

# Have fiscal rules made discretionary policy more countercyclical? Evidence from fiscal reaction functions for the Euro area

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**Work in progress – please don't quote without prior consent!**

**Abstract.** Since the early 1990s fiscal rules have played a major role in the institutional framework of Euro area countries. A key question to ask is whether these rules had an impact on the stabilization function of fiscal policy. Therefore, we estimate fiscal reaction functions of various specifications to analyse the cyclical behaviour of discretionary measures in the Euro area and the potential impact of changes in the fiscal framework. Our results show that overall discretionary fiscal policy in the EMU is marginally procyclical, characterised by strongly fiscal tightening in contractions while the reaction in the upturn is neutral. Procyclicality is mainly driven by the discretionary reaction of public expenditures, not revenues. Generally, the effect of rules-based fiscal constraints on the cyclical orientation is rather limited. Fiscal rules somewhat increase countercyclical policy responses in the upturn, but at the cost of more destabilizing policies in the downturn. Interestingly, expenditure rules perform comparably better with regard to the stabilization objective than budget or debt rules.

**Keywords.** Fiscal rules, fiscal reaction function, fiscal cyclicity, debt sustainability, EMU

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## 1. Introduction

Starting at the beginning of the 1990s there has been a substantial trend towards rules-based fiscal policy as a reaction to continuous budget deficits during the 1970s and 1980s and the associated increase in public debt ratios. According to the IMF Fiscal Rules Dataset (Schaechter et al. 2012; International Monetary Fund 2016), in 1990 only seven countries worldwide had fiscal rules implemented. In 2015, this number had increased to 92. Rules-based fiscal policy was, however, not a response to the global financial crisis in most countries. The major wave of implementations had started earlier. In 2007, already 77 countries had fiscal rules in play, summing up to a total amount of 198 numerical constraints on summary fiscal policy indicators. Although the trend did not kick-start nor accelerate after the crisis, it has not come to a halt either. By now the number of implemented numerical constraints in the dataset sums up to a total of 291. A similar picture emerges for Europe, where rules-based frameworks are a central part of fiscal policy nowadays. In line with the start of the trend in the 1990s, ideas of fiscal constraints found their way into the debate on the macroeconomic architecture of the European Monetary Union (EMU), resulting in the supranational rules agreed upon in the Maastricht Treaty (MT) and operationalized in the Stability and Growth Pact (SGP).

One important intention of fiscal rules is to restrict governments which for various economic and political reasons could otherwise implement inadequate fiscal policies with negative effects on general welfare. For instance, informational problems by economic actors may induce governments to implement tax cuts or spending increases without communicating potential future consequences (Portes and Wren-Lewis 2014). Policy makers may be confronted with numerous political pressures to overspend which may cause a tendency for the public balance to be in deficit (often referred to as “deficit bias”), such as the common-pool problem, electoral competition or transferring costs of contemporaneous consumption to future generations<sup>1</sup>. The primary aim of fiscal rules is thus to limit these political pressures and automatise policy reactions by setting fiscal constraints, especially in good economic times, and thereby avoiding unsustainable public debt levels and providing long-term fiscal sustainability (e.g. Anderson and Minarik 2006; Schaechter et al. 2012).

Fiscal rules generally have a secondary objective – they are supposed to allow and support short-term macroeconomic stabilisation (Anderson and Minarik 2006). From an economic perspective, the theoretical basis to constrain fiscal policy is partly derived from the majority of contemporary macroeconomic models in which fiscal policy has suffered a significant loss of importance and has been downgraded to the provision of the institutional framework while real stabilisation of the economy is taken over by monetary policy. However, these models have been fundamentally criticised recently. The importance of fiscal policy in macroeconomic models had already slightly increased

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<sup>1</sup>Recent literature on fiscal rules elaborates on these issues in great detail, e.g. Ayuso-i Casals et al. (2007), Calmfors and Wren-Lewis (2011), Debrun and Kumar (2007), Kumar et al. (2009), Portes and Wren-Lewis (2014), Schaechter et al. (2012), Wyplosz (2011). Similar arguments can be found in the public choice literature on the deficit bias, for instance in Imbeau (2005).

before the financial crisis by the implementation of non-ricardian agents (Galí et al. 2007; Kumhof and Laxton 2007). In addition, the current debate on the size of fiscal multipliers provides further insights. New findings in the empirical literature on the macroeconomic effects of fiscal policy on output show that short-run multipliers have been significantly underestimated in the past (Blanchard and Leigh 2013; Boussard et al. 2012). Moreover, multipliers were shown to be particularly high in recessions (Auerbach and Gorodnichenko 2012; Batini et al. 2012; Baum et al. 2012) and for shocks to public expenditures (Gechert 2015). What these findings suggest is that discretionary fiscal policy should play a major role in counterbalancing business cycle fluctuations and accommodate monetary policy (Furman 2016). Particularly when interest rates are at the effective lower bound. The consensus among a growing number of economists seems to read that austerity reduces growth in the short-run and may even increase public debt-to-GDP ratios in the medium- to long-run (Cottarelli and Jaramillo 2012; Furman 2016), because consolidation in recessions leads to output losses that become persistent by lowering potential output (Fatás and Summers 2018; Gechert et al. 2017).

Against this background, countercyclical policy turns out to be much more important, especially with regard to debt sustainability. The traditional trade-off between fiscal discipline and macroeconomic stabilization needs to be rethought. The cyclical orientation of fiscal policy is key when evaluating the performance of fiscal rules. How fiscal policy behaves in economic contractions and expansions as well as the impact of fiscal rules on the cyclical reaction become empirical questions of importance. Hence, the main research questions of this paper are: how has discretionary fiscal policy behaved with regard to the output cycle in the Euro area and has this relationship been affected by the implementation and augmentation of fiscal rules? Fiscal policy is particularly important for EMU member countries, because of the loss of other macroeconomic instruments for stabilisation, namely national monetary policies and exchange rate adjustments. Thus, the cyclical behaviour is important for the stability of the EMU as a whole.

In order to investigate cyclical properties between budgetary variables and economic activity, researchers analyse so-called fiscal reaction functions in the tradition of Perotti and Gavin (1997). With respect to Europe, the empirical debate kick-started with the seminal contribution by Galí and Perotti (2003), who analyse discretionary fiscal policy in the EMU and show that it was mildly procyclical in the period before implementation of the MT but has become more countercyclical since then. In contrast, Fatas and Mihov (2009) find discretionary fiscal policy to be somewhat procyclical in the Euro area over a prolonged sample period (1970-2007). Moreover, they conclude that the implementation of the SGP had no relevant impact on the cyclical reaction of fiscal policy. In an update of Galí and Perotti (2003) and in contrast to their results, Candelon et al. (2009) find that discretionary fiscal policy remained procyclical after introduction of the MT and ratification of the SGP using revised data and an extended time dimension. In line with preceding evidence Bénétrix and Lane (2013) find a procyclical bias for the pre-MT period. Post-MT, fiscal authorities behaved more countercyclical during the transition to the agreed upon targets. However, according to Bénétrix and Lane (2013) improved countercyclicity remained temporary and has become more procyclical again since 1999. Lastly, Huart (2012) finds a countercyclical fiscal stance in bad economic times for

countries of the Euro area after 1999 and no significant case for procyclicality after 1999 neither in bad nor in good times. Summing up the empirical literature so far, there is no clear-cut consensus among researchers about the cyclical orientation of fiscal policy in EMU countries since 1992 or the effects of rules-based constraints on governments' behaviour. Empirical results differ according to their definition of economic conditions, the methodology employed as well as the data vintage and samples used (Golinelli and Momigliano 2008).

In the present paper, we therefore estimate fiscal reaction functions of various specifications for a panel of 11 EMU member countries between 1985 to 2015 in order to analyse the behaviour of fiscal policy over the business cycle in the Euro area and the potential impact of changes in the respective fiscal framework. Additionally, the analysis investigates whether the reaction of discretionary policy is symmetric or asymmetric over the cycle by differentiating between good and bad economic times. We do so by combining the approaches of Galí and Perotti (2003), Candelon et al. (2009) and Huart (2012), extending the sample to more recent years and linking the analysis to fiscal rules using the IMF Fiscal Rules Dataset (Schaechter et al. 2012).

Overall, discretionary fiscal policy in the EMU-11 is found to be marginally procyclical. However, policy is characterised by fiscal contractions in the downturn while the reaction is neutral in the upturn. Further disaggregation shows that procyclicality is mainly determined by the discretionary reaction of public expenditures, not revenues. The effect of fiscal rules on the cyclical behaviour is rather limited. Fiscal rules somewhat increase countercyclical policy responses in the upturn, but at the cost of more destabilizing policies in the downturn. Interestingly, expenditure rules perform better with regard to the stabilization objective compared to budget or debt rules.

The remainder of the paper is structured as follows. Section 2 first elaborates on the model in question before baseline results for the cyclical behaviour of fiscal policy are presented. Section 3 integrates fiscal rules into the framework and evaluates their effect on the reaction of discretionary fiscal policy. Finally, section 4 draws some conclusions and discusses fiscal policy implications.

## **2. Cyclical orientation of fiscal policy in the EMU**

### **2.a. Model specifications and data**

The literature usually applies fiscal reaction functions (FRF) to investigate the behaviour of discretionary fiscal policy in relation to economic conditions in a systematic way empirically. Following Galí and Perotti (2003) (henceforth GP) among others we use a fixed-effects panel data analysis. The reason is essentially threefold. (i) Data for (cyclically-adjusted) fiscal variables is rather limited and leads to a low number of observations for individual country analyses. This problem is reinforced due to the application of the IMF Fiscal Rules Dataset in section 3 which further constrains the available data to the period 1985 to 2015. (ii) Higher frequency data is rather problematic when analysing fiscal policy reactions. Annual data has the advantage that it captures budgetary years more effectively (Checherita-Westphal and Žd'árek 2017). (iii) With regard to the po-

litical economy and stability of the Euro area, we are interested in the overall average Euro area reaction of fiscal policy.

In the most simple form, the model reads

$$FP_{it} = \alpha_i + \beta Cycle_{it} + \epsilon_{it}, \quad (1)$$

where  $FP$  is an indicator for fiscal policy and  $Cycle$  a measure of the business cycle. The subscripts  $i = 1, \dots, N$  denote the country- and  $t = 1, \dots, T$  the time-dimension of the observation. The coefficient  $\alpha$  is a country-fixed effect and  $\beta$  a slope coefficient for the business cycle and thus captures the responsiveness of fiscal policy to cyclical conditions, finally  $\epsilon$  represents an error term.

The simple model is generally extended to include fiscal sustainability concerns and policy dynamics. First, the lag of public debt  $D_{it-1}$  is added as a regressor to take a debt stabilization motive into account when the government sets up the budget (Bohn 1998). Second, in order to control for policy inertia the lagged dependent variable  $FP_{it-1}$  is added (see GP). As a result, the augmented reaction function is of the form:

$$FP_{it} = \alpha_i + \beta Cycle_{it} + \gamma D_{it-1} + \delta FP_{it-1} + \epsilon_{it}. \quad (2)$$

In this paper we are interested in the discretionary policy reaction of fiscal authorities. Therefore, we cannot use the headline budget balance for our measure of  $FP$ , because it includes automatic fluctuations of budgetary components outside the direct control of policy makers. When analysing discretionary fiscal policy, identification of fiscal shocks that can be deemed truly exogenous is crucial since the actual budget is sensitive to cyclical conditions and therefore prone to endogeneity bias. We consider the change of the cyclically-adjusted primary balance (CAPB) or components thereof as our measure for the fiscal stance  $FP$  to deal with this issue. The CAPB is a top-down identified measure calculated by subtracting a cyclical component based on assumptions regarding budget elasticities and the output gap from headline budgetary figures. It should be noted that many scholars have criticised the methods and assumptions when calculating CAPB (Carnot and de Castro 2015; Claeys et al. 2016; Heimberger and Kapeller 2017; Truger and Will 2012).<sup>2</sup>

An important caveat when estimating equation 2 is the endogeneity between the fiscal impulse and the cycle as has been pointed out by GP or Jaimovich and Panizza (2007) among others. Therefore, the FRFs are estimated following an instrumental variable (IV) approach.<sup>3</sup> The output gap is taken as proxy for  $Cycle$ . In line with GP, we

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<sup>2</sup>In the process of identifying exogenous discretionary fiscal policy changes, the literature offers the narrative approach of Romer and Romer (2010) as an alternative to the CAPB. Romer and Romer (2010) scan legislative texts and other historic documents to create a fiscal shock series bottom-up. The European Commission has developed an alternative bottom-up identified measure for the discretionary fiscal stance of European countries called Discretionary Fiscal Effort (DFE) (Carnot and de Castro 2015). Unfortunately, the time horizon of the DFE is very limited (starts only in 2010) and there is no other comprehensive long-term time series for a narratively identified fiscal shock series for the EMU-11 available. Therefore, we opt for the change in the CAPB or components thereof as our measure for the fiscal stance in order to increase the observations of our panel analysis.

<sup>3</sup>Considering the dynamic nature of our specification, the lag of the dependent variable as regressor will

instrument the output gap by each country’s own lagged output gap plus the lag of the US output gap. Note, the analysis merely considers ex-post fiscal policy outcomes and not real-time ex-ante fiscal plans. The related question of the latter is whether policy makers intend to be countercyclical but lack full information of current cyclical conditions leading to procyclical policy. However, this paper is concerned with what the actual outcome of government policy was and whether discretionary policy is on average pro- or countercyclical. Most studies looking at ex-ante data find policy design to be rather countercyclical (see overview in Cimadomo 2016).

Regarding the interpretation of  $\beta$  in equation 2, if  $\beta > 0$  the outcome displays countercyclical and if  $\beta < 0$  procyclical discretionary fiscal policy. Assuming the government follows a long-term debt-stabilization target, the coefficient  $\gamma$  for the lag of the debt ratio is expected to be positive. We also expect some autocorrelation of budgetary decisions and therefore the coefficient  $\delta$  of the lagged dependent variable to be positive.

A potential extension is to check for asymmetry of fiscal reactions over the output cycle (Balassone et al. 2010; Agnello and Cimadomo 2009; Huart 2012). Thus, equation 2 is modified such that the cycle coefficient is allowed to vary for periods of economic contraction and expansion,

$$FP_{it} = \alpha_i + \beta^P Cycle_{it} * P_{it} + \beta^N Cycle_{it} * N_{it} + \gamma D_{it-1} + \delta FP_{it-1} + \epsilon_{it}, \quad (3)$$

where  $P$  represents positive (upturn) and  $N$  negative variations of the output gap (downturn). Thus, good economic times (P) are defined as  $\Delta OG > 0$  and bad times (N) as  $\Delta OG < 0$ , where  $\Delta$  indicates the change of the output gap in the given as compared to the previous year.

Furthermore, two additional controls are added to the estimations following Candelon et al. (2009) and Checherita-Westphal and Žd’árek (2017). First, an election dummy as a proxy for the political cycle which signals 1 in an federal election year<sup>4</sup>. The political economy rationale is that governments overspend in election years to attract voters. Second, a crisis dummy which is 1 from 2009 on for the effects of the financial crisis on fiscal policy. As expected, throughout most of our econometric specifications the latter is strong in magnitude, negative and highly statistically significant.

Data for fiscal variables and the output gap are taken from the OECD Economic Outlook (June 2017, No. 101) and are in percent of potential output. We consider an unbalanced panel for the EMU-11<sup>5</sup> countries from 1985 to 2015. In some rare cases,

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most likely be correlated with the error term, causing a bias. Nickell (1981) shows that the consistency of the estimator depends upon the properties of the panel arguing that with large T the bias becomes less of an issue. Arellano and Bover (1995) proposed a GMM framework to increase the performance of dynamic panels as compared to using the simple within estimator. However, Harris and Matyas (2004) argue that the large instrument matrices of GMM can cause biased results if the sample size is finite (see also in Candelon et al. (2009)). Given the properties of our sample (small N, large T) and the ongoing debate in econometrics, we follow most of the recent literature on fiscal reaction functions and go for the fixed effects estimator.

<sup>4</sup>In line with Checherita-Westphal and Žd’árek (2017), we use electionresources.org as our main source for the election year dummy and correct for missing and erroneous data.

<sup>5</sup>Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain.

Table 1: FRFs – The cyclical reaction of discretionary fiscal policy in the EMU

	<i>Dependent Variable: CAPB</i>			
	(1)	(2)	(3)	(4)
<i>OG</i>	-0.157* (0.083)	-0.158* (0.083)		
<i>OG * bad</i>			-0.330*** (0.094)	-0.332*** (0.093)
<i>OG * good</i>			-0.103 (0.120)	-0.104 (0.121)
<i>FP<sub>t-1</sub></i>	0.032*** (0.010)	0.032*** (0.010)	0.033*** (0.010)	0.033*** (0.010)
<i>D<sub>t-1</sub></i>	0.620*** (0.031)	0.620*** (0.032)	0.622*** (0.033)	0.621*** (0.033)
<i>Election</i>		-0.303 (0.230)		-0.304 (0.230)
<i>Crisis Dummy</i>	-1.506*** (0.436)	-1.511*** (0.437)	-1.804*** (0.557)	-1.810*** (0.559)
Observations	315	315	315	315
Adjusted R <sup>2</sup>	0.534	0.535	0.534	0.535

*Notes: Fixed effects IV panel estimates of equations 2 and 3 for EMU-11 from 1985-2015. Robust standard errors are reported in parenthesis. \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$  shows coefficient is statistically significant at the 10%, 5% and 1%, respectively. The coefficients for fixed effects are not reported. The proxy for *FP* is the cyclically-adjusted primary balance *CAPB*, *OG* is the output gap in year  $t$  instrumented by each countries own lag of *OG* plus the lag of the US *OG* and *D* is the debt-to-GDP ratio. *Bad* constrains the effect to negative and *good* to positive variations of the output gap. We add a crisis dummy and in (2) and (4) *Election* is a dummy variable which signals 1 in an election year.*

debt-to-GDP data is the shortest time series, therefore we augment the OECD data on debt by the Historical Public Debt (HPDD) database of the IMF. The fact that the panel remains unbalanced solely comes from missing unobserved and thus calculated data such as the output gap and cyclically-adjusted fiscal variables.

## 2.b. Baseline Results

Table 1 reports results of equation 2 and 3 for estimations of the full sample. The cyclically-adjusted primary balance reacts procyclically to the output gap, yet with rather low statistical significance (column (1)). The output gap coefficient does not change when the election year dummy is included, see column (2). However, the dynamics become much clearer when the effect of the business cycle is allowed to vary between good and bad economic conditions. While the discretionary reaction of fiscal policy is on average acyclical in good times for our EMU-11 panel, it is significantly procyclical in bad times (columns (3) and (4)). Remaining coefficients mainly yield expected results. The effect of the lagged dependent variable is found to be positive and highly significant throughout the specifications, showing strong persistence in fiscal policy. Regarding the response of fiscal policy to the lag of debt ratio, our results show a small but significant debt-stabilization motive, coefficient of around 0.03, very much in line with recent results in the respective FRF literature concentrating on this relationship (see overview in Checherita-Westphal and Žďárek 2017: 23-25). The election dummy is found to be negative, as expected, but not statistically different from zero. The financial crisis, here in the form of the crisis dummy, had a statistically significantly negative effect on the cyclically-adjusted budget balance which is also high in magnitude.

Next, we disaggregate the CAPB into cyclically-adjusted primary expenditures (CAP-

EXP) and cyclically-adjusted revenues (CAREV), for which there is both data available by the OECD, and use them as proxy for  $FP$  in the FRFs respectively. Results for this exercise are presented in Table 2. Importantly, the sign interpretation of the reaction coefficient for the cyclical behaviour  $\beta$  and the debt-stabilization motive  $\gamma$  changes in case of CAPEXP, simply because  $CAPB = CAPREV - CAPEXP$ . If  $\beta > 0$ , discretionary expenditures behave procyclically otherwise countercyclically. Column (1) shows that CAPEXP react systematically procyclical to the business cycle. Splitting the reaction of the business cycle up into positive and negative variations of the output gap, columns (3) and (4) yield results economically similar to our CAPB estimates above. The procyclical reaction is mainly driven by fiscal tightening in recessionary periods, thus further destabilising the downturn. Behaviour in the upturn is also slightly procyclical but the reaction coefficient has low statistical significance. Again, we find a positive debt-stabilization motive, however, on a somehow lower level compared to the estimations with CAPB. The effect of the lagged dependent variable is higher, indicating strong policy inertia in case of primary expenditures. Results remain robust when the dummy for an election year is included in the specification. However, compared to our CAPB estimates an election year has a significant influence on expenditures (see column (2) and (4)).

Regarding the revenue side of the budget, the response of CAREV is found to be acyclical (column (5) and (6)). Nonetheless, restricting to contractionary economic phases also shows procyclicality for discretionary changes to revenues, of similar magnitude compared to the expenditure side. Thus, the overall effect is slightly neutralised by the asymmetric reaction of revenues, column (7) and (8). There is no relationship between the lag of public debt and contemporaneous changes in cyclically-adjusted revenues.

In sum, the marginally systematic procyclical reaction of discretionary fiscal policy is mainly determined by fiscal tightening in the downturn of the business cycle and to a higher extend by changes in public expenditures. However, these relationships stretch over the whole time dimension of the sample, which include substantial underlying changes to fiscal frameworks and implementation of various rules-based constraints throughout the Euro area.

### 3. Effects of rules-based constraints for fiscal policy

#### 3.a. Extended model and fiscal rules

In this section we extend the model from section 2 in order to analyse effects of various changes to the fiscal framework within our sample of countries. Therefore, the intercept and slope coefficients of the covariates are allowed to vary between time periods with and without implementation of different fiscal rules and are then estimated simultaneously.

Table 2: FRFs – Disaggregating the CAPB in CAPEXP and CAREV

	<i>Dependent variable:</i>							
	CAPEXP				CAREV			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>OG</i>	0.112*** (0.025)	0.113*** (0.025)			-0.007 (0.030)	-0.008 (0.030)		
<i>OG * bad</i>			0.166*** (0.026)	0.168*** (0.025)			-0.115*** (0.044)	-0.116*** (0.045)
<i>OG * good</i>			0.063* (0.034)	0.064* (0.034)			0.029 (0.026)	0.028 (0.026)
<i>D<sub>t-1</sub></i>	-0.013** (0.006)	-0.013** (0.006)	-0.015** (0.006)	-0.015** (0.006)	-0.0004 (0.005)	-0.001 (0.005)	0.001 (0.005)	0.0004 (0.005)
<i>FP<sub>t-1</sub></i>	0.946*** (0.029)	0.944*** (0.029)	0.952*** (0.029)	0.950*** (0.029)	0.876*** (0.025)	0.878*** (0.025)	0.868*** (0.025)	0.869*** (0.025)
<i>Election</i>		0.273*** (0.054)		0.271*** (0.056)		-0.201** (0.082)		-0.200** (0.084)
<i>Crisis Dummy</i>	0.640*** (0.175)	0.646*** (0.175)	0.700*** (0.188)	0.707*** (0.187)	0.279* (0.143)	0.278* (0.143)	0.088 (0.182)	0.086 (0.183)
Observations	315	315	315	315	315	315	315	315
Adjusted R <sup>2</sup>	0.900	0.901	0.900	0.902	0.795	0.796	0.802	0.803

Notes: Fixed effects IV panel estimates of equations 2 and 3 for EMU-11 from 1985-2015. Robust standard errors are reported in parenthesis. \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$  shows coefficient is statistically significant at the 10%, 5% and 1%, respectively. The coefficients for fixed effects are not reported. The proxies for FP are cyclically-adjusted primary expenditures CAPEXP (1)-(4) and cyclically-adjusted revenues CAREV (5)-(8). OG is the output gap in year  $t$  instrumented by each countries own lag of OG plus the lag of the US OG and  $D$  is the debt-to-GDP ratio. Bad constraints the effect to negative and good to positive variations of the output gap. We add a crisis dummy and in (2) and (4) Election is a dummy variable which is 1 in an election year.

Following the approach by GP we specify

$$\begin{aligned}
FP_{it} = & \alpha_i^{BR} + \alpha_i^{AR} \\
& + \beta^{BR} Cycle_{it} + \beta^{AR} Cycle_{it} \\
& + \gamma^{BR} D_{it-1} + \gamma^{AR} D_{it-1} \\
& + \delta^{BR} FP_{it-1} + \delta^{AR} FP_{it-1} + \epsilon_{it},
\end{aligned} \tag{4}$$

where  $BR$  signals the period without and  $AR$  with the respective fiscal rule in force. Thus, the  $\beta$  coefficients capture the reaction of discretionary fiscal policy towards the cycle for different sub-periods. Similarly, the remaining coefficients for the lag of public debt, the lag of the dependent variable and the election dummy are allowed to vary as well. Additionally, the model allows for shifts of the fixed-effects, represented by the  $\alpha$  coefficients. In line with Candelon et al. (2009), we perform simple F-tests on the hypothesis that the respective coefficient has not changed between  $BR$  and  $AR$  (eg.  $\beta^{BR} = \beta^{AR}$ ). Even though the election year had a limited role in our baseline results, it remains in our estimations below as a proxy for political risk given that fiscal rules aim to automatise budgetary decisions and thereby reduce procyclicality especially in the upturn<sup>6</sup>.

An important caveat of the analysis is that we only control for the existence of a rule, not for its compliance. Also, the included break points are motivated exogenously by the fact that a fiscal rule comes into place, we do not determine potential break points

<sup>6</sup>Given the limited space, we do not show results for estimations excluding the election dummy. However, results for other covariates are very robust to the exclusion of the election as well as crisis dummy. Results can be obtained upon request.

endogenously by the data. The reason is that we are actually interested whether a fiscal rule had an effect on how policy behaved to the cycle ex-post.

Regarding information on different fiscal rules in the sample the analysis relies entirely on the IMF Fiscal Rules Dataset (International Monetary Fund 2016). For our purpose we merely use the information provided with respect to the question whether a specific design type of a fiscal rule is in force or not. The dataset includes dummy variables with 1 indicating a specific rule is implemented. Using further information on other design characteristics is beyond the scope of the paper. Generally, there are four design types – balanced budget, debt, expenditure and revenue rules, each named after the budgetary aggregate they target<sup>7</sup>. Accordingly, results for FRFs with a structural break if the country has implemented a budget balance rule (*BBR*), a debt rule (*DR*) or an expenditure rule (*ER*) are presented (Table 3)<sup>8</sup>. Note, the correlation coefficient between budget and debt rules in the sample is with 0.94 very high, signalling the fact that these two design types are mostly introduced simultaneously. Moreover, the European supranational rules set in the MT and SGP are essentially budget and debt rules, which is for the majority of countries in the IMF database the years 1992 or 1995 and therefore drive results for these design types (Table 3). Only a small number of additional national budget and debt rules before implementation of the supranational rules cause differences in results.

### 3.b. Results – Cyclicity and the effects of fiscal rules

Table 3 shows estimates for equation 4 and variations of it. We find discretionary fiscal policy to be disconnected from the business cycle before implementation of all rule types. The estimate of the output gap becomes marginally statistically significant in the rule period for budget and debt rules, signalling slightly more procyclical policies. However, the estimates for the output gap coefficient before and after implementation of both design types are not statistically different from each other. Given the high correlation between the implementation of budget and debt rules in our sample, the results are very similar. In the specification allowing an asymmetric reaction of the output gap (column (2) and (4)), fiscal policy has, on average, a stabilising influence on the cycle in contractions without budget and debt rules, but only weakly statistically significant, somewhat higher for budget than for debt rules. However, in the period after implementation of

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<sup>7</sup>A summarised description on what is included in the database is given by Bova et al. (2014: 5): “The database includes all rules with specific numerical targets fixed in legislation, as well as arrangements for which the targets can be revised but are binding for a minimum of three years. [...] The database only includes de jure arrangements and does not take into account the de facto compliance to the rule. Rules are classified as debt rules, budget balance rules, expenditure rules, or revenue rules according to the aggregate targeted. Debt rules set an explicit limit or target for public debt in percent of GDP. Budget balance rules set a limit on the overall balance (including or net of capital expenditures), the structural or cyclically-adjusted balance, or the balance "over the cycle". Expenditure rules set limits on total, primary, or current spending; while revenue rules set ceilings on revenues and specify how unanticipated revenues should be allocated.”

<sup>8</sup>The EMU-11 sample has very little observations with respect to revenue rules, which are therefore omitted from the analysis.

these two rule types, fiscal policy is found to be significantly procyclical and thus systematically exacerbating the downturn. With 0.4, the point estimate is also comparatively high in magnitude and statistically different to the coefficient of the period without budget and debt rules implemented. Contrary, in the upturn of the business cycle discretionary fiscal policy is found to be rather expansionary, thus procyclical. Without budget and debt rules the coefficient is weakly statistically significant and becomes effectively disconnected from economic fluctuations afterwards. However, the estimates are very similar. Therefore, with regard to the effects of budget and debt rules on the cyclically behaviour of discretionary fiscal policy there seems to be a trade-off according to our results. While it may be argued that the deficit bias in the economic expansion can be marginally fought with these rules, it comes at the huge cost of strongly more procyclical fiscal tightening in contractions.

Interestingly, the results differ for expenditure rules. The response of discretionary fiscal policy to the output gap shows no significant effect before and after the implementation of expenditure rules (column (5)). But, the picture changes when asymmetry regarding the cycle position is included in the specification, without expenditure rules the response is procyclical but the estimate becomes substantially more countercyclical after their implementation – turning to be effectively acyclical. In addition, while policy becomes more countercyclical in the downturn with expenditure rules, the estimate for the coefficient of lagged debt remains positive and even increases in magnitude. In contrast, the implementation of budget and debt rules effectively increases the debt stabilization motive of discretionary fiscal policy, but, as pointed out above, simultaneously increases the destabilizing character of fiscal policy with regard to the output cycle in recessionary times. Note that our estimates for the lag of public debt regarding the *AR* cases are in line with recent findings by Checherita-Westphal and Žd'árek (2017). When it comes to the influence of an election year on fiscal policy we find that without budget and debt rules election years have a statistically significantly negative effect on the budget balance. After the use of fiscal rules, however, this statistical significance vanishes.

In the following, we turn again to cyclically-adjusted primary expenditures and revenues, investigating the potential effects of the different fiscal rule types on the budgetary components of fiscal policy. First, Table 4 presents results for CAPEXP. Column (1) shows that the implementation of budget rules goes along with no change in the reaction to the business cycle which, however, is markedly statistically significant and economically procyclical. Allowing the reaction to vary across cycle regimes shows that procyclicality is determined by fiscal tightening in the downturn (column(2)). Again with no substantial changes between the with- and without-rule period. The magnitude of the estimate slightly decreases from 0.26 to 0.15, but not statistically significantly different from each other. The coefficient for the upturn yields acyclical results throughout the whole sample with no effect of fiscal rules on the cyclical behaviour of discretionary policy. As discussed above, given the parallel nature of the implementation of budget and debt rules in our sample, the results of column (3) and (4) are very similar to column (1) and (2). However, examining expenditure rules shows again different results, see column (5) and (6) of Table 4. In countries and periods without an expenditure rule

Table 3: FRFs – CAPB: Different fiscal rule types

	Dependent Variable: CAPB											
	BBR			DR			ER					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value
$OG^{BR}$	-0.063 (0.067)		-0.081 (0.061)		-0.132 (0.121)							
$OG^{AR}$	-0.196* (0.101)	0.228	-0.191* (0.106)	0.338	-0.103 (0.102)	0.815						
$OG^{BR} * bad$		0.111** (0.053)					0.089* (0.051)					-0.408** (0.163)
$OG^{AR} * bad$		-0.395*** (0.059)					-0.392*** (0.060)	0.000				-0.130 (0.112)
$OG^{BR} * good$		-0.136** (0.059)					-0.154*** (0.054)					-0.015 (0.141)
$OG^{AR} * good$		-0.127 (0.157)					-0.118 (0.164)	0.831				-0.149 (0.138)
$D_{t-1}^{BR}$	-0.005 (0.016)	-0.012 (0.013)	-0.003 (0.016)	-0.009 (0.013)	0.033** (0.016)	0.033** (0.016)	-0.009 (0.013)					0.033** (0.014)
$D_{t-1}^{AR}$	0.035*** (0.012)	0.036*** (0.011)	0.036*** (0.013)	0.060 (0.012)	0.042*** (0.012)	0.500 (0.016)	0.036*** (0.012)	0.014				0.041** (0.016)
$FP_{t-1}^{BR}$	0.691*** (0.149)	0.587*** (0.112)	0.759*** (0.142)	0.660*** (0.121)	0.674*** (0.068)	0.676*** (0.062)	0.660*** (0.121)					0.676*** (0.062)
$FP_{t-1}^{AR}$	0.566*** (0.021)	0.567*** (0.028)	0.566*** (0.021)	0.154 (0.027)	0.286*** (0.061)	0.000 (0.067)	0.567*** (0.027)	0.420				0.274*** (0.067)
$Election^{BR}$	-1.017** (0.394)	-0.982*** (0.349)	-1.077*** (0.357)	-1.021*** (0.317)	-0.218 (0.369)	-0.221 (0.350)	-1.021*** (0.317)					-0.221 (0.350)
$Election^{AR}$	-0.184 (0.270)	-0.193 (0.267)	-0.163 (0.277)	0.065 (0.276)	-0.165 (0.159)	0.883 (0.160)	-0.167 (0.276)	0.056				-0.163 (0.160)
$Crisis Dummy$	-1.927*** (0.377)	-2.275*** (0.481)	-1.915*** (0.382)	-2.264*** (0.485)	-2.121*** (0.702)	-2.276*** (0.773)	-2.264*** (0.485)					-2.276*** (0.773)
Observations	315	315	315	315	315	315	315					315
Adjusted R <sup>2</sup>	0.536	0.541	0.534	0.540	0.554	0.548	0.540					0.548

Notes: Fixed effects IV panel estimates of fiscal reaction functions 2 and 3 for EMU-11 from 1985-2015. Robust standard errors are reported in parentheses. \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$  shows coefficient is statistically significant at the 10%, 5% and 1%, respectively. The coefficients for fixed effects are not reported. The proxy for FP is the cyclically-adjusted primary balance CAPB, OG is the output gap in year  $t$  instrumented by each country's own lag of OG plus the lag of the US OG and D is the debt-to-GDP ratio. Bad constraints the effect to negative and good to positive variations of the output gap. We add an election dummy and in (2) and (4) Election is a dummy variable which signals 1 in an election year. BR restricts the effect to periods without and AR with the respective fiscal rule in force. We analyze balanced-budget rules (BBR), debt rules (DR) and expenditure rules (ER).

in place, fiscal policy is found to be systematically procyclical, but the estimate switches sign when an ER is implemented. Even though the coefficient remains statistically insignificant and should therefore be interpreted as acyclical reaction to the business cycle in this model framework, an expenditure rule in force makes discretionary changes of public expenditures effectively more countercyclical as compared to the period without it. Looking at column (6) shows that the effect of the output gap is procyclical in the up- and downturn without expenditure rule in place. With the rule discretionary policy turns neutral in the downturn as found for the general reaction as well. Importantly, in the upturn the coefficient also changes sign and even becomes marginally statistically significant. Accordingly, expenditure rules seem to be most efficient in containing governments in the boom phase of the cycle while being less restrictive in the downturn as compared to other design types.

What about the reaction of cyclically-adjusted revenues? The response of CAREV to the output gap is found to be countercyclical and highly significant without budget and debt rules implemented and only becomes marginally procyclical in countries and periods with these rules constraining fiscal policy, see Table 5 column (1) and (3). The result is mainly determined by the reaction in bad economic times, as column (2) and (4) show. In times of no budget rule in force, the coefficient is 0.29 and statistically significant. With it, the reaction coefficient becomes  $-0.19$ , again strongly statistically significant and different from the *BR*-case. Again, a similar picture is found in case of debt rules. Contrary to the results for overall CAPB and CAPEXP, discretionary revenue-side measures behave more procyclical with expenditure rules in action. Mainly because *ERs* do not protect from tax increases in the downturn. Discretionary revenues react comparatively more procyclical in the upturn as well. However, the coefficient remains statistically insignificant with policy being effectively acyclical in the expenditure rule case.

#### 4. Conclusion

The present paper tackles the questions how discretionary fiscal policy has behaved with regard to the output cycle in the Euro area and whether this relationship has been affected by the implementation of fiscal rules. Fiscal policy, and its cyclical performance, is particularly important for EMU member countries, because of the loss of other macroeconomic instruments for stabilisation. Therefore, various fiscal reaction functions for a panel of 11 EMU member countries have been estimated in order to analyse the cyclical orientation of discretionary fiscal policy in the Euro area and the potential impact of changes in fiscal frameworks. Special care was given to determine the reaction between periods of economic contraction and expansion as well as for major components of the budget.

Overall, discretionary fiscal policy is marginally procyclical. However, it is characterised by strongly destabilising activity in the downturn while the response in economic expansions is disconnected from the business cycle. Further disaggregation shows evidence that procyclical policy is mainly determined by the discretionary reaction of public expenditures, not revenues.

Table 4: FRFs – CAPEXP: Different fiscal rule types

	Dependent Variable: CAPEXP					
	BBR		DR		ER	
	(1)	(2)	(3)	(4)	(5)	(6)
	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value	BR=AR p-value
$OG^{BR}$	0.108*** (0.037)		0.109*** (0.034)		0.134*** (0.025)	
$OG^{AR}$	0.106*** (0.040)	0.972	0.106** (0.041)	0.948	-0.109 (0.089)	0.003
$OG^{BR} * bad$		0.260*** (0.050)		0.264*** (0.048)		0.171*** (0.021)
$OG^{AR} * bad$		0.154*** (0.042)		0.154*** (0.043)	0.098	-0.036 (0.086)
$OG^{BR} * good$		0.031 (0.062)		0.038 (0.061)		0.097*** (0.036)
$OG^{AR} * good$		0.059 (0.048)		0.055 (0.049)	0.828	-0.177* (0.106)
$D_{t-1}^{BR}$	-0.032 (0.024)	-0.045 (0.042)	-0.032 (0.024)	-0.044 (0.041)	-0.018** (0.007)	-0.019** (0.008)
$D_{t-1}^{AR}$	-0.014* (0.008)	-0.016** (0.007)	-0.014* (0.008)	-0.016** (0.007)	-0.010 (0.008)	-0.017*** (0.006)
$FP_{t-1}^{BR}$	1.040*** (0.127)	1.124*** (0.157)	1.041*** (0.124)	1.126*** (0.160)	0.981*** (0.034)	0.981*** (0.034)
$FP_{t-1}^{AR}$	0.924*** (0.036)	0.930*** (0.036)	0.925*** (0.036)	0.931*** (0.036)	0.776*** (0.041)	0.789*** (0.043)
$Election^{BR}$	0.461 (0.286)	0.459* (0.267)	0.509* (0.261)	0.532** (0.259)	0.233** (0.090)	0.234*** (0.088)
$Election^{AR}$	0.250*** (0.074)	0.251*** (0.072)	0.233*** (0.071)	0.232*** (0.067)	0.187*** (0.094)	0.185*** (0.078)
$Crisis Dummy$	0.746*** (0.232)	0.795*** (0.249)	0.741*** (0.232)	0.789*** (0.250)	0.743*** (0.216)	0.781*** (0.205)
Observations	315	315	315	315	315	315
Adjusted R <sup>2</sup>	0.905	0.905	0.904	0.904	0.914	0.915

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Notes: Fixed effects IV panel estimates of fiscal reaction functions 2 and 3 for EMU-11 from 1985-2015. Robust standard errors are reported in parenthesis. \* p<0.1; \*\* p<0.05; \*\*\* p<0.01 shows coefficient is statistically significant at the 10%, 5% and 1%, respectively. The coefficients for fixed effects are not reported. The proxy for FP is the cyclically-adjusted primary balance CAPEXP, OG is the output gap in year t instrumented by each countries own lag of OG plus the lag of the US OG and D is the debt-to-GDP ratio. Bad constrains the effect to negative and good to positive variations of the output gap. We add an crisis dummy and in (2) and (4) Election is a dummy variable which signals 1 in an election year. BR restricts the effect to periods without and AR with the respective balanced-budget rules (BBR), debt rules (DR) and expenditure rules (ER).

Table 5: FRFs – CAREV: Different fiscal rule types

	Dependent Variable: CAREV											
	BBR				DR				ER			
	(1)	BR=AR p-value	(2)	BR=AR p-value	(3)	BR=AR p-value	(4)	BR=AR p-value	(5)	BR=AR p-value	(6)	BR=AR p-value
$OG^{BR}$	0.093*** (0.026)				0.089*** (0.025)				0.030 (0.029)			
$OG^{AR}$	-0.060* (0.031)	0.001			-0.064** (0.031)	0.001			-0.168* (0.089)	0.027		
$OG^{BR} * bad$			0.286*** (0.041)				0.274*** (0.030)				-0.050 (0.064)	
$OG^{AR} * bad$			-0.188*** (0.054)	0.000			-0.192*** (0.056)	0.000			-0.247*** (0.088)	0.008
$OG^{BR} * good$			0.020 (0.026)				0.024 (0.023)				0.061* (0.034)	
$OG^{AR} * good$			-0.008 (0.027)	0.270			-0.012 (0.028)	0.151			-0.155 (0.105)	0.090
$D_{t-1}^{BR}$	0.006 (0.005)		0.002 (0.013)		0.007 (0.005)		0.004 (0.012)		0.005 (0.010)		0.006 (0.009)	
$D_{t-1}^{AR}$	-0.001 (0.007)	0.394	0.0001 (0.008)	0.892	-0.002 (0.007)	0.338	-0.001 (0.008)	0.751	-0.003 (0.007)	0.345	0.0004 (0.009)	0.546
$FP_{t-1}^{BR}$	0.823*** (0.112)		0.914*** (0.131)		0.809*** (0.112)		0.893*** (0.135)		0.812*** (0.034)		0.803*** (0.037)	
$FP_{t-1}^{AR}$	0.812*** (0.044)	0.931	0.809*** (0.040)	0.480	0.813*** (0.043)	0.970	0.811*** (0.038)	0.590	0.620*** (0.061)	0.003	0.626*** (0.069)	0.006
$Election^{BR}$	-0.404 (0.326)		-0.439 (0.343)		-0.454 (0.291)		-0.469 (0.301)		-0.202 (0.131)		-0.202 (0.126)	
$Election^{AR}$	-0.126 (0.089)	0.436	-0.132 (0.090)	0.394	-0.106 (0.093)	0.285	-0.108 (0.092)	0.262	-0.177** (0.087)	0.883	-0.180* (0.094)	0.893
$Crisis Dummy$	0.165 (0.159)		-0.055 (0.196)		0.155 (0.161)		-0.065 (0.199)		0.152 (0.218)		0.045 (0.237)	
Observations	315		315		315		315		315		315	
Adjusted R <sup>2</sup>	0.802		0.807		0.802		0.807		0.815		0.815	

Notes: Fixed effects IV panel estimates of fiscal reaction functions 2 and 3 for EMU-11 from 1985-2015. Robust standard errors are reported in parentheses. \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$  shows coefficient is statistically significant at the 10%, 5% and 1%, respectively. The coefficients for fixed effects are not reported. The proxy for FP is the cyclically-adjusted primary balance CAREV, OG is the output gap in year  $t$  instrumented by each country's own lag of OG plus the lag of the US OG and D is the debt-to-GDP ratio. Bad constraints the effect to negative and good to positive variations of the output gap. We add an crisis dummy and in (2) and (4) Election is a dummy variable which signals 1 in an election year. BR restricts the effect to periods without and AR with the respective fiscal rule in force. We analyze balanced-budget rules (BBR), debt rules (DR) and expenditure rules (ER).

The effect of rules-based fiscal constraints on the cyclical behaviour is rather limited. Fiscal rules somewhat increase countercyclical policy responses in the upturn, thus fulfilling their primary objective in fighting the deficit bias. However, the empirical results in this paper show also that balanced-budget and debt rules come at the cost of more destabilizing policies in the downturn. This can be particularly harmful given new empirical findings for regime-dependent macroeconomic effects on output both in the short- and long-run. Consequently, if fiscal rules reinforce fiscal consolidation in the downturn they not just fail to achieve their secondary objective of economic stabilisation but also their first – long-term debt sustainability – because of the detrimental effects on growth. Interestingly, expenditure rules perform comparably better with regard to the stabilization objective than other types of fiscal rules. This may not come as a surprise because expenditures are observable and in direct control of the government while the public balance and debt ratio are an outcome of various endogenous dynamics.

Therefore, the empirical evidence in this paper supports the proposals of different institutions pushing for a focus on expenditure rules in the fiscal framework of the EMU, instead of the opaque set of cyclically-adjusted budget balance and debt rules.

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