# The effects of fiscal institutions on fiscal adjustments

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## Abstract

Using a panel of 40 advanced economies over the period 1990-2020 this paper investigates the effect of various characteristics of fiscal councils and fiscal rules on the probability of starting a fiscal adjustment, as well as on the probability that this fiscal adjustment will be successful. The relevance of fiscal institutions' characteristics is verified when considering alternative definitions of successful fiscal adjustments. Our results are robust after controlling for endogeneity of fiscal institutions' characteristics (by the Augmented Inverse Probability Weighted estimator) with fiscal adjustments. We find that a fiscal rule with well specified escape clause, that has multi-year expenditure ceilings and excludes public investment can induce a successful fiscal adjustment. A fiscal council with enhanced remit, independence and accountability and extended tasks and instruments increase the probability of successful fiscal adjustments. Finally, we find that a fiscal council with extended tasks and instruments increase the probability of successful fiscal adjustments based on spending cuts.

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# 1. Introduction

The COVID-19 pandemic and its economic consequences necessitated a major fiscal expansion around the globe. As a result, public debt ratios in many countries soared, putting public finances in jeopardy. The Russian invasion in Ukraine in early 2022, interrupted the dynamic post-pandemic global economic recovery and led to a full-blown energy crisis. Due to the upward trend in inflation and its negative impact on business and households, many countries have had to take additional expansionary fiscal measures, resulting in a further increase in fiscal risks.

Due to public debt sustainability concerns many countries will (sooner or later) have to launch fiscal consolidation programs. In this context, the existence and the specific design of fiscal institutions (fiscal rules and councils) is crucial as they could improve the chances that a fiscal adjustment will be successful. While fiscal rules have been established and implemented in many countries in recent decades (see Schaechter et al., 2012), fiscal councils began to be set up in the late 2010s to monitor fiscal policy.

By setting numerical restrictions on budgetary aggregates, fiscal rules limit discretionary fiscal policy, in order to ensure prudent fiscal behavior and to safeguard debt sustainability. The relationship between fiscal performance and fiscal rules has been extensively studied in the literature. Fiscal rules are found to promote prudent fiscal policies and to facilitate the initiation of a fiscal consolidation program (see e.g., Milesi-Feretti, 2004; Bergman et al., 2016; Wiese et., 2018; De Jong and Gilbert, 2020; Gootjes and de Haan, 2022a).

On the other hand, there have been limited studies assessing the effect of fiscal councils on fiscal performance and on the probability of fiscal adjustments. Beetsma et al. (2019) find that fiscal councils promote adherence to budget-balance and spending rules,

owing to their effect on the precision of budget plans. Furthermore, independent fiscal councils have a significant positive impact on the government budget balance (see e.g., Capraru et al., 2022).

This paper extends the existing literature (see e.g., Wiese et., 2018; Gootjes and de Haan, 2022a) by investigating the role played by various characteristics of fiscal councils and fiscal rules on the probability of initiating a fiscal adjustment and on the likelihood that this adjustment will be successful on a group of 40 advanced economies from 1990 to 2020. The specific characteristics of fiscal institutions are obtained from Davoodi et al. (2022). Moreover, as a robustness check, we control for possible endogeneity of fiscal institutions' characteristics (by the Augmented Inverse Probability Weighted estimator) with fiscal adjustments, and we estimate the average treatment effect (ATE) of individual fiscal institutions' characteristics on fiscal adjustments (see e.g., Jorda and Taylor, 2016).

We find that a fiscal rule with cyclically adjusted budget balance target, a well specified general escape clause, strict enforcement, strong legal base that applies to the general government, as well as a fiscal council with enhanced remit, independence and accountability increase the probability of starting a fiscal adjustment. Furthermore, we find that a fiscal rule with cyclically adjusted budget balance target, a well specified general escape clause, strict enforcement, multi-year expenditure ceilings, strong legal base that applies to the general government increases the probability of success of a fiscal consolidation program. The ATE method shows that a fiscal rule that excludes public investment, has a well specified escape clause, and a multi-year expenditure ceiling and a fiscal council with enhanced remit, extended tasks and instruments as well as independence and accountability increase the probability of a successful fiscal adjustment. These findings of the paper contribute to the debate on the revision of the

3

EU fiscal framework and the appropriate design of the fiscal rules and fiscal councils at the EU and at the national level.

The remainder of this paper is organized as follows. Section 2 reviews the empirical literature. Section 3 investigates whether the specific characteristics of fiscal rules and fiscal councils affect the probability of initiating a fiscal consolidation. Section 4 examines whether the characteristics of fiscal rules and fiscal councils affect the probability of success of a fiscal consolidation program. Section 5 presents the results based on an alternative definition of successful fiscal consolidation. Section 6 presents the average treatment effect of the fiscal institutions' characteristics on fiscal adjustments, while Section 7 concludes.

## 2. Literature review

This paper is related to the empirical literature on the impact of fiscal rules and fiscal councils on fiscal policy. According to relevant literature time-inconsistency issues on fiscal policy can lead to deficit bias. As pointed out by Milesi-Ferretti (2004) numerical fiscal rules can address the deficit bias. Various studies have shown that fiscal rules improve government budget balances (Debrun et al., 2008; Bergman et al., 2016; Landon and Smith, 2017; Burret and Feld, 2018; Caselli and Reynaud, 2020) and mitigate public debt levels (Debrun et al., 2008; Luechinger and Schaltegger, 2013; Bergman et al., 2016; Azzimonti et al., 2016; Landon and Smith, 2017; Asatryan et al., 2018). Moreover, fiscal rules limit political budget cycles, i.e., purposeful fiscal policy manipulations to boost an incumbent's chances of re-election (Gupta et al., 2016; Bonfatti and Forni, 2019; Gootjes et al., 2021) and they induce more countercyclical fiscal policies (Bergman and Hutchison 2015; Nerlich and Reuter, 2015; Combes et al., 2017; Guerguil et al., 2017; Gootjes and de Haan, 2022b). More recently, Gootjes and

de Haan (2022a) showed that fiscal rules foster sound fiscal policies, increase the probability to initiate a fiscal adjustment and the chances that this fiscal adjustment will be successful (Gootjes and de Haan, 2022a).

There is a large body of literature on the factors that influence fiscal adjustments, which are deliberate attempts to reduce the government's budget deficit in order to reduce government debt and improve fiscal sustainability. Fiscal adjustments are more likely to occur when the domestic economy is performing well, monetary policy is expansionary, or the public debt level is high (von Hagen and Strauch, 2001). Fiscal adjustments are likewise predominantly driven by economic conditions, according to Mierau et al. (2007). When economic conditions are taken into account, political variables including decision-making fragmentation, political ideology, and election closeness are also linked to fiscal adjustment measures (Mulas-Granados, 2003). According to Potrafke (2018), government ideology is crucial at the state level, however, it has no bearing on economic policy at the local level. Lavigne (2011) shows that restrictive institutional frameworks limit governments' ability to make fiscal adjustments when they are in financial trouble. Finally, Giesenow et al. (2020) demonstrate that the quality of political institutions is important not just for implementing a fiscal adjustment, but also for maintaining it.

However, not all fiscal consolidation attempts result in a long-term improvement in a country's fiscal position. As a result, another body of research on fiscal adjustments has looked into what makes these consolidation efforts "successful". According to Alesina and Perotti (1995), fiscal adjustments that rely on spending cuts are more likely to succeed. Similar findings are found in other papers (i.e., Tavares, 2004; Alesina and Ardagna, 2010, 2013).

In a large panel of developing countries, Schaltegger and Weder (2015) analyze whether fiscal adjustments increase the chance of sovereign default. Adjustment attempts focused on spending cuts appear to have no effect, whereas modifications based on tax collections appear to dramatically reduce the likelihood of sovereign default. Wiese et al. (2018) examine the differences between successful and unsuccessful fiscal adjustments for a panel of 20 OECD countries and present a new method for identifying fiscal adjustments that takes into account the volatility of fiscal policy. They show that the composition of fiscal adjustments has no bearing on their success. Lambertini and Tavares (2005) and Jalles et al. (2016) investigate how exchange rate policies and regimes affect fiscal consolidations. The former paper finds a significant positive relationship between exchange rate depreciation prior to adjustment and successful adjustment, whereas the second examines how the exchange rate regime interacts with the political context and finds that flexible exchange rate regimes are preferable because fixed exchange rate regimes are associated with less fiscal discipline.

Other papers investigate the role of budget institutions and other constraints that may have an impact on fiscal outcomes (see Clark and Hallerberg, 2000; Hallerberg et al., 2009). According to (Žigman and Jergović, 2017), fiscal councils can influence fiscal policymakers and mitigate government spending before a fiscal consolidation episode. Furthermore, strong independent fiscal councils can improve fiscal transparency and accountability (Beetsma et al., 2019). Therefore, independent fiscal councils can increase the compliance and enforceability with fiscal rules and the fiscal performance (Jankovic and Sherwood, 2017; Capraru et al., 2022). In addition, Gilbert and De Jong (2017) examining the role of the 3% budget deficit limit of the Stability and Growth Pact (SGP) show that fiscal councils can promote more unbiased fiscal forecasts. Lledo

et al. (2010) investigate the relationship between institutions and fiscal performance in low-income countries, emphasizing the importance of rules that lead to transparent budgets, whereas Tagkalakis (2009) investigates the relationship between labor and product market institutions and fiscal adjustments, concluding that regulatory policies can influence both the initiation and success of a fiscal consolidation.

## 3. The probability of initiating a fiscal adjustment

3.1 Definitions and control variables

Using annual data for 40 advanced economies[3] from 1990 to 2020, we investigate the effects of fiscal councils' and fiscal rules' characteristics on the likelihood of initiating a fiscal adjustment. Following Alesina and Ardagna (2010) and Tagkalakis (2011) a fiscal adjustment episode (FA_1) is defined as an increase in the cyclically adjusted primary balance (capb) of at least 1.5 percent of potential GDP in a single year. This definition generates 118 country-year adjustment episodes.

Turning to the control variables, we incorporate in the analysis the lagged output gap which reflects initial macroeconomic conditions. According to von Hagen and Strauch (2001), a fiscal adjustment is more likely in better economic times. Initial fiscal conditions are expected to matter as well; we anticipate that a low primary balance surplus (capb) at t-1 and a high debt-to-GDP ratio (ydebt) at t-1, increase the chances of a fiscal consolidation episode at time t. In addition, we control for monetary and exchange rate conditions in the manner of Lambertini and Tavares (2005). To this end, we employ the first lag of the logarithm of the real effective exchange rate (reer) and the first lag of the real long term interest rate (longthermir). Depreciation of the

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[3] Macroeconomic variables are taken from the International Monetary Fund (IMF) and the World bank.

exchange rate and monetary easing can enhance economic activity, making it easier to start a fiscal consolidation program.

Turning to the fiscal institutions, we use the following seven characteristics of fiscal rules: strict enforcement (enforcement), well specified escape clause (escapeclause), coverage (coverage_high), legal basis (legalbasis_high), supporting procedures (supportproc), stabilization (stabilization) and investment excluding public investment (investment). Finally, we also examine the following four characteristics of fiscal councils: remit (remit), tasks & instruments (task), independence & accountability (independence), and resources (resources) (see appendix A for the construction of these dummy variables)[4].

Furthermore, we investigate the role of the specific characteristics of fiscal institutions (FIC) in inducing revenue based and spending based adjustments. We classify a fiscal adjustment episode (as defined above) as revenue-based, when the increase in revenues is bigger than the spending (excluding interest payments) cuts. This definition generates 54 country-year revenue-based adjustment episodes (REFA). We classify a fiscal adjustment episode (as defined above) as expenditure-based, when the increase in revenues is smaller than the spending (excluding interest payments) cuts. This definition generates 57 country-year expenditure-based adjustment episodes (EXFA). In the case of revenue and expenditure-based adjustments we control for initial fiscal conditions by including the lagged values of total spending excluding interest payments and total revenues rather than by including the lagged value of CAPB.

3.2 Econometric methodology

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[4] These variables are taken from Davoodi et al. (2022).

Following Wiese et. al. (2018) and Gootjes and de Haan (2022a) we employ random effects panel probit model to examine the effects of fiscal institutions on the probability of initiating a fiscal adjustment. As a robustness check, we also employ IV probit and heteroskedasticity probit model, to account for heteroscedasticity, which can result in issues such as biased and inconsistent parameters and incorrect standard errors (see Ziogas and Panagiotidis, 2021).

The baseline specification is of the form:

$$Pr(FA\_1 = 1)$$
$$= a1 + a2capb_{it-1} + a3outputgap_{it-1} + a4ydebt_{it-1}$$
$$+ a5reer_{it-1} + a6longtermir_{it-1} + a7FIC_{it} + u_{it} \ (1)$$

3.3 Estimation results

Tables 1 and 2 report the empirical estimates for equation (1). The coefficient estimates of the control variables are as expected. In line with Tagkalakis (2009) and Gootjes and de Haan (2022a), an increase in the cyclically adjusted primary balance reduces the likelihood of a fiscal adjustment. An improvement in cyclical conditions (an increase in the outputgap), reduces the likelihood of fiscal adjustment. The higher is the debt to GDP ratio at time t-1, the more likely is a fiscal adjustment at time t (see Table 1, columns 2, 3, 4, 7). An increase in the long-term interest rate prior to the fiscal consolidation, increases the likelihood of a fiscal adjustment, while the real effective exchange rate has no statistically significant effect (see also Tagkalakis, 2011).

Turning to the variables of interest, a fiscal rule that includes a budget balance target in cyclically adjusted terms, has a well specified escape clause, involves strict enforcement, has a strong legal base and applies to the general government increases the likelihood of initiating a fiscal consolidation (see Table 1, columns 2, ,3, 4, 6, 7).

9

These results are in line with Gootjes and de Haan (2022a), who report that fiscal rules increase the probability of fiscal adjustment, without, however, examining each individual characteristic. Turning to Table 2, a fiscal council with enhanced remit and sufficient independence and accountability increases the likelihood of initiating a fiscal adjustment (see Table 2, columns 1, 2).

Table 1. Probability of starting a fiscal adjustment - fiscal rules' characteristics.

| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| capb (t-1) | -2.824*** | -2.714*** | -2.521*** | -2.862*** | -2.824*** | -2.812*** | -2.946*** |
| | (0.598) | (0.526) | (0.475) | (0.322) | (0.577) | (0.491) | (0.400) |
| outputgap (t-1) | -1.122** | -0.989* | -0.934** | -0.936** | -0.979* | -1.234*** | -1.170** |
| | (0.490) | (0.510) | (0.472) | (0.435) | (0.523) | (0.451) | (0.499) |
| Ydebt (t-1) | 0.0807 | 0.0914* | 0.0757** | 0.0777*** | 0.0793 | 0.0435 | 0.0798** |
| | (0.0644) | (0.0503) | (0.0371) | (0.0301) | (0.0645) | (0.0603) | (0.0366) |
| Reer (t-1) | 0.0381 | 0.0258 | 0.0221 | -0.124 | 0.0225 | -0.0804 | -0.0868 |
| | (0.111) | (0.111) | (0.110) | (0.118) | (0.104) | (0.109) | (0.113) |
| longtermir (t-1) | 2.233*** | 2.604*** | 2.739*** | 2.337*** | 2.519*** | 2.419*** | 2.235*** |
| | (0.440) | (0.478) | (0.393) | (0.429) | (0.483) | (0.477) | (0.445) |
| Investment (t) | -0.00245 | | | | | | |
| | (0.0440) | | | | | | |
| Stabilization (t) | | 0.0698*** | | | | | |
| | | (0.0259) | | | | | |
| Escapeclause (t) | | | 0.104*** | | | | |
| | | | (0.0235) | | | | |
| Enforcement (t) | | | | 0.126*** | | | |
| | | | | (0.0187) | | | |
| Supportproc (t) | | | | | 0.0513 | | |
| | | | | | (0.0318) | | |
| legalbasis_high (t) | | | | | | 0.113*** | |
| | | | | | | (0.0233) | |
| coverage_high (t) | | | | | | | 0.119*** |
| | | | | | | | (0.0197) |
| Observations | 680 | 680 | 680 | 680 | 680 | 680 | 680 |

Notes: Probit model. Dependent variable: Probability of starting a fiscal consolidation. For each independent variable we report dF/dX, i.e., the regressor's marginal effect of a one-unit change (evaluated at the means of all regressors). Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 2. Probability of starting a fiscal adjustment - fiscal councils' characteristics.

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| capb (t-1) | -3.031*** | -3.020*** | -3.000*** | -2.910*** |
| | (0.474) | (0.467) | (0.515) | (0.508) |
| outputgap (t-1) | -0.906** | -0.941** | -1.202*** | -1.347*** |

|  |  |  |  |  |
|---|---|---|---|---|
|  | (0.405) | (0.410) | (0.456) | (0.481) |
| ydebt (t-1) | 0.0404 | 0.0457 | 0.0595 | 0.0606 |
|  | (0.0470) | (0.0505) | (0.0602) | (0.0637) |
| reer (t-1) | -0.0430 | -0.0517 | -0.0289 | -0.0213 |
|  | (0.118) | (0.116) | (0.106) | (0.105) |
| longtermir (t-1) | 2.676*** | 2.673*** | 2.349*** | 2.169*** |
|  | (0.460) | (0.487) | (0.500) | (0.529) |
| Fr (t) | 0.0677 | 0.0683** | 0.0679** | 0.0646** |
|  | (0.744) | (0.0291) | (0.0306) | (0.0316) |
| Remit (t) | 0.0887*** |  |  |  |
|  | (0.0315) |  |  |  |
| Independence (t) |  | 0.0757** |  |  |
|  |  | (0.0340) |  |  |
| Tasks (t) |  |  | 0.0392 |  |
|  |  |  | (0.0459) |  |
| Resources (t) |  |  |  | -0.0238 |
|  |  |  |  | (0.0373) |
| Observations | 670 | 670 | 670 | 670 |

Notes: Probit model. Dependent variable: Probability of starting a fiscal consolidation. For each independent variable we report dF/dX, i.e., the regressor's marginal effect of a one-unit change (evaluated at the means of all regressors). Robust standard errors in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

## 4. The determinants of a successful fiscal adjustment

4.1 Definitions and control variables

In this section, we examine the effect that the different characteristics of fiscal institutions have on the probability of a successful fiscal adjustment. Following previous studies (such as Lambertini and Tavares, 2005 and Tagkalakis, 2011), we define as a successful fiscal consolidation episode ("succeed1") the country-year observations where the cyclically adjusted primary balance does not deteriorate three years after the initiation of the fiscal adjustment (CAPBt+3 > CAPBt). This definition generates 69 country-year successful fiscal adjustments. As in Section 3.1 we control for initial fiscal and macroeconomic conditions. Moreover, we add the change in total government spending excluding interest payments and the change in total government revenues to control for the "size effect" of fiscal consolidation as in Wiese et al. (2018), i.e., a sizeable fiscal consolidation is more likely to succeed. Hence, we obtain 50

country-year successful expenditure-based episodes and 14 country-year successful revenue-based episodes[5].

The successful adjustment episodes are then differentiated into successful expenditure-based and revenue-based adjustments. In the first case, spending cuts are bigger than revenue increases between t and t+3, while in the second case, it is the other way round.

## 4.2 Econometric methodology

The dependent variables are "succeed1" (successful fiscal adjustment) for equation 2 and "expsuc" (fiscal adjustment based on expenditure cuts) and "revsuc" (fiscal adjustment based on revenue increases) for equations 3[6]. These dummy variables take the value 1 when a fiscal adjustment take place and 0 otherwise. The empirical models are as follows:

$$Pr(succeed1 = 1)$$
$$= a1 + a2capb_{it-1} + a3outputgap_{it-1} + a4ydebt_{it-1}$$
$$+ a5reer_{it-1} + a6longtermir_{it-1} + a7\Delta spending_{it}$$
$$+ a8\Delta revenue_{it} + a9FIC_{it} + u_{it} \ (2)$$

$$Pr(expsuc \ or \ revsuc = 1)$$
$$= a1 + a2capb_{it-1} + a3outputgap_{it-1} + a4ydebt_{it-1}$$
$$+ a5reer_{it-1} + a6longtermir_{it-1}$$
$$+ a7(\Delta spending_{it-1} \ or \ a8\Delta revenue_{it-1}) + a8FIC_{it} + u_{it} \ (3)$$

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[5] The small difference between the sum of the successful fiscal adjustments based on spending cuts and revenue increases (64) and the main definition on successful fiscal adjustments (69) is due to missing values.

[6] In equation (3) we use the change in total government spending as control variable when the dependent variable is the successful fiscal adjustment based on spending cuts and the change in total government revenues (as a control variable) when the dependent variable is the successful fiscal adjustment based on revenue increases.

## 4.3 Estimation results

Table 3 report the results for equation (2). A fiscal rule that includes a budget balance target in cyclically adjusted terms, has a well specified escape clause, involves strict enforcement, has a strong legal base, and applies to the general government increases the likelihood of a successful fiscal adjustment. On the contrary, a fiscal rule that excludes public investment and has multi-year expenditure ceilings, has a positive but not statistically significant effect on the likelihood of successful fiscal consolidation. These results are particularly relevant in the context of the upcoming revision of the European fiscal framework and the importance that needs to be assigned to fiscal rules.

Table 3. Probability of successful fiscal adjustments- fiscal rules' characteristics.

| VARIABLES | (1) success | (2) success | (3) success | (4) success | (5) success | (6) success | (7) success |
|---|---|---|---|---|---|---|---|
| Capb (t-1) | -2.478*** | -2.471*** | -2.296*** | -2.508*** | -2.398*** | -2.517*** | -2.595*** |
| | (0.459) | (0.397) | (0.399) | (0.392) | (0.465) | (0.453) | (0.401) |
| Outputgap (t-1) | -1.085*** | -1.012*** | -0.974*** | -0.857** | -0.968** | -1.045*** | -1.063*** |
| | (0.370) | (0.385) | (0.368) | (0.350) | (0.397) | (0.354) | (0.383) |
| Ydept (t-1) | 0.0281 | 0.0302 | 0.0204 | 0.0372 | 0.0199 | 0.00614 | 0.0365 |
| | (0.0456) | (0.0387) | (0.0320) | (0.0331) | (0.0420) | (0.0422) | (0.0348) |
| Reer (t-1) | 0.0780 | 0.0606 | 0.0708 | -0.0341 | 0.0676 | -0.0485 | -0.0178 |
| | (0.115) | (0.115) | (0.111) | (0.123) | (0.108) | (0.107) | (0.124) |
| Longtermir (t-1) | 1.411*** | 1.575*** | 1.528*** | 1.402*** | 1.570*** | 1.505*** | 1.310*** |
| | (0.310) | (0.310) | (0.315) | (0.394) | (0.300) | (0.387) | (0.406) |
| ΔSpending (t) | -1.551*** | -1.549*** | -1.541*** | -1.562*** | -1.527*** | -1.577*** | -1.539*** |
| | (0.442) | (0.445) | (0.462) | (0.479) | (0.429) | (0.446) | (0.468) |
| ΔRevenue (t) | 2.220** | 2.149** | 2.100** | 2.099** | 2.197** | 2.223** | 2.153** |
| | (0.977) | (0.964) | (0.921) | (0.981) | (0.986) | (1.018) | (0.980) |
| Investment (t) | 0.000428 | | | | | | |
| | (0.0304) | | | | | | |
| Stabilization (t) | | 0.0372** | | | | | |
| | | (0.0175) | | | | | |
| Escapeclause (t) | | | 0.0468** | | | | |
| | | | (0.0190) | | | | |
| Enforcement (t) | | | | 0.0894*** | | | |
| | | | | (0.0242) | | | |
| Supportproc (t) | | | | | 0.0426 | | |
| | | | | | (0.0295) | | |
| legalbasis_high (t) | | | | | | 0.0868*** | |
| | | | | | | (0.0197) | |
| coverage_high (t) | | | | | | | 0.0868*** |

|  |  |  |  |  |  |  | (0.0243) |
|---|---|---|---|---|---|---|---|
| Observations | 642 | 642 | 642 | 642 | 642 | 642 | 642 |

Next, we examine the role of fiscal institutions in determining the probability of successful expenditure and revenue-based adjustments (see equation (3), and Tables 4 and 5). We find that, a fiscal rule that excludes public investment, has a well specified escape clause, involves strict enforcement, has multi-year expenditure ceilings, strong legal base, and applies to the general government increases the probability of a successful fiscal adjustment based on spending cuts (see Table 4). Moreover, a fiscal rule with well specified escape clause, strict enforcement, strong legal base, that applies to the general government increases the probability of a successful fiscal adjustment based on revenue increases (see Table 5).

Overall, the fiscal rules characteristics have a more sizable positive effect on the probability of a successful expenditure-based relative to a revenue-based consolidation.

Table 4. Probability of successful fiscal adjustment based on spending cuts- fiscal rules' characteristics.

| VARIABLES | (1) success | (2) success | (3) success | (4) success | (5) success | (6) success | (7) success |
|---|---|---|---|---|---|---|---|
| Capb (t-1) | -1.402*** | -1.373*** | -1.433*** | -1.654*** | -1.430*** | -1.731*** | -1.674*** |
|  | (0.235) | (0.241) | (0.273) | (0.260) | (0.264) | (0.262) | (0.269) |
| Outputgap (t-1) | -0.655** | -0.748** | -0.778** | -0.889*** | -0.531 | -1.077*** | -1.000*** |
|  | (0.292) | (0.348) | (0.353) | (0.313) | (0.353) | (0.314) | (0.338) |
| Ydept (t-1) | 0.00478 | 0.0195 | 0.0102 | 0.000496 | 0.0110 | -0.0181 | 0.00288 |
|  | (0.0177) | (0.0233) | (0.0266) | (0.0291) | (0.0178) | (0.0208) | (0.0277) |
| Reer (t-1) | -0.0368 | 0.0413 | 0.0279 | -0.0127 | -0.0261 | -0.0205 | -0.00934 |
|  | (0.0671) | (0.0676) | (0.0689) | (0.0671) | (0.0669) | (0.0639) | (0.0660) |
| Longtermir (t-1) | 1.709*** | 1.356*** | 1.267*** | 1.148*** | 1.768*** | 1.159*** | 1.058*** |
|  | (0.306) | (0.295) | (0.353) | (0.269) | (0.378) | (0.273) | (0.281) |
| Δspending (t) | -0.953*** | -0.792** | -0.726* | -0.672** | -0.922*** | -0.714*** | -0.635** |
|  | (0.303) | (0.344) | (0.371) | (0.266) | (0.355) | (0.254) | (0.270) |
| Investment (t) | 0.0545** |  |  |  |  |  |  |
|  | (0.0267) |  |  |  |  |  |  |
| Stabilization (t) |  | 0.0262 |  |  |  |  |  |

|  |  |  |  |  | (0.0164) |  |  |
| Escapeclause (t) |  |  |  | 0.0407** |  |  |  |
|  |  |  |  | (0.0188) |  |  |  |
| Enforcement (t) |  |  |  |  | 0.0580*** |  |  |
|  |  |  |  |  | (0.0158) |  |  |
| Supportproc (t) |  |  |  |  |  | 0.0808** |  |
|  |  |  |  |  |  | (0.0345) |  |
| legalbasis_high (t) |  |  |  |  |  |  | 0.0586*** |
|  |  |  |  |  |  |  | (0.0173) |
| coverage_high (t) |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Observations | 646 | 646 | 646 | 646 | 646 | 646 | 646 |

Notes: Hetrobit model. Dependent variable: Probability of a successful fiscal adjustment based on spending cuts. For each independent variable we report dF/dX, i.e., the regressor's marginal effect of a one-unit change (evaluated at the means of all regressors). Robust standard errors in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 5. Probability of successful fiscal adjustment based on revenue increases - fiscal rules' characteristics.

| VARIABLES | (1) success | (2) success | (3) success | (4) success | (5) success | (6) success | (7) success |
|---|---|---|---|---|---|---|---|
| Capb (t-1) | -0.633*** | -0.597*** | -0.634*** | -0.662*** | -0.546*** | -0.653*** | -0.720*** |
|  | (0.179) | (0.170) | (0.177) | (0.194) | (0.156) | (0.198) | (0.202) |
| Outputgap (t-1) | -0.472** | -0.315 | -0.294 | -0.195 | -0.427* | -0.341* | -0.480* |
|  | (0.208) | (0.241) | (0.220) | (0.141) | (0.220) | (0.186) | (0.282) |
| Ydebt (t-1) | -0.00769 | 0.0133 | 0.00677 | 0.0118 | 0.00242 | -0.0119 | 0.00499 |
|  | (0.00819) | (0.0226) | (0.0114) | (0.0124) | (0.0111) | (0.00761) | (0.00892) |
| Reer (t-1) | 0.0556 | 0.0745 | 0.0345 | -0.0194 | 0.0453* | -0.0113 | 0.0121 |
|  | (0.0387) | (0.0613) | (0.0232) | (0.0239) | (0.0235) | (0.0189) | (0.0265) |
| Longtermir (t-1) | -0.0844 | -0.0144 | -0.104 | -0.165 | -0.0811 | -0.125 | -0.118 |
|  | (0.194) | (0.225) | (0.268) | (0.196) | (0.206) | (0.218) | (0.169) |
| Δrevenue (t) | -0.0238 | 0.175 | 0.153 | 0.0505 | 0.108 | 0.0646 | -0.0349 |
|  | (0.188) | (0.281) | (0.261) | (0.178) | (0.206) | (0.195) | (0.197) |
| Investment (t) | -0.00198 |  |  |  |  |  |  |
|  | (0.0154) |  |  |  |  |  |  |
| Stabilization (t) |  | 0.0172 |  |  |  |  |  |
|  |  | (0.0161) |  |  |  |  |  |
| Escapeclause (t) |  |  | 0.0287* |  |  |  |  |
|  |  |  | (0.0149) |  |  |  |  |
| Enforcement (t) |  |  |  | 0.0383*** |  |  |  |
|  |  |  |  | (0.0122) |  |  |  |
| Supportproc (t) |  |  |  |  | -0.00970 |  |  |
|  |  |  |  |  | (0.0134) |  |  |
| legalbasis_high (t) |  |  |  |  |  | 0.0283*** |  |
|  |  |  |  |  |  | (0.00860) |  |
| coverage_high (t) |  |  |  |  |  |  | 0.0296** |
|  |  |  |  |  |  |  | (0.0130) |
| Observations | 658 | 658 | 658 | 658 | 658 | 658 | 658 |

Notes: Hetrobit model. Dependent variable: Probability of a successful fiscal adjustment based on revenue increases. For each independent variable we report dF/dX, i.e., the regressor's marginal effect of

a one-unit change (evaluated at the means of all regressors). Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Turning to the fiscal council characteristics, we find that, in the most cases, their coefficient estimates are insignificantly estimated. However, enhanced tasks and instruments can increase the probability of successful fiscal consolidation (see Table 6, column 1). Moreover, a fiscal council with enhance tasks and instruments can increase the probability of a successful fiscal adjustment based on spending cuts (see Table 6, column 2)[7].

Table 6. Probability of succeed fiscal adjustments- fiscal councils' characteristics.

| VARIABLES | (1) success | (2) success |
|---|---|---|
| remit | 0.0910 | 0.0575 |
|  | (0.256) | (0.257) |
| independence | 0.0633 | 0.0525 |
|  | (0.244) | (0.245) |
| tasks | 0.662** | 0.613** |
|  | (0.271) | (0.262) |
| resources | -0.428 | -0.405 |
|  | (0.316) | (0.302) |
| Observations | 609 | 613 |

Notes: IVprobit model. Dependent variable: Probability of a successful fiscal adjustment (column 1) and successful fiscal adjustment based on spending cuts (column 2). For each independent variable we report dF/dX, i.e., the regressor's marginal effect of a one-unit change (evaluated at the means of all regressors). Instrument variable outputgap with its first lag. Independent variables: cyclically adjusted primary balance with one lag, debt to GDP ratio with one lag, real effective exchange rate with one lag, long term interest rate with one lag, change in total spending excluding interest payments and total revenues8 at time t. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

## 5. Robustness Checks

5.1 Definition and methodology

In this section we examine a different definition of a successful fiscal adjustment episode. A country-year observation is considered to be a successful fiscal adjustment when the cyclically adjusted primary balance does not deteriorate three years after the

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[7] The full set of estimates are presented in the online appendix (supplementary material 1).
[8] Change in total revenues excluded of the equation for successful fiscal adjustment based on spending cuts.

fiscal adjustment (CAPBt+3 > CAPBt) and at the same time the reduction of the debt to GDP ratio three years after the fiscal adjustment is at least 3%. This definition (SFA_1) generates 84 country-year observations (relative to 69 in the baseline definition). As in Section 4, a successful fiscal adjustment is expenditure based if spending cuts are bigger than revenue increases. This definition (SSP) generates 61 country year observations (relative to 50 in the previous section). Analogously, a successful adjustment is revenue based if spending cuts are smaller than revenue increases. This definition (SREV) generates 16 country-year observations (relative to 14 in the previous section).

## 5.2 Estimation results

Table 7 reports the estimations for the alternative successful fiscal consolidation definition (SFA_1)[9]. The coefficient estimates of all fiscal rules' characteristics (except a fiscal rule excluding public investment) are positive and statistical significance. Hence, the baseline finding presented in Section 4 are verified even when considering an alternative definition of a successful fiscal adjustment.

Table 7. Probability of succeed fiscal adjustment- fiscal rules' characteristics.

| VARIABLES | (1) success | (2) success | (3) success | (4) success | (5) success | (6) success | (7) success |
|---|---|---|---|---|---|---|---|
| Capb (t-1) | -2.207*** | -2.214*** | -2.101*** | -2.343*** | -2.215*** | -2.288*** | -2.425*** |
| | (0.495) | (0.455) | (0.420) | (0.376) | (0.493) | (0.465) | (0.404) |
| Outputgap (t-1) | -0.772* | -0.704 | -0.630 | -0.626 | -0.611 | -0.785* | -0.812* |
| | (0.445) | (0.446) | (0.424) | (0.400) | (0.477) | (0.427) | (0.433) |
| Ydebt (t-1) | 0.0300 | 0.0365 | 0.0298 | 0.0396 | 0.0268 | 0.0158 | 0.0407 |
| | (0.0467) | (0.0413) | (0.0353) | (0.0359) | (0.0451) | (0.0461) | (0.0383) |
| Reer (t-1) | 0.0150 | 0.00823 | 0.0150 | -0.0566 | 0.00108 | -0.0474 | -0.0491 |
| | (0.110) | (0.114) | (0.116) | (0.124) | (0.101) | (0.115) | (0.126) |
| Longtermir (t-1) | 1.606*** | 1.771*** | 1.839*** | 1.693*** | 1.905*** | 1.744*** | 1.610*** |

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[9] The estimation results for the fiscal councils' characteristics are statistically insignificant. The full set of results are available in the online appendix (supplementary material 1).

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | (0.369) | (0.369) | (0.368) | (0.418) | (0.378) | (0.394) | (0.429) |
| $\Delta$spending (t) | -2.461*** | -2.458*** | -2.420*** | -2.464*** | -2.475*** | -2.482*** | -2.386*** |
| | (0.674) | (0.671) | (0.679) | (0.682) | (0.663) | (0.668) | (0.667) |
| $\Delta$revenue (t) | 3.181*** | 3.071*** | 3.013*** | 3.054*** | 3.131*** | 3.171*** | 3.216*** |
| | (1.141) | (1.108) | (1.086) | (1.119) | (1.143) | (1.133) | (1.145) |
| Investment (t) | 0.00909 | | | | | | |
| | (0.0357) | | | | | | |
| Stabilization (t) | | 0.0384* | | | | | |
| | | (0.0204) | | | | | |
| Escapeclause (t) | | | 0.0584*** | | | | |
| | | | (0.0215) | | | | |
| Enforcement (t) | | | | 0.0845*** | | | |
| | | | | (0.0239) | | | |
| Supportproc (t) | | | | | 0.0601** | | |
| | | | | | (0.0304) | | |
| legalbasis_high (t) | | | | | | 0.0725*** | |
| | | | | | | (0.0260) | |
| coverage_high (t) | | | | | | | 0.0847*** |
| | | | | | | | (0.0247) |
| Observations | 646 | 646 | 646 | 646 | 646 | 646 | 646 |

Notes: Probit model. Dependent variable: Probability of a successful fiscal adjustment. For each independent variable we report dF/dX, i.e., the regressor's marginal effect of a one-unit change (evaluated at the means of all regressors). Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Tables 8 and 9 present the results for the alternative successful expenditure and revenue-based definitions (SSP and SREV). A fiscal rule with a well specified escape clause, strict enforcement, strong legal base, that applies to the general government raises the probability of a successful expenditure and revenue based fiscal adjustment (see Tables 8 and 9). A fiscal rule with a multi-year expenditure ceiling increases the probability of a successful fiscal adjustment only when it is based on spending cuts (see Table 8).

As before, the coefficient estimates of the individual fiscal rules' characteristics are more sizeable in the cases of successful expenditure-based adjustments. This probably reflects that expenditure are under the direct control of the government and fiscal institutions and are affected to a lesser extent by macroeconomic and behavioral conditions.

Table 8. Probability of successful fiscal adjustment based on spending cuts - fiscal rules' characteristics.

| VARIABLES | (1) success | (2) success | (3) success | (4) success | (5) success | (6) success | (7) success |
|---|---|---|---|---|---|---|---|
| Capb (t-1) | -1.378*** | -1.262*** | -1.255*** | -1.616*** | -1.428*** | -1.662*** | -1.628*** |
| | (0.271) | (0.306) | (0.406) | (0.318) | (0.291) | (0.310) | (0.334) |
| Outputgap (t-1) | -0.853** | -0.710* | -0.623 | -0.836* | -0.560 | -1.063*** | -0.912* |
| | (0.353) | (0.429) | (0.489) | (0.438) | (0.419) | (0.410) | (0.472) |
| Ydebt (t-1) | -0.00352 | 0.0285 | 0.0275 | 0.00875 | 0.0130 | -0.0152 | 0.0124 |
| | (0.0242) | (0.0300) | (0.0408) | (0.0373) | (0.0229) | (0.0282) | (0.0357) |
| Reer (t-1) | -0.0347 | 0.0137 | 0.0190 | -0.0128 | -0.0216 | 0.00744 | -0.0126 |
| | (0.0820) | (0.0781) | (0.0764) | (0.106) | (0.0747) | (0.0926) | (0.104) |
| Longtermir (t-1) | 1.759*** | 1.693*** | 1.803*** | 1.495*** | 2.051*** | 1.441*** | 1.442*** |
| | (0.368) | (0.376) | (0.475) | (0.406) | (0.427) | (0.391) | (0.430) |
| Δspending (t) | -1.415*** | -1.297*** | -1.335** | -1.114** | -1.296*** | -1.090*** | -1.089** |
| | (0.428) | (0.500) | (0.625) | (0.456) | (0.447) | (0.386) | (0.479) |
| Investment (t) | 0.0437 | | | | | | |
| | (0.0290) | | | | | | |
| Stabilization (t) | | 0.0269 | | | | | |
| | | (0.0178) | | | | | |
| Escapeclause (t) | | | 0.0385* | | | | |
| | | | (0.0215) | | | | |
| Enforcement (t) | | | | 0.0549*** | | | |
| | | | | (0.0180) | | | |
| Supportproc (t) | | | | | 0.0826** | | |
| | | | | | (0.0334) | | |
| legalbasis_high (t) | | | | | | 0.0478** | |
| | | | | | | (0.0213) | |
| coverage_high (t) | | | | | | | 0.0567*** |
| | | | | | | | (0.0190) |
| Observations | 646 | 646 | 646 | 646 | 646 | 646 | 646 |

Notes: Hetprobit model. Dependent variable: Probability of a successful fiscal adjustment based on spending cuts. For each independent variable we report dF/dX, i.e., the regressor's marginal effect of a one-unit change (evaluated at the means of all regressors. Robust standard errors in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 9. Probability of successful fiscal adjustment based on revenue increases - fiscal rules' characteristics.

| VARIABLES | (1) success | (2) success | (3) success | (4) success | (5) success | (6) success | (7) success |
|---|---|---|---|---|---|---|---|
| capb (t-1) | -0.648*** | -0.612*** | -0.656*** | -0.686*** | -0.560*** | -0.677*** | -0.735*** |
| | (0.178) | (0.171) | (0.179) | (0.194) | (0.161) | (0.200) | (0.202) |
| outputgap (t-1) | -0.477** | -0.327 | -0.324 | -0.207 | -0.402* | -0.343* | -0.485* |
| | (0.210) | (0.224) | (0.203) | (0.150) | (0.234) | (0.190) | (0.289) |
| ydebt (t-1) | -0.00842 | 0.00844 | 0.00341 | 0.00875 | -0.000972 | -0.0132* | 0.00363 |
| | (0.00778) | (0.0161) | (0.0103) | (0.0129) | (0.0112) | (0.00796) | (0.00914) |
| reer (t-1) | 0.0566 | 0.0654 | 0.0418* | -0.0165 | 0.0450* | -0.0107 | 0.0162 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (0.0380) | (0.0458) | (0.0247) | (0.0242) | (0.0241) | (0.0193) | (0.0280) |
| longtermir (t-1) | -0.0485 | 0.0633 | 0.00785 | -0.106 | -0.0371 | -0.0697 | -0.0793 |
| | (0.181) | (0.170) | (0.186) | (0.208) | (0.206) | (0.197) | (0.163) |
| Δrevenue (t) | -0.0370 | 0.155 | 0.153 | 0.0582 | 0.140 | 0.0755 | -0.0109 |
| | (0.173) | (0.282) | (0.273) | (0.197) | (0.218) | (0.205) | (0.210) |
| investment (t) | -0.00278 | | | | | | |
| | (0.0142) | | | | | | |
| stabilization (t) | | 0.0173 | | | | | |
| | | (0.0122) | | | | | |
| escapeclause (t) | | | 0.0293** | | | | |
| | | | (0.0123) | | | | |
| enforcement (t) | | | | 0.0371*** | | | |
| | | | | (0.0113) | | | |
| supportproc (t) | | | | | -0.00941 | | |
| | | | | | (0.0152) | | |
| legalbasis_high (t) | | | | | | 0.0298*** | |
| | | | | | | (0.00870) | |
| coverage_high (t) | | | | | | | 0.0300** |
| | | | | | | | (0.0122) |
| Observations | 659 | 659 | 659 | 659 | 659 | 659 | 659 |

Notes: Hetprobit model. Dependent variable: Probability of a successful fiscal adjustment based on revenue increases. For each independent variable we report dF/dX, i.e., the regressor's marginal effect of a one-unit change (evaluated at the means of all regressors, Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

## 6. The average treatment effect of fiscal institutions on fiscal consolidation

One possible concern with the analysis conducted so far relates to the possibility of endogeneity between the fiscal adjustments and the design of fiscal institutions. To address this concern which has been noted before in the context of monetary policy (Leeper, 1997), we employ a "doubly robust" estimator, i.e., the augmented inverse propensity-score weighted regression adjustment method as in Jorda and Taylor (2016). First, we examine whether the specific fiscal institutions' characteristics at time t can be predicted based on information available at time t-1. This is the treatment model. We focus on the following fiscal institutions' characteristics: a fiscal rule that excludes public investment, that has a well specified escape clause, multi-year expenditure ceilings, a budget balance target in cyclically adjusted terms and a fiscal council with

20

enhanced remit, independence and accountability and extended tasks and instruments[10].

We add various macroeconomic and fiscal variables, to control for initial conditions prior to the adoption of the specific characteristic of the fiscal rule and fiscal council. In addition, we add several political and institutional variables. As regards institutional variables, we consider whether a country is a member of eurozone ("ez"); eurozone countries face stricter fiscal surveillance and would probably align domestic fiscal rules and councils with the requirement of the EU fiscal framework. Turning to political variables, we consider the ideology of the cabinet (i.e., "right" is a binary variable and takes the value 1 if the ideological orientation of the cabinet is right-wing and 0 if is left-wing), elections ("elections") and the strength of government (i.e., "power" is a binary variable that takes the value 1 if the political party has the most members in the parliament). One could expect that a right-wing government with enhanced political power would be in favor of fiscal institutions that increase fiscal discipline and hence would design fiscal rules and councils according to its political preferences. In election years fiscal policy is usually loosened, this could also impact on the design and the working of fiscal institutions. The political data were obtained from Döring's et al. (2022) website (ParlGov)[11].

The estimation results of the treatment model are reported in Table 10. As we can see, some but not all, macroeconomic, fiscal and political variables are significant in the probit model. However, the AUC statistic[12] which has an average value of 0.79 in the

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[10] We do not examine the remaining characteristics because the estimated probit model had small predictive ability. The estimates for the remaining fiscal rules and fiscal council characteristics (i.e., a fiscal rule with strict enforcement, high legal basis, that applies to the general government and a fiscal council that its governing members are appointed and dismissed by the parliament) are available upon request.

[11] http://www.parlgov.org/.

[12] AUC refers to the area under the curve. The curve most commonly refers to the Receiver Operating Characteristic (ROC) curve. Also, describes the Correct Classification Frontier as in Jorda and Taylor (2011). In biostatistics and machine learning, the AUC statistic is commonly used to assess classification ability (see Jorda and Taylor, 2016). When AUC = 0.5 the covariates have no classification ability, while

seven models considered in Table 10, provides additional confirmation on the

satisfactory predictive ability of these treatment regressions.

Table 10. Treatment regression, probability of designing a fiscal rule/fiscal council with specific characteristics (average marginal effects)

| Dependent variables | (1) investment | (2) Escape clause | (3) supportproc | (4) stabilization | (5) Remit | (6) tasks | (7) independence |
|---|---|---|---|---|---|---|---|
| Capb (t-1) | 1.232 | -2.287** | 0.701 | -0.984 | 4.167*** | 0.687 | 3.608*** |
| | (1.303) | (1.090) | (1.161) | (1.174) | (1.353) | (0.907) | (1.377) |
| Outputgap (t-1) | -0.195 | -2.658** | -3.081*** | -3.438*** | -3.136*** | -1.817* | -3.750*** |
| | (1.281) | (1.083) | (1.074) | (1.120) | (1.137) | (0.994) | (1.264) |
| Ydebt (t-1) | -0.00528 | -0.0262 | -0.170 | -0.259* | 0.194 | -0.0146 | 0.0866 |
| | (0.184) | (0.148) | (0.156) | (0.147) | (0.153) | (0.103) | (0.162) |
| Reer (t-1) | 1.116*** | 0.576*** | 0.654 | 0.387 | 0.475** | 0.0673 | 0.390* |
| | (0.357) | (0.220) | (0.473) | (0.306) | (0.217) | (0.174) | (0.214) |
| Tradeopeness (t-1) | -0.198 | 0.265** | -0.00596 | 0.0695 | 0.203* | -0.0123 | 0.0934 |
| | (0.153) | (0.121) | (0.119) | (0.104) | (0.122) | (0.0740) | (0.102) |
| Netnx (t-1) | -0.130 | -0.401** | -0.315* | 0.0395 | -0.223 | -0.243 | -0.244 |
| | (0.144) | (0.181) | (0.177) | (0.100) | (0.232) | (0.162) | (0.206) |
| Longtermir (t-1) | -3.559** | -3.413** | -6.470*** | -3.595** | -5.354*** | -4.062*** | -6.344*** |
| | (1.615) | (1.616) | (1.347) | (1.574) | (1.493) | (1.567) | (1.675) |
| Ez (t) | -0.101 | 0.238*** | 0.0650 | 0.135 | -0.0518 | 0.0106 | -0.0146 |
| | (0.131) | (0.0879) | (0.125) | (0.0935) | (0.104) | (0.0923) | (0.111) |
| Right (t) | 0.00692 | -0.0215 | -0.0411 | -0.106* | -0.0528 | 0.0861* | -0.0620 |
| | (0.0554) | (0.0678) | (0.0615) | (0.0620) | (0.0654) | (0.0475) | (0.0657) |
| Power (t) | -0.0721 | -0.0554 | -0.0542 | -0.156 | -0.0460 | - | -0.128 |
| | (0.111) | (0.0863) | (0.0973) | (0.0986) | (0.107) | | (0.118) |
| Elections (t) | 0.0506*** | 0.0224 | 0.0150 | 0.0363 | 0.0176 | - | 0.00847 |
| | (0.0165) | (0.0230) | (0.0222) | (0.0233) | (0.0175) | | (0.0158) |
| Classification test: AUC | 0.76 | 0.83 | 0.75 | 0.75 | 0.84 | 0.77 | 0.82 |
| | (0.02) | (0.01) | (0.02) | (0.02) | (0.01) | (0.02) | (0.01) |
| Observations | 623 | 623 | 623 | 623 | 613 | 613 | 613 |

Notes: Standard errors (clustered by country) in parentheses. The area under the CCF curve is denoted by AUC.
*** p<0.01, ** p<0.05, * p<0.1

To check for overlap, Figure 1 shows the smooth kernel density estimates of the

distribution of the propensity score for the treated and control units[13]. Despite the

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when AUC = 1 there is perfect classification ability. In large samples, the AUC statistic has a Gaussian distribution.

[13] In the ideal randomized control trial (RCT) the empirical distributions of propensity scores for treated and control units would be equal and identical. However, suppose that treatment is allotted mechanically based on controls. The treated unit distribution would then rise at one and remain zero elsewhere, whereas the control unit distribution would rise at zero and remain zero throughout.

satisfactorily high AUC, Figure 1 shows significant overlap between the distributions,

indicating that we have a sufficiently good first-stage model.

Figure 1. Overlap tests: Empirical Distributions of the Treatment Propensity Score.
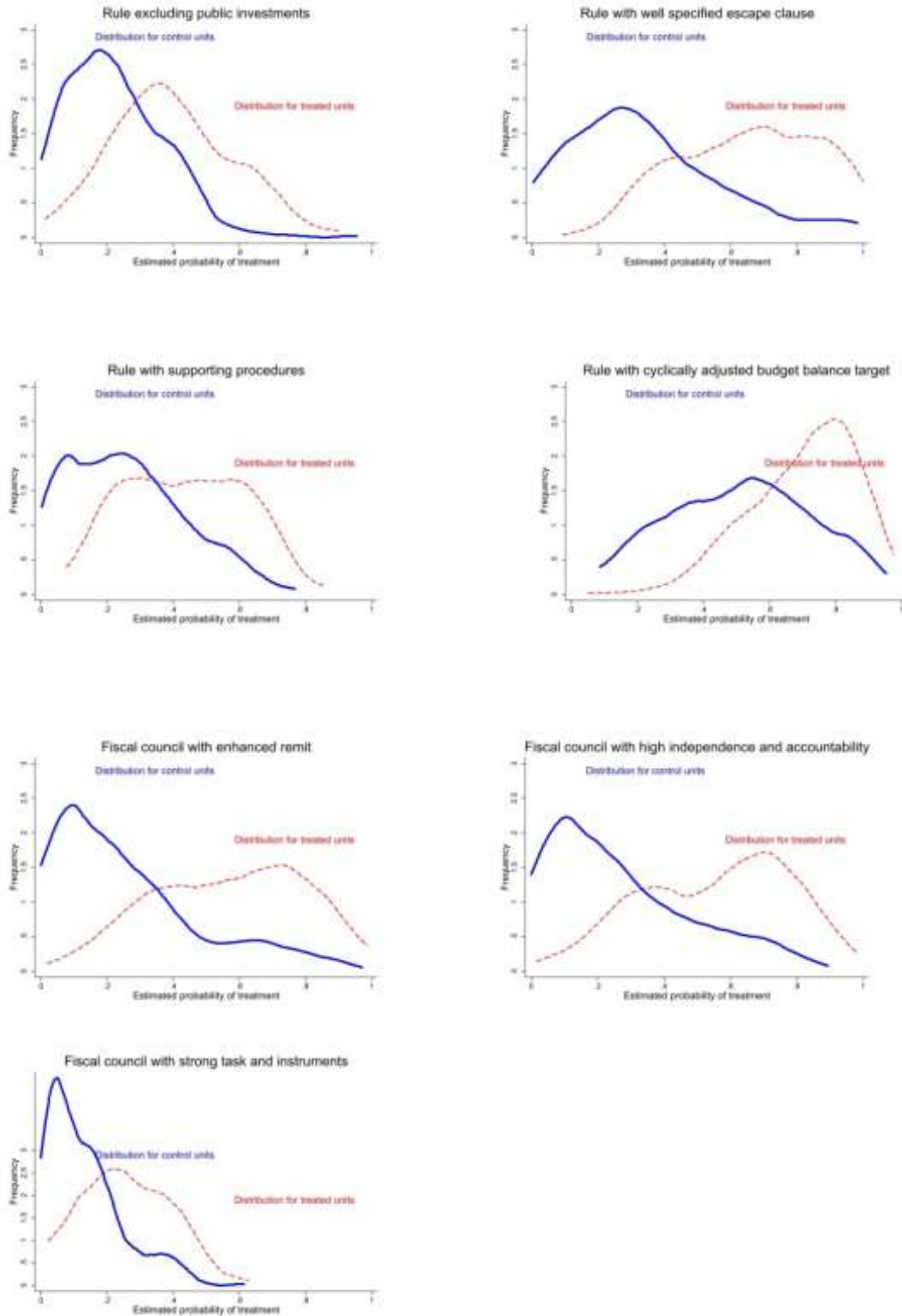
Table 11 reports the average treatment effect (based on the AIPW estimator) of fiscal rules and fiscal councils' characteristics on the probability of starting a fiscal adjustment, the probability of a successful fiscal adjustment and the probability of a successful fiscal adjustment based on spending cuts[14]. We find that a fiscal rule with well specified escape clause, that has multi-year expenditure ceilings can induce a fiscal adjustment, whereas these fiscal rules characteristics plus a fiscal rule that excludes public investment can induce a successful fiscal adjustment as well as a successful fiscal adjustment based on spending cuts. As regards fiscal councils, we find that, a fiscal council with enhanced remit increases the probability of initiating a fiscal adjustment, whereas a fiscal council with enhanced remit, independence and accountability and extended tasks and instruments increase the probability of successful fiscal adjustments. Finally, we find that a fiscal council with extended tasks and instruments increase the probability of successful fiscal adjustments based on spending cuts. These results are particularly relevant for the ongoing debate on the revision of European fiscal framework and in particular on the proper design of fiscal councils and fiscal rules.

Table 11. Average treatment effect of (successful) fiscal adjustment, AIPW estimates.

| Treatment variables | (1) investment | (2) Escape clause | (3) supportpro c | (4) stabilizatio n | (5) Remit | (6) tasks | (7) independ ence |
|---|---|---|---|---|---|---|---|
| **Fiscal consolidation** | | | | | | | |
| ATE | 0.046 | 0.189*** | 0.081** | 0.053 | 0.146*** | 0.093 | 0.140 |
| | (0.05) | (0.05) | (0.04) | (0.04) | (0.03) | (0.05) | (0.09) |
| Observations | 623 | 623 | 623 | 623 | 613 | 613 | 613 |
| **Successful fiscal consolidation** | | | | | | | |
| ATE | 0.124* | 0.087* | 0.098** | 0.025 | 0.142** | 0.085* | 0.072* |
| | (0.06) | (0.04) | (0.04) | (0.01) | (0.05) | (0.04) | (0.04) |

[14] The estimates are insignificant in the case of the successful revenue based fiscal consolidation.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Observations | 594 | 594 | 594 | 594 | 584 | 584 | 584 |
| **Successful fiscal consolidation based on spending cuts** | | | | | | | |
| ATE | 0.106** | 0.142** | 0.097*** | 0.015 | 0.077 | 0.162*** | 0.041 |
| | (0.04) | (0.06) | (0.03) | (0.01) | (0.09) | (0.04) | (0.07) |
| Observations | 598 | 598 | 598 | 598 | 588 | 588 | 588 |

Notes: Standard errors clustered by country in parentheses. Outcome equation variables: cyclically adjusted primary balance with one lag, outputgap with one lag, debt to GDP ratio with one lag, real effective exchange rate with one lag, tradeopenness with one lag, net exports as a % of GDP with one lag, long term interest rate with one lag, change in total spending excluding interest payments and total revenues[15] at time t (for successful fiscal adjustment) and the political and institutional variables we discussed above at time t. Treatment equations are reported in Table 10. The full set of results are presented in the online appendix (supplementary material 2).
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 7. Conclusion remarks

Using a panel of 40 advanced economies from 1990 to 2020 and the IMF dataset on fiscal rules and fiscal councils developed by Davoodi et al. (2022), this paper investigates the effect of the individual characteristics of fiscal rules and fiscal councils, on the probability to initiate a fiscal adjustment, as well as on the probability that this fiscal adjustment will be successful.

We find that, a fiscal rule with a cyclically adjusted budget balance target, well specified escape clause, strict enforcement, strong legal base, that applies to the general government increases the probability to initiate a fiscal adjustment and increases the likelihood that this adjustment will be successful. Moreover, a fiscal council with enhanced remit, independence and accountability increases the likelihood to start a fiscal adjustment, while a fiscal council with enhanced tasks and instruments can lead to a successful fiscal adjustment as well as a successful fiscal adjustment based on spending cuts. A fiscal rule with well specified escape clause, strict enforcement, multi-year expenditure ceilings strong legal base, that applies to the general government has a more sizable positive effect on the probability of a successful expenditure-based relative to a revenue-based adjustment.

Our results are robust to an alternative definition of successful fiscal adjustment.

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[15] Total revenues excluded of the equation for successful fiscal adjustment based on spending cuts.

Moreover, our results are robust once accounting for likely endogeneity between the fiscal adjustments and the design of the fiscal institutions. In this case we estimate the average treatment effect of fiscal rules and fiscal councils' characteristics on fiscal adjustments by means of the augmented inverse propensity-score weighted regression adjustment method as in Jorda and Taylor (2016). We find that, with a fiscal rule with a well specified general escape clause and multi-year expenditure ceilings, as well as a fiscal council with enhanced remit, increase the probability of a fiscal adjustment. Furthermore, a fiscal rule that excludes public investment, has a well specified general escape clause and multi-year expenditure ceilings increase the probability of a successful fiscal adjustment as well as a successful fiscal adjustment based on spending cuts. Finally, a fiscal council with enhanced remit, independence and accountability and extended tasks and instruments, increase the probability of successful fiscal adjustments, while a fiscal council with enhanced tasks and instruments increase the probability of a successful fiscal adjustments based on spending cuts.

Our findings are in line with Caselli and Reynaud (2020), who find that "well-designed" fiscal rules have a positive and significant impact on fiscal balance, as well as Gootjes and de Haan (2002a), who find that fiscal rules improve fiscal policy outcomes and the probability of successful fiscal adjustment. Overall, our findings add to the existing literature on the optimal design of fiscal institutions and contribute to the on-going debate on the review of the European fiscal framework.

## Appendix A

Building on the latest IMF dataset for fiscal councils and fiscal rules as constructed by Davoodi et al. (2022), we construct 4 dummy variables as fiscal councils' characteristics and 7 dummy variables as fiscal rules' characteristics. We definite them as follows:

- Positive and normative analysis, forecast preparation and assessment, recommendations, long-term sustainability, consistency with objectives, costing of measures, monitoring of fiscal rules, ex-post analysis, fiscal policy coordination, and mandate beyond fiscal policy are the twelve subcategories that make up the remit. When at least six of the twelve subcategories are included in the fiscal council's remit, the dummy variable "**remit**" has a value of one, indicating a strong fiscal council.

- The binary variable tasks & instruments ("tasks") describes the tools available to fiscal councils to perform two critical tasks that influence the fiscal policy debate. The first duty is to manage public relations. This captures the council's ability to communicate its opinions to the public and other relevant stakeholders, and it is supported by the production of timely and accessible public reports, as well as the media impact of these and other public interventions by the council. The second task is to have sway over the budgeting process. The fiscal council's projections and policy recommendations used in budget preparation, the requirement for governments to publicly explain deviations from these forecasts and recommendations, and whether the fiscal council is able to meet with decision-makers on a regular basis are among the instruments available. When four of the above tasks and instruments are included in the fiscal council's mandate, the dummy variable "**tasks**" assumes the value 1 to represent a powerful fiscal council.

- The binary variable independence and accountability ("independence") reflects the fact that non-partisanship and independence, as well as management independence, the existence of staff commensurate to tasks, and legally based access to information relevant to the performance of the fiscal council's tasks,

are prerequisites for successful fiscal councils. This variable investigates various aspects of the council's legal and operational independence, such as whether the financial resources made available to the institution are safeguarded and proportionate to its tasks, whether governing members of councils are selected based on technical competence, and whether access to all relevant government is legally guaranteed. When three of the following traits are reflected in the fiscal council's mandate, the dummy variable "**independence**" gets the value 1, indicating a strong fiscal council. Two of the above attributes must be legal and operational independence.

- The binary variable "resources" is concerned with the human resources of fiscal councils, namely the appointment and firing of its governing members. More specifically, the dummy variable "resources" represents a strong fiscal council and takes the value 1 if its ruling members are selected and removed by parliament rather than the government or any government-related organization. The binary variable "resources" is concerned with the human resources of fiscal councils, namely the appointment and firing of its governing members. More specifically, the dummy variable "**resources**" represents a strong fiscal council and takes the value 1 if its governing members are selected and removed by parliament rather than the government or any government-related organization.

- Enforcement is divided into two subcategories: compliance monitoring outside of government and formal enforcement procedures. When both subcategories are included in the fiscal rule's characteristics, the dummy variable "**enforcement**" has a value of 1.

- The binary variable well specified escape clause ("**escapeclause**") takes the value 1 when a fiscal rule has a well specified escape clause to allow for temporary exceptions to the rules.

- The binary variable coverage ("**coverage_high**") takes the value 1 when the fiscal rule applies to the general government, and 0 otherwise.

- When the fiscal rule is based on constitutional, international treaty, and statutory commitment, the dummy variable "**legalbasis high**" has the value 1 and when it is based on coalition agreement and political commitment, it has the value 0.

- When the fiscal rule includes multi-year expenditure ceilings, the dummy variable "**supportproc**" has the value 1 and otherwise has the value 0.

- When a fiscal rule includes a cyclically adjusted/structural budget balance target, the dummy variable "**stabilization**" has the value 1 and otherwise has the value 0.

- When the fiscal rule removes public investment or other priority items from the ceiling, the dummy variable "**investment**" has the value 1.

## Appendix B

Table B1. List of countries and their (successful) fiscal consolidation dates.

| Country | Fiscal consolidation | Succeed Fiscal consolidation | Country | Fiscal consolidation | Succeed Fiscal consolidation |
|---|---|---|---|---|---|
| Australia | - | - | Italy | 1992, 1993, 1997, 2007, 2012 | 1992, 1993 |
| Austria | 1997, 2001, 2005, 2015 | - | Japan | 1997, 2014 | 2014 |
| Belgium | 1993, 2006 | 1993 | Latvia | 2009, 2011, 2012 | 2009, 2011 |
| Bulgaria | 2011, 2016 | - | Lithuania | 2009, 2010, 2012 | 2009, 2010, 2012 |
| Canada | 1995, 1996, 1997 | 1995, 1996 | Luxembourg | 1997, 2018 | 1997 |
| Chile | - | - | Malta | 2004, 2009, 2016, 2017 | 2004 |
| Colombia | 2012, 2019 | - | Mexico | 2000, 2017 | 2000 |

| Croatia | 2007, 2008, 2012, 2015, 2016 | 2007, 2012, 2015, 2016 | Netherlands | 2012, 2013, 2016 | 2012, 2013, 2016 |
|---|---|---|---|---|---|
| Cyprus | 2007, 2012, 2013, 2014 | 2012, 2013, 2014 | New Zealand | 2012 | 2012 |
| Czech Republic | 1999, 2004, 2011, 2013 | 2011, 2013 | Norway | 1993, 1994, 1995, 1996, 2000 | 1993, 1994, 1995 |
| Denmark | 1996, 2005, 2013, 2014, 2019 | 1996, 2013, 2014 | Poland | 2005, 2007, 2011, 2012 | 2011, 2012 |
| Estonia | 2009 | - | Portugal | 2006, 2011, 2012, 2015, 2018 | 2011, 2012, 2015 |
| Finland | 1996, 1998, 2000 | 1996, 1998 | Romania | 2010, 2011, 2012 | 2010, 2011 |
| France | 1996 | 1996 | Slovak Republic | 2001, 2003, 2011, 2013 | 2001, 2011 |
| Germany | 1996, 2011 | 1996, 2011 | Slovenia | 2012, 2014, 2015 | 2012, 2014, 2015 |
| Greece | 1994, 2005, 2010, 2011, 2012, 2013, 2016 | 1994, 2010, 2011, 2013 | Spain | 2010, 2012 | 2010, 2012 |
| Hungary | 2007, 2009, 2012 | 2007, 2009 | Sweden | 1995, 1996, 1998, 2001, 2005 | 1995, 1996, 1998 |
| Iceland | 2005, 2009, 2010, 2012, 2014, 2016 | 2009, 2010, 2012 | Switzerland | - | - |
| Ireland | 2011, 2012 | 2011, 2012 | United Kingdom | 1996, 2010, 2011 | 1996, 2010, 2011 |
| Israel | - | - | United States | 2011, 2012, 2013 | 2011, 2012 |

Notes: This table shows the identification of fiscal adjustments based on Alesina and Ardagna (2010) and Tagkalakis (2011) definition and the Lambertini and Tavares (2005) and Tagkalakis (2011) criterion for success.

Table B2. Summary statistics

| Variable | Mean | Std.Dev. | Min | Max | Source |
|---|---|---|---|---|---|
| capb | -0.006 | 0.032 | -0.165 | 0.149 | IMF |
| ydebt | 0.599 | 0.378 | 0.037 | 2.562 | World Bank |
| outputgap | -0.002 | 0.025 | -0.162 | 0.118 | IMF |
| tradeopenness | 0.8938 | 0.599 | 0.001 | 4.083 | IMF |
| netnx | 0.041 | 0.328 | -1.672 | 6.432 | IMF |
| spending | 0.389 | 0.077 | 0.154 | 0.605 | IMF |
| revenue | 0.400 | 0.081 | 0.138 | 0.590 | IMF |
| longtermir | 0.046 | 0.029 | -0.005 | 0.224 | IMF |
| reer | 4.556 | 0.166 | 3.740 | 5.056 | IMF |
| remit | 0.269 | 0.443 | 0 | 1 | IMF |
| independence | 0.268 | 0.443 | 0 | 1 | IMF |
| tasks | 0.084 | 0.277 | 0 | 1 | IMF |
| resources | 0.117 | 0.322 | 0 | 1 | IMF |
| investment | 0.221 | 0.415 | 0 | 1 | IMF |
| escapeclause | 0.368 | 0.482 | 0 | 1 | IMF |
| enforcement | 0.507 | 0.500 | 0 | 1 | IMF |
| supportproc | 0.246 | 0.431 | 0 | 1 | IMF |
| legalbasis_high | 0.649 | 0.477 | 0 | 1 | IMF |

| | | | | | |
|---|---|---|---|---|---|
| stabilization | 0.435 | 0.496 | 0 | 1 | IMF |
| coverage_high | 0.510 | 0.500 | 0 | 1 | IMF |
| ez | 0.271 | 0.445 | 0 | 1 | Self-Constr. |
| right | 0.647 | 0.478 | 0 | 1 | ParlGov |
| power | 0.238 | 0.426 | 0 | 1 | ParlGov |
| elections | 0.276 | 0.447 | 0 | 1 | ParlGov |

Notes: The table reports descriptive statistics for the variables in the dataset. The sample covers the period 1990 to 2020.

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