of Government	-0.804 (2.040)	-0.828 (2.009)		4.140*** (1.461)
Political stability	14.776** (6.379)	14.330** (6.555)		0.311 (2.830)
IMF Arrangement	-2.272* (1.168)	-2.262* (1.173)		-2.990*** (1.018)
EU Membership	-0.363 (0.593)	-0.360 (0.592)		-0.673 (0.531)
Eurozone Membership	0.097 (0.557)	0.096 (0.535)		-0.552** (0.256)
Time fixed effects	Yes	Yes	Yes	No
Country fixed effects	Yes	Yes	Yes	No
N	464	466	493	464
Groups	27	27	27	27
R ² (within)	0.554	0.554	0.504	0.394

Notes: Dependent Variable is discretionary general government expenditures in percentage of GDP. Columns indicate different settings regarding control variables and fixed effects. Regressions include time and country fixed effects according to rows. Heteroscedasticity robust standard errors are in parentheses. * indicate significance at 10% level, ** at 5% level and *** at 1% level.

A.7 Robustness: Fiscal Rules, Fiscal Space and Output Volatility

Table 11: *Regression results (5-year rolling window, dependent variable: volatility of output growth)*

	(1) All Rules	(2) No controls	(3) Lagged Fiscal Rule	(4) No fixed effects	(5) 10-Year Average
Fiscal Space	0.025** (0.010)	0.017** (0.008)	0.024** (0.010)	0.026*** (0.007)	0.016*** (0.005)
Fiscal Rule	1.331 (0.894)	0.548 (1.064)	1.352 (0.914)	1.465 (0.947)	1.176 (0.768)
Fiscal Space X Fiscal Rule	-0.016** (0.005)	-0.011 (0.008)	-0.015* (0.008)	-0.016** (0.008)	-0.011** (0.005)
GDP per Capita	-1.935* (1.002)		-1.762* (1.001)	0.558 (0.548)	-0.004 (0.175)
Government Size	-6.406 (13.057)		-6.797 (12.904)	12.936 (16.298)	4.481 (5.290)
Financial Openness	-0.368 (0.417)		-0.342 (0.415)	-0.056 (0.291)	0.056 (0.176)
Terms of Trade Volatility	0.223 (0.162)		0.178 (0.156)	0.649*** (0.194)	0.186 (0.183)
Young	-50.813* (26.174)		-45.685* (25.009)	-70.347*** (18.381)	-35.867*** (5.584)
Old	-11.059 (29.672)		-8.737 (29.405)	23.443 (21.670)	-5.608 (9.010)
Trade Openness	-0.015 (0.016)		-0.014 (0.016)	-0.002 (0.010)	0.001 (0.004)
Elections	-0.599 (0.642)		-0.599 (0.665)	-0.284 (0.858)	-0.155 (0.953)
Ideology	-0.094 (0.091)		-0.101 (0.091)	0.008 (0.119)	0.089** (0.043)
Ideological Range	-0.375 (0.255)		-0.380 (0.256)	-0.274 (0.251)	-0.161** (0.065)
Government Fragmentation	7.206 (4.362)		7.173* (4.281)	11.940* (7.145)	10.892** (4.216)
Time fixed effects	Yes	Yes	Yes	No	No
Country fixed effects	Yes	Yes	Yes	No	No
N	370	446	370	370	261
Groups	27	27	27	27	25
R ² (within)	0.628	0.581	0.625	0.211	0.179

Notes: Dependent Variable is standard deviation of GDP growth of past 5 years. All variables are averages of past 5 years. Columns indicate different definitions of "Fiscal Rule" variable. Heteroscedasticity robust standard errors are in parentheses. * indicate significance at 10% level, ** at 5% level and *** at 1% level.

A.3 Fiscal space over time

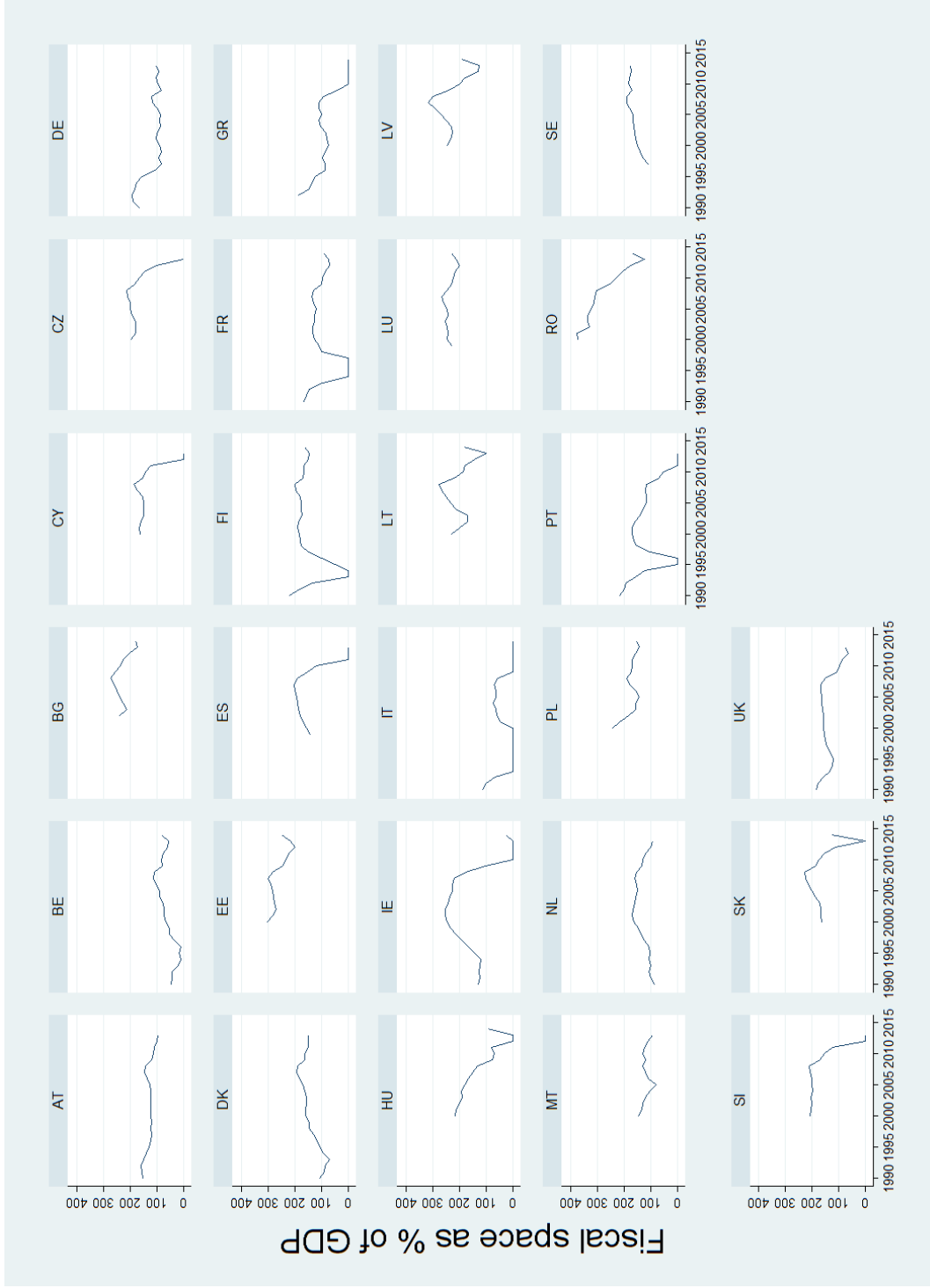


Figure 5: Fiscal space (as % of GDP) across EU27 from 1990 to 2014