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The effects of fiscal rules on budget deficit does democracy matter?

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ABSTRACT

This paper aims to analyse the extent to which democracy shapes the relationship between fiscal rules and budget deficits. To attain this objective, we estimated different fiscal reaction functions for a sample of 97 countries over the period 1985–2021. Our results show that fiscal rules reduce primary budget deficits. Furthermore, the paper establishes that this effect diminishes with democracy as a marginal increase in fiscal rules strength reduces the primary budget only in weak democracies while in strong democracies they do not, indicating that fiscal rules and democracy are substitutes to attain fiscal discipline. Our results are robust to the exclusion of EU countries members, alternative methods dealing with endogeneity or time-invariant variables and the inclusion of other determinants of primary budget deficit as explanatory variables. This suggests that fiscal rules and democracy are substitutes. However, when dealing with the fiscal framework, we find that fiscal rules and democracy are substitutes only in new democracies and under high indebtedness.

1. Introduction

In recent years, many countries have adopted fiscal rules which are defined as permanent or specific legal constraints on fiscal policy through a quantitative limitation of fiscal aggregates by Kopits and Symansky (1998).[1] According to the International Monetary Fund's (IMF) budget department, their number increased from 5 in 1990 to 106 in 2021. The main arguments for their adoption are based on the fact that governments tend to adopt behaviours that can be considered suboptimal from the standpoint of social welfare, to achieve certain electoral or political objectives. For instance, policymakers may have partisan biases, in addition to being subjected to incentives that promote short-term political opportunism and can make decisions that favour their political support. Thereby, several contributions argue that fiscal rules may play a significant role in reducing or eliminating deficits and controlling the growth of government debt in a context of deficit bias, debt accumulation and intergenerational redistribution conflicts (Alesina and Passalacqua, 2016; Altunbas et al., 2017; Drazen and Eslava, 2005; Eslava, 2011; Gootjes et al., 2021; Gootjes and de Haan, 2022; Hansen, 2020; Strong, 2022). Fiscal rules, therefore, aim to Government deficit bias and reinforce the credibility of decision-makers in fiscal policy implementation.

As an extension of this literature, this paper aims to analyse the extent to which democracy shapes the relationship between fiscal rules and fiscal deficit as far as a relatively new debate in the literature highlights the importance of institutions in shaping fiscal rules-

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[1] Following this definition, Kopits and Symansky (1998) distinguish four types of fiscal rules: revenue rules, expenditure rules, balanced budget rules and debt rules.

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fiscal discipline nexus. Precisely, we examine the role of democracy in the fiscal rules-fiscal deficit nexus as the first study of this kind. To the best of our knowledge, we do not find a paper which deals with the contribution of democracy in shaping the effects of fiscal rules on fiscal discipline. Given the controversy about the disciplining effect of fiscal rules, this article critically contributes to the existing literature by demonstrating how the level of democracy influences the effect of fiscal rules on fiscal discipline.

Regarding the literature, two points of view emerge from the studies on the assessment of the disciplining effect of fiscal rules. The first group of studies argues that fiscal rules and more specifically stringent ones contribute to enhancing fiscal discipline. They are mainly based on the principle that stronger rules provide a binding framework for fiscal policy to improve the fiscal outcome (Badinger and Reuter, 2017; Foremny, 2014; Maltritz and Wüste, 2015). For instance, empirical evidence from Alt and Lowry (1994), Alesina and Bayoumi (1996), Canova and Pappa (2006) in the case of the United States as well as Foremny (2014), Maltritz and Wüste (2015) in the case of the European Union, reports on the growing fiscal discipline in these economies with the use of more stringent rules. More recently, Gootjes et al. (2021), Strong (2022) argue that fiscal rules were effective in mitigating the political business cycle. If this point of view tends to be supported in developing countries by the work of Badinger and Reuter (2017), Dabla-Norris et al. (2010), it remains strongly criticised by a second group of studies. In fact, according to these studies, no matter how rigid the fiscal rules adopted may be, it must be recognised that there exist unforeseeable events such as crises, which may likely break them (Debrun and Jonung, 2019; Milesi-Ferretti, 2003; Wyplosz, 2012). That is the case especially if the political costs of fiscal discipline outweigh the gains for public authorities (politicians). Moreover, as suggested by Wyplosz (2005, 2012), if there is such a situation, public authorities, in general, will choose not to comply with the rules and to downgrade the soundness of public finances. In addition, if governments are not committed to fiscal discipline, they will find ways to get around fiscal rules (Kopits, 2001). Recently, Vinturis (2022) shows that fiscal rules do not significantly affect fiscal performance in the group of EU former communist countries.

The debate about the importance of fiscal rules in government discipline has been revived recently. Countries with more sophisticated rules have struggled to control their public finances in attempts to stabilise the economy after the 2007–2008 financial crisis (Schaechter et al., 2012). During this period the state of public finances deteriorated considerably due to the implementation of major stimulus plans to counter the Great Recession that ensued (Spilimbergo et al., 2008).[2] Even though public deficits have subsequently declined in several countries as a result of tightening the existing budgetary arrangements and the implementation of austerity measures, public debt ratios are still high and, in some cases, far from the set target. More importantly, in monetary unions where countries are theoretically subjected to the same fiscal constraints, some of them are undisciplined while others are virtuous, considering the evolution of their budget deficit and public debt. A pellucid example here is that of the European Union (EU) where the Stability Growth Pact (SGP) rules did not help in the maintenance of healthy public finance in all the member countries during and after the financial crisis (Hallett and Hougaard Jensen, 2012; Mathieu and Sterdyniak, 2012).

Although no studies had previously focused on the link between democracy, fiscal rules, and fiscal discipline, some arguments help to justify the theoretical underpinnings of this paper. The first argument is based on the implications of the democratic game on policymakers' ability to be committed to the respect of established fiscal rules. Building on the fact that policymakers are generally interested in getting re-elected, they are willing to tilt fiscal policy to achieve that objective (Buchanan and Wagner, 1977; Nordhaus, 1975). Further, there is evidence that how a political regime responds to political demand determines the durability of its mandate (Fumagalli and Turmanidze, 2017; Miller, 2015). Specifically, Fumagalli and Turmanidze (2017) show that policymaking and voter perception of policy play an important role in determining the survival of a regime. Even if the threat of ouster is low in autocracies, some studies indicate that voters' discontent after elections usually leads to increased public spending, especially on education and social welfare (Miller, 2015). Thus, in a context where voters value high-spending governments, policymakers are less concerned about fiscal discipline and less committed to complying with fiscal rules. The neglect of fiscal discipline goal is particularly acute since voters can exercise their sanctioning power when decision-makers in office fail to deliver on their electoral promises unless they do not comply with fiscal rules (Wyplosz, 2012; 2005). As a result, they can put in place creative accounting to circumvent fiscal rules to satisfy voters and increase their chances of getting re-elected (Hirota and Yunoue, 2022; Milesi-Ferretti, 2003) and consequently weaken public finance. For instance, they can upwardly adjust the expenditure of the budget items that are not covered by the rules.

The second argument is related to the role of the information gap between politicians and voters on policymakers' commitment to enforcing fiscal rules in an authoritarian regime or in a democratic one. Relative recent literature highlights that under asymmetric information, all incumbents tend to weaken public finance. Moreover, it has been shown that citizens are more tolerant of public finance (budget deficit and debt) manipulation when they have less information about fiscal outcomes, as well as less understanding of the political process generating fiscal policy, especially if the government do not communicate on the fiscal policy actions (Brender and Drazen, 2007; Gootjes et al., 2021).[3] On the contrary, when voters are well-informed on the conduct of fiscal policy, they better control government actions (Brender and Drazen, 2007) and can contribute to enhancing fiscal discipline. Thus, since in authoritarian regimes, voters are less well informed about the conduct of fiscal policy as well as fiscal outcomes,[4] their decision-makers are more likely to manipulate public spending to the detriment of the objective of fiscal discipline even in the presence of fiscal rules. On the contrary, in

[2] For instance, in 2010 the global deficit stood at 6.2 % of GDP for the euro area, 11.3 % for the United States, and 10 % for the United Kingdom. These deficits have contributed to a high increase in public debt. Between 2008 and 2012, general government public debt as a share of GDP has increased from around 70.3 % to 92.9 % for the euro area, from 72.8 to 102.5 % for the United States, and from 51.9 to 89.1 % for the United Kingdom.

[3] Indeed, According to Stratmann and Francisco (2006), when voters are not well informed on the conduct of fiscal policy, they may have less interest in constraining the actions of officials and parties.

[4] It is because of the low transparency of public decision-makers and the low level of media freedom.

democratic regimes, voters are more likely to force them to respect fiscal rules because of the smaller information gap between politicians and voters.

On the other hand, the argument presented by Aaskoven (2022) suggests that in autocratic systems, fiscal rules are designed to limit excessive spending and debt accumulation. This is achieved by imposing limits on key fiscal aggregates, such as the budget deficit or public debt (Asatryan et al., 2018; Thornton and Vasilakis, 2018). Furthermore, fiscal rules can strengthen the credibility of governments in the eyes of international investors and financial markets, as they convey signals of fiscal prudence and restraint. Indeed, as Aaskoven (2022) points out, the adoption of fiscal rules by autocracies demonstrates a commitment to maintaining sound public finances. This can help to mitigate the risk perceptions associated with their governance and compensate for the institutional weaknesses often associated with this regime. Following (Ballard-Rosa et al., 2021), the disciplining effect of fiscal rules may be particularly potent in autocracies. This is because, in such systems, those in power are less constrained by formal pressure from legislative actors, such as the opposition and supporting parties, to limit the budgetary discretion of the executive. Consequently, fiscal rules can reinforce fiscal discipline in autocracies by replacing political certainty and legislative constraints on the executive, enabling autocracies to offset their 'democratic disadvantage' in access to the credit market (Ballard-Rosa et al., 2021). Moreover, as suggested by Aaskoven (2022), the introduction of fiscal rules enhances transparency and predictability of economic policies in autocracies. This can facilitate more accurate anticipation of future government actions, thereby reducing uncertainty and the cost of credit (Ballard-Rosa et al., 2021). Furthermore, the threat of bond market sanctions for breaches of fiscal rules may be sufficient to maintain government compliance and the confidence of bond market participants in autocracies, even in the absence of formal sanctions. Indeed, fiscal rules serve as focal points for the coordination of bond market participants (Kelemen and Teo, 2014). Therefore, the implementation of fiscal rules in autocracies could promote fiscal discipline by improving fiscal and financial transparency, which is an important determinant of sovereign creditworthiness (Copelovitch et al., 2018).

Moreover, beyond this theoretical background, the relevant literature on the link between institutions, fiscal rules, and fiscal discipline leads to conflicting and ambiguous conclusions. For instance, Debrun (2007), Debrun and Kumar (2007) show that the combination of fiscal rules and the independent fiscal council inevitably leads to the deterioration of public finances in the EU 15[5] countries. However, when assessing the question of the role of the fiscal council and fiscal rules individually, they find that they contribute to diminishing the deficit. In other words, they behave as substitutes for controlling the government deficit bias. On the contrary, Nerlich and Reuter (2013), Maltritz and Wüste (2015), in the case of European Union countries found that the effectiveness of fiscal rules is improved by the establishment of an independent fiscal council, especially when the appointment of their members and the resources at their disposal are not dependent on the government. In other words, they behave as complementary.

More recently, when assessing the role of budget transparency on the fiscal rules-fiscal discipline relationship, Gootjes and de Haan (2022) show that fiscal rules improve the government budget balance under high budget transparency. Moreover, Bergman et al. (2016) find that fiscal rules are effective in reducing the budget deficit, regardless of the level of government efficiency. Nevertheless, they show that the effects of fiscal rules diminish as government efficiency increases and depend on the types as well as the combination of rules. Thus, by expanding these previous studies, we ought to provide an additional answer to the question initiated by Hallett and Hougaard Jensen (2012), Wyplosz (2005, 2012) concerning the optimal design of the fiscal framework when fiscal rules interact with institutions. Indeed, according to these authors, economies face two optimal choices: adopting binding fiscal rules or improving the institutional framework if they have a conflicting relationship (i.e. they are substitutes); or adopting strict rules while improving the institutional framework at the same time if they are complementary.

To achieve our objective, we, first, constructed a fiscal rule aggregate index and four sub-aggregate indices of specific types of fiscal constraints. This allows us to assess whether the different types of fiscal rules have distinct effects on the primary budget deficit and whether these effects differ according to the level of democracy. Furthermore, we use these fiscal rules index to assess the effect of some combinations of fiscal rules that have been adopted. In fact, since the work of Bergman et al. (2016), it seems that fiscal rules, as well as their combinations, have a different effect on the primary budget balance. This constitutes the second contribution of this paper. Moreover, we deal with the endogeneity of fiscal rules. A major concern when analysing the effects of fiscal rules is that they are endogenous to economic performance in general and to fiscal performance, in particular (Bergman et al., 2016; Caselli and Reynaud, 2020; Gootjes et al., 2021). Thus, it is harder to establish causality between fiscal rules and fiscal outcomes, as both could be shaped by similar factors. For instance, countries with fiscal rules may have certain observed or unobserved characteristics that foster good fiscal policy, such as a preference for fiscal prudence, whether a rule is in place (Poterba, 1996). Most importantly, Heinemann et al. (2018) indicate that the positive correlation between fiscal rules and fiscal outcomes tends to disappear once the analysis correctly addresses the issue of endogeneity. To address this endogeneity issue, we build on an instrumental variable strategy inspired by Caselli and Reynaud's (2020) approach and consist to instrument the fiscal rules' strength by the stringency of neighbouring countries' fiscal rules over the previous period.

The study builds on a sample of 97 countries both industrialised and developing using fiscal rules over the period 1985–2021. Our results show that fiscal rules contribute to diminishing the primary budget deficit, confirming their disciplining effect. Furthermore, we establish that this disciplining effect decreases with democracy, indicating that fiscal rules and democracy are substitutes to attain fiscal discipline. Our results are robust alternative methods dealing with endogeneity or time-invariant variables, exclusion of the EU countries members and the inclusion of other determinants of primary budget deficit as explanatory variables as well as alternative measures of democracy. However, when dealing with the fiscal framework, the disciplining effect of fiscal rules increases with

[5] The EU15 refers to the European Union of 15, i.e., 15 members.

democracy under low indebtedness and established democracies.

This paper is structured as follows: the second section provides the empirical framework. In the third section, the different results are presented and discussed. Finally, the fourth section unveils the conclusion as well as some policy recommendations.

2. Data and methodology

This section presents the empirical framework, and the data used to analyse the extent to which democracy shapes the relationship between fiscal rules and budget deficits.

2.1. Data measurement

For this study, we rely on a sample of 97 countries because of the availability of data continuously over a large set of countries. The countries of the sample are listed in Table A in the appendixes. The data are collected on a yearly frequency and cover the period 1985–2021.

2.1.1. The measurement of fiscal rules strength index

To construct the fiscal rule stringency index (FRSI), we use the methodological framework defined by Schaechter et al. (2012) and extended by Gootjes et al. (2021). Following this framework, the FSRI is constructed in two steps.

The first stage involves combining five main indicators characterising the stringency adopted fiscal rules which are 'supporting procedures', 'enforcement', 'coverage', 'legal basis', and 'flexibility' of fiscal rules. The '**legal basis**' indicator reflects the strictness of the legislative support for the adopted rules. The legislative support for each adopted rule is defined and classified into five levels of the regulatory framework, ranging from the least strict (political agreement) to the most rigid (constitution), including the coalition agreement, statutory, and international treaty. The 'legal basis' is then calculated by summing up the values of the legislative supports of all rules adopted. The '**enforcement**' indicator, also defined for each fiscal rule, identifies whether formal enforcement procedures exist and whether an external control mechanism has been implemented. It is computed as the sum of the existence of a formal enforcement procedure for the adopted rules. The '**coverage**' indicator measures the level of government covered by the rules, including supranational governments. It is calculated as the sum of the coverage of each adopted rule. The '**flexibility**' indicator measures the flexibility of the rules used. It shows whether there is a well-defined safeguard clause, whether the balanced budget target is adjusted according to the cycle and whether public spending on infrastructure is excluded from the spending ceiling. It is defined as the sum of information on the existence of a clearly defined safeguard clause, the existence of a cyclically adjusted balanced budget target and the existence of a clause excluding public spending from the spending ceiling. The '**supporting procedures**' indicator identifies procedures and institutions that support fiscal rules, particularly national rules. It is not defined for each rule and is computed as the sum of the existence or absence of multi-annual spending ceilings, a fiscal responsibility law, and an independent fiscal body that sets budgetary assumptions and monitors their implementation.

In the second step, the computation of the overall FRSI is then done by summing up these main indicators (characterising the rules), that have been normalised first in the interval [0–1], as follows:

$$FRSI = legal\_basis + coverage + enforcement + flexibility + supporting\_procedure \quad (1)$$

Therefore, *FRSI* takes values in the interval [0–5]. As for the interpretation, an increase in the FRSI indicates a rise in fiscal rules strength and vice versa. This aggregation method has the advantage of being transparent and straightforward (Gootjes et al., 2022).

In addition to the overall indicator of the fiscal rules' strength, we also construct four FRSI for each type of fiscal rule. This allows us to assess whether the different types of fiscal rules have distinct effects on the primary budget deficit and whether these effects differ according to the level of democracy. However, given that the score for supporting procedures is the same for all the rules adopted, we only consider the four other properties for each rule to construct these specific rules' indices, at the risk of attributing an index score to a non-existent fiscal rule. Hence the *FRSI* for each type of rule is computed as follows:

$$FRSI\_type = legal\_basis + coverage + enforcement + flexibility \quad (2)$$

Where *type* refers to revenue rule (RR), expenditures rule (ER), budget balance rule (BBR), and debt rule (DR). At this stage, the *FSRI_type* takes values between 0 and 4. However, to make our indices comparable, we normalised the FRSI in the interval [0–1]. Information used to construct the FRSI comes from the IMF's fiscal rules dataset which only covers countries that have adopted fiscal rules. They concern both national and supranational rules. Moreover, since supranational rules are only established through international treaties as suggested by Schaechter et al. (2012), the only difference between national and supranational fiscal rules is their legal basis. Hence, the constructed FSRIs concern both national and supranational rules. However, since our sample may be biased, as it only includes countries that have introduced a fiscal rule at some point in time, the model includes country-fixed. Indeed, by including country-fixed effects in our analysis, we can control for unobserved and time-invariant individual characteristics that may be correlated with the observed independent variables. This may mitigate at least partially this sample bias.

2.1.2. The measurement of the other variables

As to what concerns our variables of interest, we use the primary fiscal balance to measure fiscal balances. This choice of this indicator is driven by the fact that the interests of public debt stock do not reflect fiscal policies in the ongoing period. It therefore must

Table 1
Descriptive statistics of the fiscal rules index and sub-indices.

Variable	Obs	Mean	Std.	Min	Max
	Overall sample				
FRSI	3061	0.132	0.157	0	0.836
Revenue rule (RR)	3061	0.029	0.088	0	0.440
Expenditures rule (ER)	3061	0.082	0.188	0	0.980
Budget balance rule (BBR)	3061	0.226	0.265	0	0.980
Debt rule (DR)	3061	0.179	0.220	0	0.980
	At least one rule				
FRSI	1976	0.204	0.153	0.024	0.836
Revenue rule (RR)	327	0.267	0.095	0.070	0.440
Expenditures rule (ER)	716	0.350	0.240	0.070	0.980
Budget balance rule (BBR)	1721	0.402	0.233	0.070	0.980
Debt rule (DR)	1539	0.356	0.182	0.070	0.980

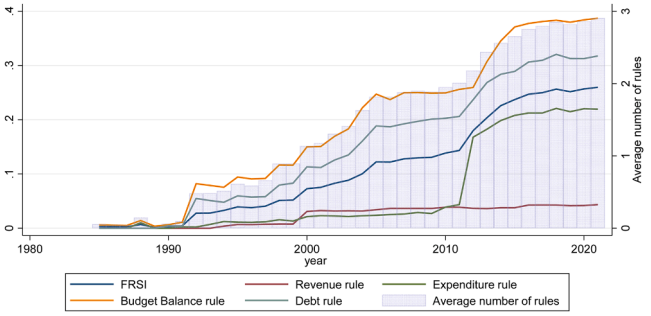

Fig. 1. Number of rules and Fiscal rules index.

Table 2
Descriptive statistics.

	Overall sample			No rule			At least one rule			Mean test
	Obs	Mean	Std. dev	Obs	Mean	Std. dev	Obs	Mean	Std. dev	
Public budget balance	3061	−3.250	16.602	1085	−4.477	26.93	1976	−2.576	5.256	−1.901***
Debt	2778	55.70	43.16	826	53.30	54.69	1952	56.72	37.19	−3.422*
GDP growth	3033	1.998	5.158	1058	2.738	6.381	1975	1.601	4.314	1.137***
FRSI	3061	0.132	0.132	1085	0.000	0.000	1976	0.204	0.153	−0.204***
Democracy	2721	0.631	0.005	989	0.534	0.008	1732	0.686	0.005	−0.151***

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence.

be deducted from the balanced budget, which is calculated as the difference between government revenues and government expenditures. Government revenue and public expenditures data are drawn as a share of GDP from the IMF's World Economic Outlook database. Those on debt servicing are provided by the World Development Indicator, also as a share of GDP. The Polity IV database's polity2 indicator is used to measure the level of democracy. It is a democracy indicator corrected from dictatorship which varies between −10 and 10. Precisely, it is a score that is computed by subtracting from the institutionalised democracy score the institutionalised autocracy score. The institutionalised autocracy score measures the sharp restriction or suppression of competitive political participation, as well as the exercise of power with few institutional constraints by a chief executive chosen in a regularised process of selection within the political elite. Conversely, the institutionalised democracy score measures the presence of institutions and procedures through which citizens can express effective preferences about alternative policies as well as the existence of institutionalised constraints on the exercise of power by the executive and the guarantee of civil liberties to all citizens. The GDP growth, the GDP per capita and the public debt (measures as a share of GDP) are taken from the IMF World Economic Outlook Database.

Before turning to the main econometric analysis, we carry out some preliminary analysis of relevant information regarding the interest variables of the econometric model. From this standpoint, we are first interested in the main characteristics of the constructed FRSI, before focusing on the link between fiscal rules, fiscal discipline, and democracy. As for FRSI characteristics, Table 1 below shows the descriptive statistics of the different indices constructed, and Fig. 1 their evolution over the 1985–2021 period. According to the descriptive statistics, the FRSI range from 0 to 0.836. For countries having a rule, the FRSI mean value is 0.132, with a minimum value of 0.024 for Namibia over the 2001–09 period and a maximum value of 0.836 for Latvia over 2020–21. The mean value of the index for countries with revenue, expenditure, balance budget, and debt rules are respectively 0.267, 0.350, 0.402 and 0.356. The most common specific rules amongst our four categories are balanced budget (implemented in countries) and debt rules (implemented in 85). The

least popular fiscal rules are revenue rules (only 17 have adopted them). Regarding the evolution of our different indices, Fig. 1 indicates an increasing trend in the number of fiscal rules adopted and their strength over time, suggesting the rising preference for fiscal discipline.

Table 2 reports the summary statistics of the variables. The first presents respectively statistics for the global sample while the second and the third part present those of both countries not using fiscal rules and using at least one fiscal rule. The last column presents the mean test between these two groups of countries. According to this table, the level of public budget balance when using fiscal rules is lower (2.576 %) than that with no fiscal rules (respectively 4.477 %). Since the difference in means is significant at 1 %, this suggests that with fiscal rules countries may have lower deficits. However, countries with fiscal rules curiously have much higher debt (56.72 %) than those without fiscal rules (53.30 %). At the same time, Table 2 also shows that countries using the fiscal rules are more democratic (the average level of democracy observed is 0.829) than those not applying them (the average level of democracy is 0.629). Since these statistics show a large difference between fiscal deficits as flow variables and changes in debt stock as stock variables in our sample, this indicates that countries using fiscal rules may have practised creative accounting. And to the extent that countries using fiscal rules are on average more democratic, this analysis might suggest that the disciplining effect of fiscal rules is attenuated by democracy. However, a more robust analysis should be carried out using an econometric approach to support this conclusion, especially since the previous analysis does not consider endogeneity issues that may arise.

2.2. The econometric model

To examine the extent to which democracy shapes the relationship between fiscal rules and budget deficit, we followed the two-step approach developed by Bergman et al. (2016), Maltritz and Wüste (2015). In the first step, we assess the effects of fiscal rules' strength on budget deficits and in the second, we evaluate the joint effect of fiscal rules' strength and democracy. To examine the relationship between fiscal rules' strength effect and budget deficit, we run various cross-country regressions of the following fiscal policy reaction function[6]:

$$PBB_{i,t} = \alpha_0 + \alpha_1 X_{i,t} + \alpha_2 demo_{i,t} + \alpha_3 FRSI_{i,t} + \eta_i + \mu_t + \varepsilon_{i,t} \quad (3)$$

Where i and t represent the individual and temporal dimensions, PBB is the public budget balance, X is a vector of control variables, and FRSI is our fiscal rules composite index. The set of control variables X includes both GDP growth to control for business cycle dynamics, and one-year lagged public debt to consider the long-term sustainability objective to which governments are subject. We also include the GDP per capita (in logarithm) to consider the role of the level of economic development on fiscal discipline. According to this econometric specification, the parameter associated with FRSI measures the effects of fiscal rules' strength on the primary budget deficit. Considering the primacy of the discipline objective when adopting strong fiscal rules, we expected a positive sign at the end of our analysis.

To evaluate the joint effect of fiscal rules strength and democracy, we estimate the following fiscal policy reaction function:

$$PBB_{i,t} = \alpha_0 + \alpha_1 X_{i,t} + \alpha_2 demo_{i,t} + \alpha_3 FRSI_{i,t} + \alpha_4 demo_{i,t} * FRSI_{i,t} + \eta_i + \mu_t + \varepsilon_{i,t} \quad (4)$$

Since the introduction of the interaction term could introduce multicollinearity problems, we normalised in the interval [0–1] our democracy proxy (polity2) following the recommendations of Balli and Sørensen (2013). Considering this specification, a positive sign of the interaction term parameter indicates that democracy contributes to greater efficiency of fiscal rules in reducing the deficit while a negative one implies that it attenuates it. Nevertheless, to have greater precision and clarity of the results, we computed the net effect of fiscal rules for each level of democracy.[7]

In the estimation of panel data-specified econometric models, it is not unusual to rely on the fixed-effect model (FE) estimated by ordinary least squares (OLS), especially when explanatory variables are expected to be correlated with unobserved individual effects. Furthermore, when unobserved heterogeneity is either suspected or when time series elements are included, it is recommended to control for the various forms of misspecification (autocorrelation errors and/or heteroskedasticity errors) using the Huber-White standard error correction. However, OLS are generally inefficient when the explanatory variables are correlated with the error term. In other words, they produce biased estimators in the presence of endogeneity. This can arise, on the one hand, when no distinction is made between variable(s) determined by the model and those predetermined (simultaneity problem), and, on the other hand, when an omitted variable affects both the explained variable and one (or more) explanatory variable(s). Therefore, we avoid using OLS to assess both relations 1 and 2, because fiscal rules can be endogenous to economic performance in general and to fiscal performance. Although several empirical studies have found that countries with fiscal rules tend to have better fiscal outcomes, particularly in terms of lower budget deficits (Bergman et al., 2016; Caselli and Reynaud, 2020; Gootjes et al., 2021), other works suggest that countries tend to adopt fiscal rules after consolidation periods to lock in the gains (Badinger and Reuter, 2017).

To circumvent this difficulty, we use an instrumental variable strategy inspired by Caselli and Reynaud's (2020) approach that relies on the fixed-effect two-stage least square (FE-2SLS). They use the diffusion of fiscal rules adopted to deal with the endogeneity issue when assessing the effect of fiscal rules on fiscal balances. Their strategy builds on the assumption that fiscal rules' adoption in neighbouring countries may induce the domestic country to introduce a rule as well. The intuition is that public policies in

[6] Our fiscal policy reaction function is captured by a Taylor rule applied to the fiscal policy. This rule specified the behaviour of fiscal authorities considering the public debt sustainability and the business cycle smoothing objectives.

[7] To this we report the evolution of the marginal effects of fiscal rules strength as a function of the level of democracy.

Table 3
The effect of fiscal rules on the public budget balance, Instrumental variables (2SLS).

	(1)	(2)	(3)	(4)	(5)
FRSI	0.145**				
	(0.060)				
Revenue rules index		1.354**			
		(0.620)			
Expenditure rules index			0.134**		
			(0.055)		
Balances budget rules index				0.107**	
				(0.044)	
Debt rules index					0.134**
					(0.055)
Democracy	0.062**	0.127**	0.063**	0.054**	0.068**
	(0.024)	(0.050)	(0.025)	(0.022)	(0.027)
Lagged debt	−0.071***	−0.061***	−0.074***	−0.072***	−0.070***
	(0.026)	(0.022)	(0.027)	(0.026)	(0.025)
GDP growth	−0.070	0.018	−0.088	−0.066	−0.069
	(0.232)	(0.219)	(0.236)	(0.231)	(0.232)
GDP per capita (in log)	0.005***	−0.001	0.005***	0.005***	0.006***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Constant	−0.121***	−0.123***	−0.110***	−0.123***	−0.136***
	(0.028)	(0.034)	(0.024)	(0.029)	(0.034)
Observations	2320	2320	2320	2320	2320
Countries	97	97	97	97	97
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes
Cragg-Donald	0.000	0.000	0.000	0.000	0.000
Kleibergen and Paap's test	794.724***	24.399***	453.259***	511.636***	419.642***
Hausman endogeneity test	0.050	0.013	0.038	0.070	0.025

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence. The first-stage regression results are presented in Appendix C.

neighbouring countries may affect the adoption of domestic public policies through coercion, competition, imitation, learning, socialisation and peer pressure effect (Buera et al., 2011; Dobbin et al., 2007; Giuliano et al., 2013; Shipan and Volden, 2008). In the specific case of fiscal rules, since they are understood as policies to achieve the objectives of constraining budget deficits and sovereign debt, governments facing fiscal indiscipline will be keener to follow and learn from rule adopters (Caselli and Reynaud, 2020). Moreover, Caselli and Reynaud (2020) underline that countries without fiscal rules could be pressured by their peers, close economic allies and possibly international organisations to adopt fiscal rules if they are proven to contribute to fiscal sustainability. Besides, several cases seem to strengthen these intuitions. For example, the fiscal rule 'à la Chile' has been cited as an example to follow by its neighbours such as Uruguay and Colombia. Similarly, the experience of the United States and Mexico, which adopted similar fiscal rules in 2011 and 2013 due to their economic, geographical, and cultural proximity, seems to support the hypothesis of the diffusion of fiscal rules to neighbours. In the European context, it is well-documented that Germany's choice to introduce a debt brake was inspired by the Swiss model (Kirchgässner, 2017). In Eastern Europe, too, the introduction of debt brake limits in Poland and Slovakia triggered reforms in the Czech Republic along the same lines. More recently, Balvir (2023) provides evidence of spatial diffusion of fiscal policy through geographic proximity.

Given that we are interested in the effect of fiscal rules strength and based on Caselli and Reynaud's (2020), Balvir's (2023) arguments, our instrumental strategy relies on the idea that the stringency of neighbouring countries' fiscal rules over the previous period influences the home country's fiscal rules strength. Hence, we use the one-period-lagged average neighbourhood fiscal rules strength index to instrument fiscal rules strength.

To capture the process of the geographical diffusion of fiscal rules strength, we define the instrument in the following way:

$$Instrument = \sum_{j \neq i}^{n-i} \left(FRSI_{j,t} * contiguity_{j,i,t} \right) \tag{5}$$

Where j is the neighbouring country of the domestic country I. $Contiguity_{j,i,t}$ is a dummy variable taking the value 0 when countries have no common borders and 1 if they share common borders.

This instrument seems to be relevant insofar as it is not probable that the lagged average neighbourhood FRSI affects fiscal balances in each country through channels other than the FRSI score of the country itself. However, to check the validity of the instrumentation strategy we apply the Hausman exogeneity test and Kleibergen and Paap's (2005) weak identification and under-identification tests since the model is just-identified and the chosen instrument may be correlated with the other variables of the model.

3. Baseline results

In this section, we report the baseline results obtained from the estimation of the relationship between fiscal rules budget deficit

Table 4
The effect of fiscal rules and democracy on the public budget balance, Instrumental variables (2SLS).

	(1)	(2)	(3)	(4)	(5)
FRSI	1.621**				
	(0.645)				
FRSI * Democracy	−2.020**				
	(0.805)				
Revenue rule index		5.968**			
		(2.751)			
Revenue rule * Democracy		−8.637**			
		(4.080)			
Expenditure rules index			2.707**		
			(1.129)		
Expenditure rules index * Democracy			−3.282**		
			(1.368)		
Balanced budget rules index				1.059**	
				(0.419)	
Balanced budget rules index * Democracy				−1.320**	
				(0.523)	
Debt rules index					1.285**
					(0.511)
Debt rules index * Democracy					−1.633**
					(0.650)
Lagged debt	−0.062***	−0.076***	−0.060***	−0.063***	−0.063***
	(0.022)	(0.028)	(0.022)	(0.023)	(0.023)
GDP growth	−0.002	0.031	−0.111	0.044	0.042
	(0.215)	(0.224)	(0.244)	(0.205)	(0.205)
GDP per capita (in log)	0.002	−0.007	0.003**	0.001	0.001
	(0.001)	(0.005)	(0.001)	(0.001)	(0.002)
Democracy	0.260***	0.273**	0.175***	0.304***	0.298***
	(0.100)	(0.111)	(0.068)	(0.117)	(0.115)
Constant	−0.213***	−0.115***	−0.160***	−0.237***	−0.227***
	(0.063)	(0.034)	(0.044)	(0.071)	(0.068)
Observations	2320	2320	2320	2320	2320
Countries	97	97	97	97	97
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes
Cragg-Donald	0.000	0.000	0.000	0.000	0.000
Kleibergen and Paap's test	123.270***	6.148***	31.542***	115.913***	89.588***
Hausman endogeneity test	0.004	0.042	0.009	0.011	0.043

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence. The first-stage regression results are presented in Appendix D.

and democracy. First, we present the results of the fiscal rules on the budget deficits. Secondly, we look at the mediating effect of democracy.

3.1. The effect of fiscal rules on the budget deficit

To assess this effect, we estimate the baseline specification (3) for the overall index and each type of rule sub-index. Table 3 summarises the results of the estimates. Before analysing the results, an important step is the validation of the instrumentation method. This is jointly carried out by Kleibergen and Paap's (2005) under-identification test,Cragg and Donald's (1993) test and the Hausman exogeneity test. Statistics obtained from the estimation show that these three tests are conclusive. They indicate that the instruments selected for the different estimates are valid since they are exogenous, not weak and the models are not under-identified. Most importantly, The Cragg-Donald F-statistic testing of the fitness of instruments in the first-stage regression confirms that our instrument has a strong correlation with FRSI with exogenous regressors controlled. In addition, the Fisher test established that the estimated models are globally significant at the 1 % level. Regarding the results, column 1 shows that the primary budget deficit decreases with the use of more stringent fiscal rules – the parameter of FRSI being positive and significant at the 5 % level of confidence. In line with the findings of Burret and Feld (2018), Badinger and Reuter (2017), Bergman et al. (2016), Maltritz and Wüste (2015), these estimates are further evidence of the disciplining effect of stringent fiscal rules. When assessing the effects of each type of rule, we find that all the rules appear to be effective in improving the primary budget balance, with both parameters significantly positive at least at the 5 % level of confidence.

Concerning the other variables, an important result concerns the cyclical behaviour of fiscal policy in countries using fiscal rules. Based on the results, it appears that fiscal policy is acyclical in our sample as the parameter of GDP growth is non-significant. However, this result should be analysed with caution as our sample comprises both developed and developing countries. Most importantly, the parameter associated with the GDP per capita is positive and overall significant, indicating that countries tend to reduce primary budget deficits with economic development. An increase in GDP per capita indicates economic development and is often accompanied

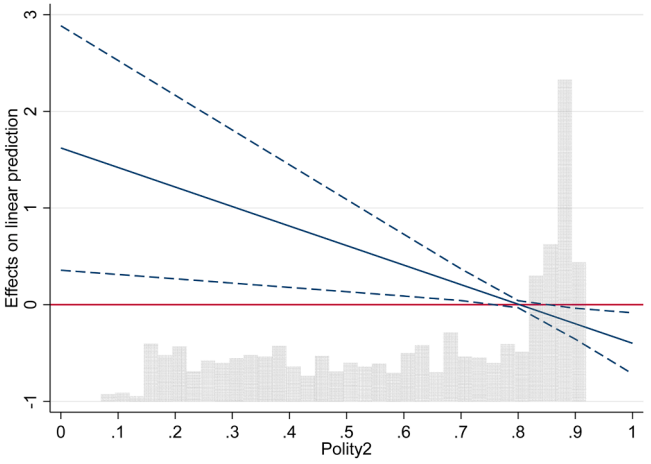

Fig. 2. Marginal effects of fiscal rules conditional on democracy
Notes. The marginal effects of the fiscal rules' strength index on the primary budget balance conditional on democracy are calculated with a 95 % confidence interval. The graphs are based on the estimates shown in column (1) of Table 4.

by an increase in fiscal space. A higher GDP per capita is associated with a broader tax base and less resistance from citizens to pay taxes (Muibi and Sinbo, 2013). It also leads to increased consumption of goods and services, resulting in higher tax revenues (Yogo and Ngo Njib, 2018), which can help reduce the public deficit if government spending remains constant or increases at a slower rate.

Regarding democracy, the parameter associated with its proxy is positive and significant at the 5 % level, suggesting that with democratisation, the countries of the sample tend to be more disciplined. According to Feld and Kirchgässner (2001), government actions are more transparent in a democratic system. Additionally, accountability mechanisms, such as public scrutiny, encourage policymakers to be cautious about budgetary decisions. This is particularly important in democracies, where public opinion tends to be averse to high debt levels, and citizens are concerned about the burden on future generations and the risk of default. Moreover, democratic systems provide checks and balances and prevent any single branch from dominating fiscal decisions. Lastly, the parameter of the lagged level of debt is negative and meaningful in all the regressions. This is an unexpected result as it means that a higher level of public debt does not lead to budgetary efforts to improve the budget balance. As an explanation, it should be noted that countries with relatively high government debt levels tend to be unable to borrow as high debt can lead to higher interest rates, which can reduce private investment and overall economic activity (Bergman and Hutchison, 2020). Given that a sluggish economy results in lower tax revenue, this exacerbates the public deficit. Moreover, a high level of debt can lead to large sovereign debt service costs that could directly impact the budget deficit, especially if the debt service consumes a significant portion of the budget and leaves less room for other essential expenditures. In this context, the government may need to increase the deficit and debt to finance essential expenditures, leading to a vicious circle of indebtedness and deficits.

3.2. *The role of democracy*

Table 4 provides the results on the role of democracy in fiscal rules' effectiveness on fiscal discipline. More specifically, it presents the results of the estimation of the joint effect of democracy and our different fiscal rule indices. These results show that interaction between the FRSI, as well as different fiscal rule indices and democracy is negative and significant at 5 %, suggesting that the effectiveness of rigorous fiscal rules decreases with the level of democracy. As far as the parameter of this interaction term cannot be interpreted as the average (unconditional) effect on the primary budget balance as in linear-additive models, it becomes necessary to rely on the marginal effect of fiscal rules for all possible values of the democracy index.

This marginal effect is depicted in Fig. 2. The graph shows that fiscal rules' marginal effect on the public budget balance decreases with democracy as highlighted by estimates. Interestingly, fiscal rules do not limit the government deficit bias for all possible levels of democracy as in some cases the marginal effect of rules is negative and significant. Indeed, the graph suggests that the disciplining effect of fiscal rules is conditional on a maximum level of democracy. Fiscal rules limit the bias of the public deficit when the level of democracy is within a certain threshold (about 0.81), regardless of the strength of the rules. This means that strong fiscal rules have a disciplining effect only in the weakest democracies, while they do not in the strongest democracies.

To put this result in perspective, let us consider four countries: Cameroon, Norway, Germany, and the United States. These countries respectively have an FRSI of around 0.318, 0.235, 0.608 and 0.318 in 2014. According to our results, a marginal increase in fiscal rules strength will reduce the Government deficit bias in Cameroon whereas they will not in Norway, even though the latter uses more rigorous rules because Cameroon (with a normalised democracy score of 0.21) is less democratic than Norway (with a normalised democracy score of 1). In the same vein, the United States and Germany will have the same gains in fiscal discipline if they increase the strength of fiscal rules at the margin even if they enforce less stringent rules than Germany at present because they have the same level of democracy (the democracy level of these two countries is established at 1 when considering our polity2 normalised index).

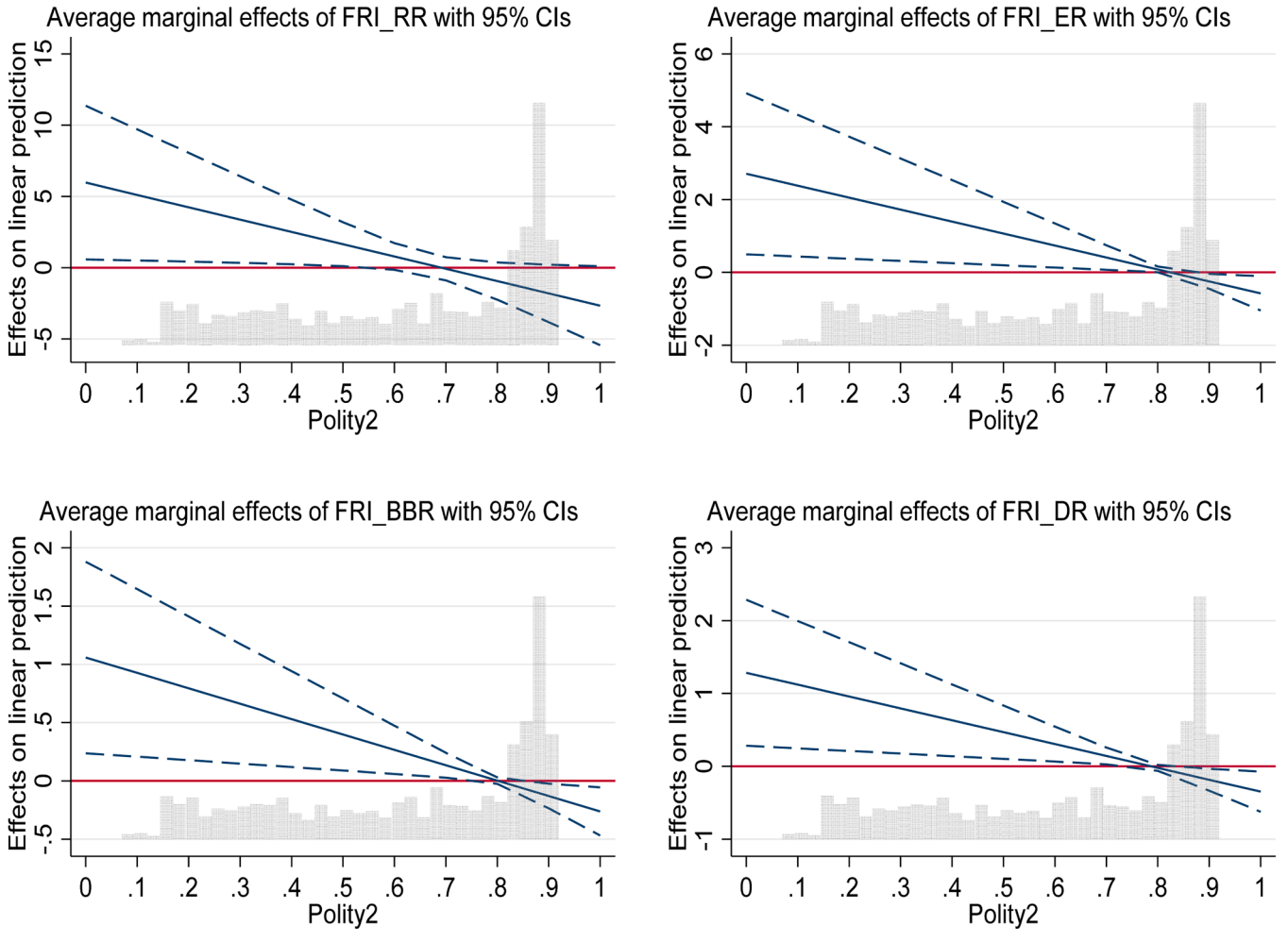

Fig. 3. Marginal effects of fiscal rules conditional on democracy.

Notes. The marginal effects of the fiscal rules' strength index on the primary budget balance conditional on democracy are calculated with a 95 % confidence interval. The graphs are based on the estimates shown in columns (2), (3), (4) and (5) of Table 4.

Table 5
The effect of fiscal rules and democracy on the public budget balance – the non-EU sample, Instrumental variables (2SLS).

	FRSI (1)	RR (2)	ER (3)	BBR (4)	DR (5)
FRSI	1.997***	6.186**	3.792**	1.349***	1.697***
	(0.760)	(2.711)	(1.566)	(0.504)	(0.637)
FRSI * Democracy	−2.891***	−9.685**	−5.388**	−2.016***	−2.603***
	(1.065)	(4.078)	(2.171)	(0.727)	(0.945)
Democracy	0.299***	0.253**	0.207***	0.366***	0.335***
	(0.110)	(0.100)	(0.078)	(0.133)	(0.123)
Constant	−0.205***	−0.072***	−0.124***	−0.240***	−0.208***
	(0.061)	(0.027)	(0.037)	(0.073)	(0.065)
Observations	1689	1689	1689	1689	1689
Countries	60	60	60	60	60
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Cragg-Donald	0.000	0.000	0.000	0.000	0.000
Kleibergen and Paap's test	93.313	17.161	31.125	37.703	23.963
Hausman endogeneity test	0.007	0.010	0.004	0.002	0.009

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence. RR=Revenue rule, ER= Expenditures rule, BBR= Balance budget rule, DR= Debt rule. The first stage regression results are presented on appendix E.

Regarding the estimates with the four specific rule indices, we reach similar findings as the parameter associated with the interaction term is negative and significant at 5 % for all the regressions. Moreover, the marginal effects of all the fiscal rules depicted in Fig. 3 are decreasing with democracy, suggesting the different rules are substitutes for democracy. Nevertheless, the level of democracy at which fiscal rules become ineffective for discipline depends on the type of the rule. For instance, this threshold is around 0.67 for the revenue rule and 0.8 for the expenditure, budget balance and debt rules.

Overall, the results we have reached so far indicate that fiscal rules contribute to the reduction of the deficit but for weakly democratic countries. And given that in all estimates parameters of democracy as well as the one FRSI are positive, these results also indicate that fiscal rules are substitutes for democracy in achieving the fiscal discipline objective. This result is consistent with the view that under democracy decision-makers tend to employ creative accounting as 'stock-flow adjustments' (Hirota and Yunoue, 2022; Milesi-Ferretti, 2003; von Hagen and Wolff, 2006), resulting from financial assets or liabilities transactions, valuation effects resulting from the exchange rate, and volume effects including both changes in public sector classifications and other volume changes in financial liabilities (Reischmann, 2016). Furthermore, Hirota and Yunoue (2022) reveal that creative accounting practices can occur through positive stock-flow adjustments or negative stock-flow adjustments. Positive stock-flow adjustments result from government purchases of financial assets, transfers of funds or subsidies to government enterprises and are treated as unreported in the deficit. In addition to these practices, governments may transfer public spending off-budget to public enterprises excluded from the target accounts. On the other hand, negative adjustments to stock flows occur when governments sell their assets, including through the privatisation of public enterprises. These creative accounting practices are notably the case when voters value high-spending governments and can exercise their sanctioning power when decision-makers in office fail to deliver on their electoral promises, and if decision-makers are less concerned about fiscal discipline and less committed to complying with fiscal rules (Wyplosz, 2012; 2005).

In autocracies, fiscal rules typically serve to constrain excessive spending and indebtedness by imposing limits on budget aggregates, such as the budget deficit or public debt (Asatryan et al., 2018; Thornton and Vasilakis, 2018). Furthermore, these rules can enhance the credibility of governments in the view of international investors and financial markets, insofar as they convey signals of fiscal prudence and constraint. Indeed, the adoption of fiscal rules by autocracies demonstrates a commitment to maintaining sound public finances, which can reduce the perceptions of risk associated with their governance and compensate for the institutional weaknesses often associated with this regime.[8] In this way, fiscal rules improve fiscal discipline in autocracies as they act as a substitute for political certainty and legislative constraints on the executive and help autocracies to counteract their "democratic disadvantage" (Ballard-Rosa et al., 2021). Moreover, as suggested by Aaskoven (2022), the implementation of fiscal rules tends to enhance transparency and predictability about economic policies in autocracies. This can facilitate a more accurate anticipation of future government actions, thereby reducing uncertainty and the cost of credit (Ballard-Rosa et al., 2021). Meanwhile, the threat of bond market sanctions when fiscal rules are violated may be sufficient to maintain government compliance and the confidence of bond market participants in autocracies, even in the absence of formal sanctions, as fiscal rules serve as focal points for the coordination of bond market participants (Kelemen and Teo, 2014). Consequently, the implementation of fiscal rules in autocracies can facilitate enhanced fiscal and financial transparency, which is a significant determinant of sovereign creditworthiness (Copelovitch et al., 2018) and a pivotal mechanism for democratic advantage (Ballard-Rosa et al., 2021).

[8] It can be reasonably argued that, in the context of these rules, those responsible for formulating policy are less likely to face formal pressure from legislative actors, such as the opposition and supporting parties, to limit the budgetary discretion of the executive through the implementation of budgetary rules. Consequently, there is arguably less incentive for such actors to 'tie the hands' of their successors on the fiscal front.

Table 6
Sensitivity analysis to the adding of new control variables, Instrumental variables (2SLS).

	FRSI (1)	RR (2)	ER (3)	BBR (4)	DR (5)
FRSI	1.547**	3.972**	3.380**	0.951**	1.073**
	(0.605)	(1.844)	(1.395)	(0.370)	(0.419)
FRSI * Democracy	−1.906**	−5.270*	−4.086**	−1.171**	−1.348**
	(0.748)	(2.741)	(1.687)	(0.457)	(0.529)
Democracy	0.197**	0.104*	0.217**	0.213**	0.196**
	(0.078)	(0.062)	(0.087)	(0.084)	(0.078)
Herfindahl Index of Government Parties	−0.037***	−0.007	−0.065***	−0.036***	−0.030***
	(0.013)	(0.014)	(0.024)	(0.013)	(0.011)
Parliamentary system	0.020***	0.037***	0.021***	0.013***	0.012***
	(0.006)	(0.013)	(0.008)	(0.004)	(0.004)
Left-wing government	0.011*	0.000	0.010	0.011*	0.011*
	(0.006)	(0.010)	(0.008)	(0.006)	(0.006)
Age dependency ratio	−0.001**	−0.002*	0.001**	−0.001**	−0.001**
	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
Constant	−0.135***	0.044	−0.247***	−0.108***	−0.088***
	(0.037)	(0.062)	(0.080)	(0.030)	(0.026)
Observations	2254	2254	2254	2254	2254
Countries	97	97	97	97	97
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes
Previous controls	Yes	Yes	Yes	Yes	Yes
Cragg-Donald	0.000	0.005	0.000	0.000	0.000
Kleibergen and Paap's test	165.808***	3.945***	28.388***	206.461***	158.887***
Hausman endogeneity test	0.014	0.031	0.016	0.033	0.053

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence. RR=Revenue rule, ER= Expenditures rule, BBR= Balance budget rule, DR= Debt rule. The first stage regression results are presented on appendix F.

4. Further analyses

4.1. Exclusion of European Union countries

The first step in robustness analysis consists of checking the results' sensitivity to the exclusion of EU countries given that they have adopted on average more stringent fiscal rules than non-EU countries. To investigate whether our results are driven by EU countries, we estimate Eq. (2) for the non-EU countries in our sample. The related estimates presented in Table 5 suggest that our results are not driven by EU countries because in the sample of non-EU countries democracy also limits the fiscal discipline effects of fiscal rules.

4.2. Adding control variables

The first step in robustness analysis consists of checking the results' sensitivity to the addition of new control variables. In this regard, it should be noted that the previous conclusion may have been influenced by the omission of important determinants of fiscal discipline. To this end, it should be pointed out that early theories of fiscal deficits highlight the role of opportunistic motivation and partisan preference for incumbents trying to improve their chances to be re-elected (Buchanan, 1976; Nordhaus, 1975) or to tie the hands of successors with different fiscal preferences (Alesina and Tabellini, 1990; Alt and Lassen, 2006). Another explanation of the fiscal deficit is given by the war of attrition theory which links the expenditures bias of fiscal authorities to distributional conflicts and electoral systems (Alesina et al., 1999; Bucovetsky et al., 2002; Persson and Tabellini, 2001). More precisely, they argue that heterogeneous preferences across groups of voters lead to distributional conflicts that generate large coalitions and more fragmented governments disposed to increase deficit-financed expenditures, and delays to undertake adjustment. The partisans of this theory also defend the thesis that proportional representation systems and parliamentary systems are related to more fragmentation and greater government spending (Persson and Tabellini, 2001; 2003). To consider these explanations, we estimate a new fiscal policy reaction which dummies variables for parliamentary systems and left-wing governments, as well as a proxy of government fragmentation. The dummies concerning parliamentary systems and left-wing governments are constructed using the political system variable and the Chief Executive Party Orientation of the 2020 Database of Political Institutions (DPI). We also retrieved the Herfindahl Index of Government Parties as a measure of government fragmentation from this database.

The results that are reported in Table 6 confirm our conclusions. Concerning the new covariates, most of the results are in line with expectations. First, countries that have more fragmented governments run on average higher deficits as suggested by Persson and Tabellini (2001, 2003). One reason for this finding is that greater fragmentation leads to more distribution conflicts and greater public deficits. In a political system with multiple actors, decision-makers may not fully consider the costs of spending, leading to increased expenditure without sufficient thought on its impact on the public deficit (Woo, 2003). The more participants involved in the decision-making process, the greater the issues arising from fragmentation (Crivelli et al., 2016). Additionally, high political fragmentation can impede efforts to reduce debt or deficits, resulting in continuous or growing deficits. Moreover, public budget deficits

Table 7
Sensitivity analysis to the adding of new control variables, Instrumental variables (2SLS).

	ER_DR (1)	ER_BBR (2)	BBR_DR (3)	ER_BBR_DR (4)	RR_BBR_DR (5)	RR_ER_BBR_DR (6)
FRSI	8.467	4.177**	0.944**	1.393**	9.009*	2.467*
	(6.089)	(2.055)	(0.390)	(0.592)	(5.126)	(1.466)
FRSI *Democracy	−10.685	−5.958**	−1.011**	−1.696**	−14.755*	−2.739*
	(8.599)	(2.947)	(0.434)	(0.719)	(8.364)	(1.645)
Democracy	0.165***	0.195**	0.274**	0.199**	0.567*	0.124**
	(0.064)	(0.077)	(0.109)	(0.078)	(0.300)	(0.050)
Constant	−0.201***	−0.156***	−0.289***	−0.179***	−0.365**	−0.043**
	(0.059)	(0.050)	(0.093)	(0.054)	(0.162)	(0.017)
Observations	2320	2320	2320	2320	2320	2320
Countries	97	97	97	97	97	97
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Cragg-Donald	0.004	0.000	0.000^{2}	0.000	0.010	0.023
Kleibergen and Paap's test	4.219***	8.266***	9.791***	21.227***	3.296***	2.602***
Hausman endogeneity test	0.045	0.050	0.060	0.009	0.046	0.043

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence. RR=Revenue rule, ER= Expenditures rule, BBR= Balance budget rule, DR= Debt rule. The first stage regression results are presented on appendix G.

tend to deteriorate when the dependency ratio grows as highlighted by Foremny (2014). As an explanation, the rising costs of healthcare and pensions for older people put pressure on government budgets, leading to increased social spending and a higher public deficit in countries with ageing populations (Kamiguchi and Tamai, 2019). Furthermore, as the number of retirees rises in comparison to the working-age population, tax revenues tend to decline (Chen, 2004).

Conversely, the leftist government tends to run surpluses as reported by Franzese (2000). Left-wing governments generally implement progressive tax policies that target the wealthy and businesses, resulting in increased government revenue (Gomez-Gonzalez et al., 2022). This can be achieved by raising tax rates on higher income brackets and reducing tax avoidance. Additionally, leftist governments tend to focus on reducing income inequality and promoting economic equality as a means of enhancing the budget balance (Pressman, 2022). Therefore, by implementing policies that lift people out of poverty, improve access to education and healthcare, and create a fairer society they can stimulate economic growth and generate higher tax revenues. These initiatives not only address social inequalities but also contribute to improving the budget balance. Interestingly, parliamentary systems tend to run public budget surpluses. In fact, parliamentary systems have a strong connection between the government and parliament, which allows for better implementation of fiscal policy (Baldini, 2000; Lienert, 2013; Tezcan, 2020). In addition, parliaments play a critical role in the budget process, enhancing fiscal discipline and transparency (Tezcan, 2020). Moreover, parliamentary oversight ensures the effective allocation of resources.

4.3. Dealing with the combinations of fiscal rules

The estimates insofar as well show how the interaction of each fiscal rule with democracy affects primary budget deficits. But it should be recalled that many countries use at least two fiscal rules. Moreover, the combinations adopted differ from one economy to another. From this perspective, it is thus crucial to assess the effects of some combinations of fiscal rules that are generally adopted, since Bergman et al. (2016) show that the effects of fiscal rule combinations can be different. To examine this issue, we construct different FRSI variables to capture the strength of some combinations of fiscal rules in place for a given country at a precise point in time. These variables are non-overlapping meaning that if a country has two fiscal rules in place at a precise point in time, then the variable for one, three and four rules is equal to zero. Precisely, we compute the sum of the FRSI of the fiscal rules only adopted at each point in time for each country. After computing the FRSI of fiscal rules' combinations, we normalise it in the interval [0–1] to allow us to make a comparison between the different combinations. The focus is on the combinations of expenditures-debt rules (ER_BR), expenditures-Balance budget rules (ER_BBR), budget balance-debt rules (BBR_DR), expenditures-balance budget-debt rules (ER_BBR_DR), revenue-balance budget-debt rules (RR_BBR_DR) and revenue-expenditures-balance budget-debt rules (RR_ER_BBR_DR).

The results from this assessment are shown in Table 7 and Fig. 4. These results indicate that the combination of an expenditure rule and a debt rule (ER_DR) does not affect the primary budget balance for all levels of democracy in the sample. By contrast, the ER_BBR, ER_BBR_DR, and RR_BBR_DR combinations limit the bias of the public deficit until a certain threshold of democracy, regardless of the strength of the rules adopted. After this threshold, these combinations accentuate primary budget deficits, suggesting that in highly democratic countries, fiscal rules are not effective in reducing the primary budget deficit, while in low democratic countries, they are. Concerning BBR_DR and RR_ER_BBR_DR combinations, although their effects are decreasing, in highly democratic countries, they do not affect the primary budget balances, as the marginal effect is not significant.

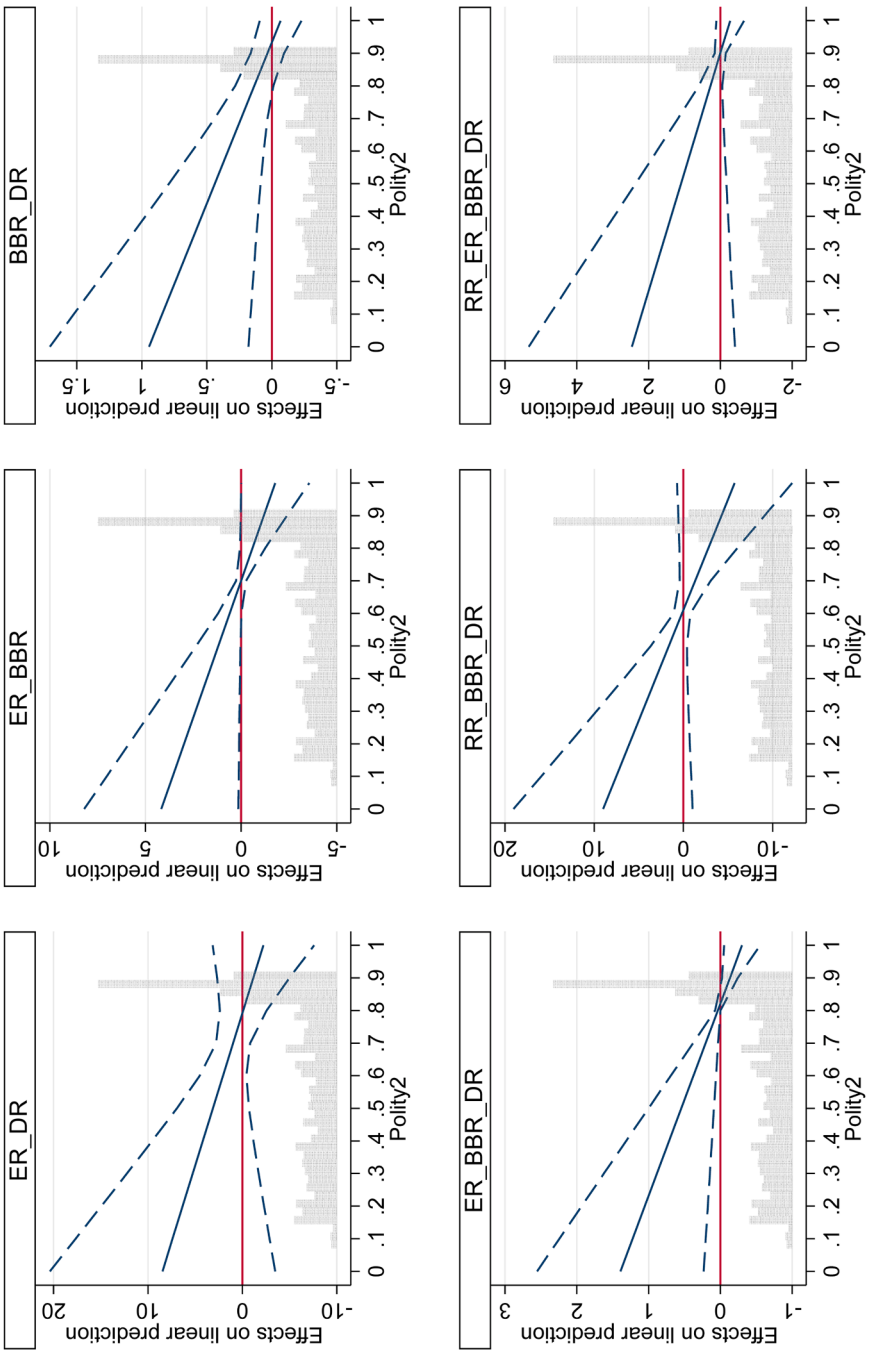

Fig. 4. Marginal effects of fiscal rules' combinations conditional on democracy.
Notes. The marginal effects of the fiscal rules' strength index on the primary budget balance conditional on democracy are calculated with a 95 % confidence interval. The graphs are based on the estimates shown in columns (1), (2), (3), (4), (5) and (6) of Table 7.

Table 8
The effect of fiscal rules and political regimes on the public budget balance, Instrumental variables (2SLS).

	AUTHOR (1)	AUTOCR (2)	HYBRID (3)	FULL (4)
FRSI	−0.005	0.178***	0.098**	1.252**
	(0.016)	(0.060)	(0.045)	(0.498)
Authoritarian	−0.268***			
	(0.101)			
Autocracy		−0.488**		
		(0.218)		
Hybrid regime			0.200	
			(0.227)	
Full democracy				−1.670**
				(0.676)
Authoritarian * FRSI	3.136**			
	(1.304)			
Autocracy * FRSI		0.080***		
		(0.026)		
Hybrid regime * FRSI			−0.041	
			(0.031)	
Full democracy *FRSI				0.250**
				(0.097)
Constant	0.011	−0.069***	−0.046***	−0.180***
	(0.033)	(0.014)	(0.014)	(0.054)
Average marginal effect	3.131***	−0.310	0.299	−0.418**
	(1.301)	(0.199)	(0.220)	(0.184)
Observations	2320	2320	2320	2320
Countries	97	97	97	97
Controls	Yes	Yes	Yes	Yes
Cragg-Donald	0.000	0.000	0.000	0.000
Kleibergen and Paap's test	19.836***	45.168***	42.288***	10.633***
Hausman endogeneity test	0.008	0.030	0.011	0.001

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence.

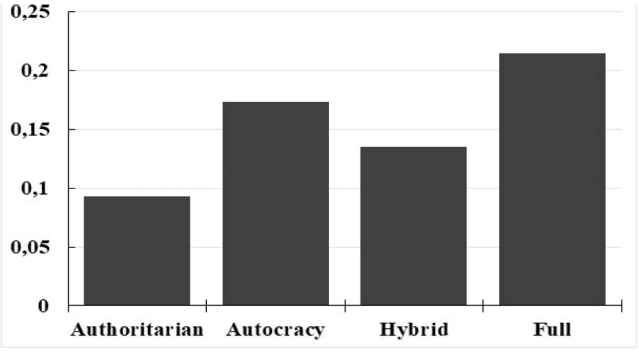

Fig. 5. Average Fiscal rules strength (index) by political regimes.
Note. The number on this figure represents the average fiscal rules strength index by political regimes.

4.4. Dealing with an alternative measure of democracy

In the second step, we performed a sensitivity analysis by using an alternative measure of democracy based on political regimes. To do that, we classify countries under relatively homogenous groups from full democratic regimes [FULL] (scaled +6 to +10) to authoritarian ones [AUTHOR] (scaled −10 to −6), with an intermediate group called 'anocracies' which includes hybrid democracies [HYBRID] (scaled 1 to 5), and relatively autocratic regimes [AUTOCR] (scaled −5 to 0) and we construct the dummies distinguishing these regimes. Then, we estimate Eq. (2) using the different dummies and rely on the marginal effect of the FRSI. The results presented in Table 8 indicate that in authoritarian regimes and hybrid democracies, fiscal rules contribute to reducing public budget deficits, while in autocratic regimes and full democracies, they accentuate it. From these new findings, we note that improving democracy does not always lead to a decrease in the effectiveness of fiscal rules in fiscal discipline. Notably, when moving from an autocratic regime to a hybrid democracy, the disciplining effect of fiscal rules gets improved [see Fig. 5]. However, it should be noted that in the sample, hybrid democracies have on average adopted stricter rules than autocracies.

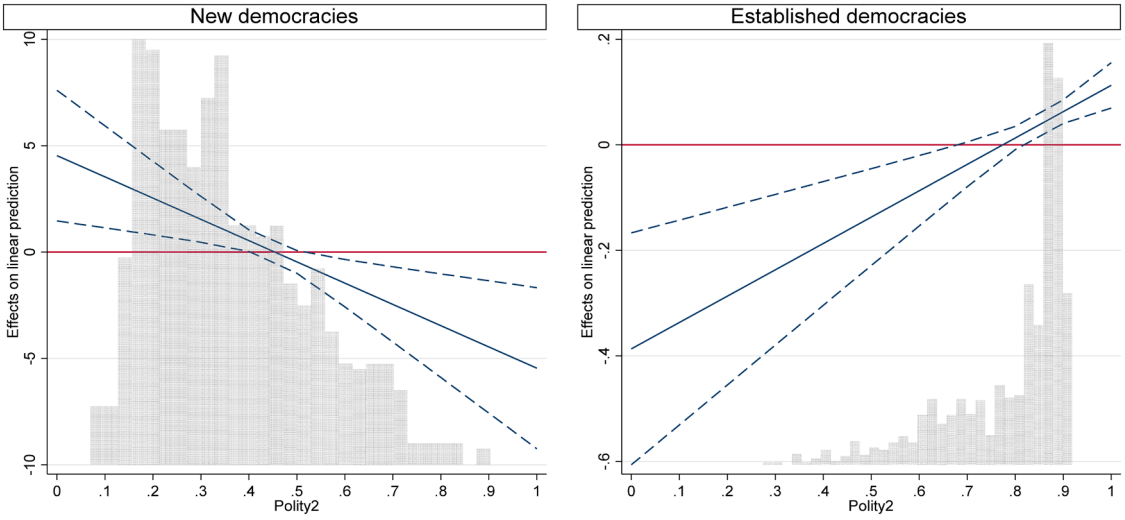

Fig. 6. Marginal effects of fiscal rules conditional on democracy under the age of democracy.
Notes. The marginal effects of the fiscal rules' strength index on the primary budget balance conditional on democracy are calculated with a 95 % confidence interval. The graphs are based on the estimates shown in columns (3) and (4) of Table J in the appendix.

4.5. Dealing with dynamic specification and alternative estimation methods

Until now, all regressions were done without considering the dynamic specification of the fiscal policy reaction function. Yet, fiscal aggregates used by policymakers to implement an announced fiscal policy are only partially under control and subject to significant inertia (Ilzetzki and Vegh, 2008), especially as the current budget largely determines the next period one's (Alesina et al., 1999). To reflect the influence of the initial fiscal conditions on the budget decisions for a given period, and particularly the inertia in the evolution of the fiscal variables due to the delays, we amend Eq. (2) by including the lagged public budget balance. Hence, we obtain the following Eq. (5).

$$PBB_{i,t} = \alpha_0 + \alpha_1 X_{i,t} + \alpha_2 demo_{i,t} + \alpha_3 FRSI_{i,t} + \alpha_4 demo * FRSI + \alpha_5 PBB_{i,t-1} + \varepsilon_{i,t} \quad (6)$$

Given that the new model is dynamic, we rely on two estimators that deal with endogeneity issues resulting from this specification. The first one is the system generalised method of moments estimator (SYS-GMM) developed by Blundell and Bond (1998) which allows the correction of the endogeneity bias through double instrumentation. The first one consists of instrumenting the first difference of the equation to be estimated (which eliminates the unobservable, individual, and time-invariant characteristics) by at least one period-lagged variable (in level). The second instrumentation uses lagged variables (in differences) by one period (or more) to instrument variables in level. However, given that an important limitation of this estimator is the instrument proliferation[9] which induces an overfitting of endogenous variables, discrepancies in estimates and the weakening of Sargan or Hansen tests (Bergman and Hutchison, 2015; Bergman et al., 2016; Roodman, 2009) rely on the approach developed by Roodman (2009) to deal with this issue. That consists of limiting the number of certain lags and collapsing the instruments by having separate moments for each lag (instead of a moment for each lag and period). Table H in the appendix reports the system GMM estimates of the Eq. (5). Before analysing the results, an important step is the validation of the instrumentation method. This is jointly carried out by the autocorrelation tests of Arellano and Bond (1991) and the Hansen J-test. Statistics obtained from the estimation show that these three tests are conclusive. They indicate that the instruments selected for the different estimates are valid. In addition, the Wald test established that the estimated models are globally significant at 1 % level. Consistent with our previous results, the coefficient associated with the interaction term between our fiscal rules strength index and democracy is negative and significant at 1 %. Similarly, the coefficient of interaction term is also negative and significant at least at 10 % when considering each type of fiscal rules strength index. Moreover, in all regressions FRSI and democracy are positive and significant, corroborating the fact that fiscal rules are substitute for democracy.

The second estimator used is the new sequential dynamic panel estimator (SLPD) of Kripfganz and Schwarz (2019) which allows both to correct for endogeneity problems and to deal with the invariant character of the explanatory variables. Even though the SYS-GMM address the problem of endogeneity in our model, it is inconsistent when an econometric model includes time-invariant variables. When using SYS-GMM, the estimators of all coefficients including those of time-varying regressors might be biased and inconsistent if strong orthogonality assumptions imposed to find valid instruments can't hold (Kripfganz and Schwarz, 2019). Thus, as some variables (democracy and the fiscal rules index when considering the type of rule) are weakly time-variant in our sample, it may be possible that our conclusion is inconsistent. To circumvent these drawbacks and identify the coefficients of invariant regressors,

[9] In GMM-SYS estimates, the number of instruments increases quadratically with the duration of the study as argued by Roodman (2009).

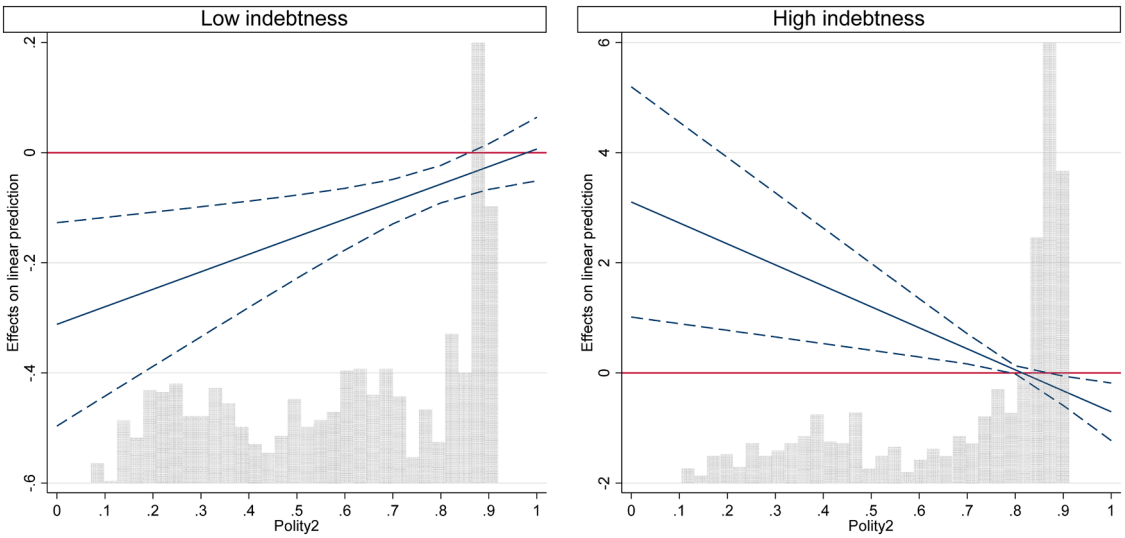

Fig. 7. Marginal effects of fiscal rules conditional on democracy under the indebtedness level.
Notes. The marginal effects of the fiscal rules' strength index on the primary budget balance conditional on democracy are calculated with a 95 % confidence interval. The graphs are based on the estimates shown in columns (1) and (2) of Table J in the appendix.

Kripfganz and Schwarz (2019) developed a sequential estimation strategy. First, they estimate the coefficients of time-varying variables. Then, they regress the residuals from this first estimation on the invariant regressors. Finally, using instrumental variables in the spirit of Hausman and Taylor (1981), they proceed to identify and adjust the standard errors of the second stage to account for the first-stage estimation error. The related results are drawn in Table I. In terms of the focus variables, the results of the estimates indicate that the parameters of the fiscal rules strength index and democracy are positive and significant in most cases and the interaction term is negative and meaningful at least at the 5 % level as expected. These results support our early evidence that fiscal rules strength and democracy are substitutes.

4.6. *Additional findings*

In addition to the previous robustness check, we check if the role of democracy on the disciplining effect of fiscal rules depends on the age of democracy, as Brender and Drazen (2005) show that in established democracies voters have a relatively long experience in analysing the fiscal policies pursued by politicians. Hence, they are more observant about the handling of public finances and can ensure better control and guarantee the disciplining effect of fiscal rules.[10]

To distinguish between new democracies from established democracies, we follow Veiga et al. (2017) approach. Precisely, we consider as established democracy a country that has had four competitive elections and at least ten consecutive democratic years. Therefore, we construct a dummy that is one when a country has had four competitive elections and at least ten consecutive democratic years using the classification and the assessment of democracy by Boix et al. (2013). Based on this dummy, we run regressions on new and established democracies. The related results are presented in Table J (columns (1) and (2)) of the appendix. We also depict the marginal effect in Fig. 6. Concerning the results in new democracies, this figure shows that the effect of fiscal rules diminishes as the level of democracy increases. Interestingly, the graph suggests that the disciplining effect of fiscal rules is conditional on a maximum level of democracy (about 0.45) in new democracies. After this threshold, the fiscal rules emphasise the budget deficit. This suggests that in new democracies, fiscal rules and democracy are substitutes. Regarding the results in established democracies, Fig. 6 indicates that the disciplining effect of fiscal rules increases as the level of democracy rises. Moreover, the graph suggests that the disciplining effect of fiscal rules is conditional on a minimum level of democracy (around 0.80), suggesting that in established democracies, fiscal rules and democracy are complementary.

Finally, the level of public debt is considered as it can affect the government's ability to downgrade public finances, even in the presence of rules, and therefore the soundness of public finances. In the context of low debt, public authorities may be tempted to use creative accounting practices for electoral gain and convince voters that worsening public finances is necessary to maximise social welfare, even if it violates fiscal rules. To do it, countries are differentiated into those with low and high public debt. Precisely, we create a dummy based on the median of the debt variable following Gootjes et al. (2021). Based on this dummy, we re-estimate Eq. (4) in each sample. The related results are presented in Table J of the appendix (columns (3) and (4)) and in Fig. 7. Concerning the results under low indebtedness, Fig. 7 shows that the marginal effect of fiscal rules on public budget deficits increases with democracy.

[10] In this regard, it should be noted that the democratic experience of voters in strong democracies allows them not to be victims of fiscal illusion (Brender and Drazen, 2005).

Interestingly, these results also show that until a democracy threshold of around 0.98, fiscal rules exacerbate the primary budget deficit while above this threshold, fiscal rules do not significantly reduce the primary budget deficit. Conversely, in a high indebtedness environment, the disciplining effect of fiscal rules diminishes with democracy. Intriguingly, fiscal rules have a disciplining effect only when the polity 2 index is lower than 0.79 while above this threshold, they increase primary budget deficits. This suggests that fiscal rules and democracy are substitutes in a high-indebtedness environment and complement in the context of a low-indebtedness environment.

5. Conclusion and policy recommendations

This study set out to analyse the extent to which democracy shapes the relationship between fiscal rules and fiscal deficit. The study is based on a sample of 97 countries that have adopted fiscal rules from 1985 to 2021. To attain this objective, we successively estimated two functions of fiscal policy reaction using the instrumental variable method. At the end of the analyses, we reach two main findings. First, we find that strong fiscal rules reduce primary deficits, thus confirming their disciplining effect as highlighted by previous studies. Secondly, the disciplining effect of fiscal rules decreases with democracy. In other words, democracy and strong fiscal rules are substituted in achieving the government discipline objective. These results are robust to alternative methods dealing with endogeneity or time-invariant variables and to the inclusion of other determinants of public budget balance as explanatory variables. As an explanation, we underline that in countries using fiscal rules, decision-makers tend to employ creative accounting as 'stock-flow adjustments', resulting from financial assets or liabilities transactions, valuation effects resulting from the exchange rate, and volume effects including both changes in public sector classifications and other volume changes in financial liabilities. This is notably the case in democracies when voters value high-spending governments and can exercise their sanctioning power when decision-makers in office fail to deliver on their electoral promises, and if decision-makers are less concerned about fiscal discipline and less committed to complying with fiscal rules. Fiscal rules help autocratic countries compensate for their democratic disadvantage by signalling prudence, fiscal transparency, and credibility to capital markets. This leads to increased discipline as their access to the capital market is conditional upon fiscal discipline. Overall, these results suggest the adoption of stringent fiscal rules in autocracies.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

CRediT authorship contribution statement

Bernard Clery Nomo Beyala: Writing – review & editing. **Jean Pierre Fouda Owoundi:** Validation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Tables A–K

Table A
Countries list.

Industrialized countries	Developing countries	
Australia	Argentina	Latvia
Austria	Armenia	Liberia
Belgium	Azerbaijan	Lithuania
Canada	Benin	Malaysia
Cyprus	Botswana	Maldives
Czech Republic	Brazil	Mali
Denmark	Bulgaria	Malta
Estonia	Burkina Faso	Mauritius
Finland	Burundi	Mexico
France	Cabo Verde	Mongolia
Germany	Cambodia	Montenegro, Rep. of

(*continued on next page*)

Table A (*continued*)

Industrialized countries	Developing countries	
Greece	Cameroon	Namibia
Hong Kong SAR	Central African Republic	Niger
Iceland	Chad	Nigeria
Ireland	Chile	Pakistan
Israel	Colombia	Panama
Italy	Congo, Republic of	Paraguay
Japan	Costa Rica	Peru
Luxembourg	Croatia	Poland
Netherlands	Côte d'Ivoire	Romania
New Zealand	Ecuador	Russia
Norway	Equatorial Guinea	Rwanda
Portugal	Gabon	Senegal
Singapore	Georgia	Serbia
Slovak Republic	Guinea Bissau	Sri Lanka
Slovenia	Hungary	Tanzania
Spain	India	Thailand
Sweden	Indonesia	Timor-Leste
Switzerland	Iran	Togo
United Kingdom	Jamaica	Turkmenistan
United States	Kazakhstan	Uganda
	Kenya	Uruguay
	Kosovo	Vietnam

Sources: Fiscal rules Dataset 2021.

Table B
Baseline results, OLS results.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FRSI	0.037***					0.322**				
	(0.009)					(0.141)				
Revenue rule index		0.019**					0.135*			
		(0.009)					(0.078)			
Expenditure rule index			0.022***					0.088***		
			(0.005)					(0.024)		
Balanced budget rule index				0.033***					0.268***	
				(0.007)					(0.084)	
Debt rule index					0.021***					0.215**
					(0.007)					(0.087)
FRSI * Democracy						−0.372**				
						(0.176)				
Revenue rule index * Democracy							−0.248**			
							(0.115)			
Expenditure rule index * Democracy								−0.082***		
								(0.036)		
Balanced budget rule index * Democracy									−0.308***	
									(0.104)	
Debt rule index * Democracy										−0.266**
										(0.112)
Democracy	0.072**	0.079**	0.075**	0.068**	0.076**	0.104**	0.084**	0.077**	0.119**	0.110**
	(0.031)	(0.032)	(0.032)	(0.030)	(0.031)	(0.045)	(0.034)	(0.033)	(0.047)	(0.045)
Lagged debt	−0.073***	−0.073***	−0.073***	−0.073***	−0.072***	−0.071***	−0.073***	−0.073***	−0.072***	−0.072***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.025)	(0.026)	(0.026)	(0.026)	(0.026)
GDP growth	−0.069	−0.079	−0.075	−0.065	−0.072	−0.049	−0.077	−0.075	−0.028	−0.048
	(0.230)	(0.230)	(0.230)	(0.230)	(0.230)	(0.224)	(0.230)	(0.231)	(0.222)	(0.224)
GDP per capita (in log)	0.004***	0.004***	0.004***	0.004***	0.004***	0.003***	0.003***	0.004***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	−0.090***	−0.086***	−0.087***	−0.091***	−0.091***	−0.106***	−0.085***	−0.088***	−0.116***	−0.104***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)	(0.025)	(0.019)	(0.019)	(0.026)	(0.024)
Observations	2362	2362	2362	2362	2362	2362	2362	2362	2362	2362
Countries	97	97	97	97	97	97	97	97	97	97
Country fixed effect	Yes	Yes	Yes	Yes	Yes					
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R squared	0.38	0.37	0.38	0.39	0.38	0.41	0.38	0.38	0.46	0.41
Fisher test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence.

Table C
First stage regression of Table 3.

	(1) Overall	(2) RR	(3) ER	(4) BBR	(5) DR
Instrument	1.074***	0.115***	1.167***	1.460***	1.160***
	(0.038)	(0.023)	(0.055)	(0.055)	(0.057)
Democracy	0.223***	−0.024***	0.236***	0.379***	0.198***
	(0.010)	(0.007)	(0.014)	(0.019)	(0.016)
Lagged debt	0.010	−0.007*	0.035***	0.024***	0.001
	(0.006)	(0.004)	(0.008)	(0.013)	(0.009)
GDP growth	0.034	−0.061**	0.171***	0.005	0.029
	(0.041)	(0.028)	(0.053)	(0.079)	(0.062)
GDP per capita (in log)	0.005***	0.003***	−0.010***	−0.014***	−0.014***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Constant	−0.009	−0.002	−0.116	−0.025	0.079***
	(0.008)	(0.011)	(0.023)	(0.034)	(0.028)
Observations	2320	2320	2320	2320	2320
Countries	97	97	97	97	97
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes
Fischer	0.000	0.000	0.000	0.000	0.000

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence.

Table D
First stage regression of Table 4.

	(1) Overall	(2) RR	(3) ER	(4) BBR	(5) DR
	Dependent variable: **FRSI**				
Instrument	0.188***	0.258***	−0.444***	0.484***	0.582***
	(0.077)	(0.073)	(0.055)	(0.124)	(0.120)
Instrument * Democracy	1.323***	−0.214**	−0.079***	1.457***	0.862***
	(0.132)	(0.093)	(0.093)	(0.216)	(0.190)
Democracy	0.050***	0.004	2.405	0.189***	0.085***
	(0.014)	(0.012)	(0.014)	(0.028)	(0.023)
Lagged debt	0.000	−0.005	0.016	0.014	−0.006
	(0.006)	(0.004)	(0.008)	(0.012)	(0.009)
GDP growth	−0.015	−0.053*	0.081	−0.050	−0.003
	(0.039)	(0.029)	(0.053)	(0.079)	(0.063)
GDP per capita (in log)	−0.009***	0.003***	−0.010	−0.014***	−0.014***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Constant	−0.092	−0.022	0.109	0.112***	0.160***
	(0.019)	(0.015)	(0.023)	(0.036)	(0.030)
	Dependent variable: **FRSI * Democracy**				
Instrument	−0.341***	0.064***	−0.669***	−0.364***	−0.150**
	(0.093)	(0.030)	(0.105)	(0.083)	(0.069)
Instrument * Democracy	1.681***	−0.300***	2.365***	2.116***	1.445***
	(0.093)	(0.093)	(0.495)	(0.169)	(0.136)
Democracy	0.041	0.004	−0.091	0.186***	0.001
	(0.093)	(0.060)	(0.100)	(0.021)	(0.016)
Lagged debt	−0.001	−0.005**	0.014	0.009	−0.007
	(0.093)	(0.002)	(0.021)	(0.009)	(0.007)
GDP growth	−0.004	−0.031**	0.039	0.007	0.034
	(0.093)	(0.015)	(0.217)	(−0.013)	(0.044)
GDP per capita (in log)	−0.008	0.001	−0.009***	0.057	−0.013***
	(0.093)	(0.001)	(0.001)	(0.093)	(0.001)
Constant	0.089	−0.000	0.115	0.025	0.136***
	(0.093)	(0.007)	(0.073)	(−0.364)	(0.020)
Observations	2320	2320	2320	2320	2320
Countries	97	97	97	97	97
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Fixed effect	Yes	Yes	Yes	Yes	Yes
Fischer	0.000	0.000	0.000	0.000	0.000

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence.

Table E
. First stage regression of Table 5.

	(1) Overall	(2) RR	(3) ER	(4) BBR	(5) DR
	Dependent variable: **FRSI**				
Instrument	7.827***	−1.156***	4.458***	1.759***	5.160***
	(1.058)	(0.181)	(1.205)	(0.051)	(1.649)
Instrument * Democracy	−6.651***	1.135***	−3.509**	−1.630***	−5.230***
	(1.222)	(0.242)	(1.408)	(0.364)	(0.894)
Democracy	1.399***	0.102**	0.409*	2.808***	2.465***
	(0.261)	(0.040)	(0.232)	(0.509)	(0.396)
Lagged debt	−0.013	0.015*	0.025	0.037**	−0.029**
	(0.010)	(0.008)	(0.020)	(0.016)	(0.014)
GDP growth	−0.125	−0.093*	0.157	−0.071	−0.089
	(0.102)	(0.049)	(0.192)	(0.170)	(0.143)
GDP per capita (in log)	−0.002	0.003**	0.007	−0.005	−0.016***
	(0.003)	(0.001)	(0.005)	(0.006)	(0.005)
Constant	−1.155***	−0.098***	−0.621***	−2.213***	−1.823***
	(0.214)	(0.037)	(0.190)	(0.416)	(0.323)
	Dependent variable: **FRSI * Democracy**				
Instrument	−0.468***	0.115***	−0.580***	−0.417***	−0.216***
	(0.100)	(0.033)	(0.104)	(0.094)	(0.025)
Instrument * Democracy	1.348***	−0.298***	2.513***	2.184***	1.463***
	(0.091)	(0.080)	(0.471)	(0.182)	(0.110)
Democracy	0.041***	0.015	−0.100	0.118	0.060***
	(0.08)	(0.030)	(0.215)	(0.150)	(0.018)
Lagged debt	−0.001	−0.012***	0.020	0.008	−0.014
	(0.001)	(0.002)	(0.081)	(0.006)	(0.011)
GDP growth	−0.004**	−0.030**	0.412***	0.010	0.060***
	(0.002)	(0.025)	(0.041)	(−0.013)	(0.017)
GDP per capita (in log)	−0.008	0.004	−0.010***	0.080	−0.001
	(0.013)	(0.006)	(0.002)	(0.075)	(0.001)
Constant	0.089***	−0.080***	0.005	0.014	0.087***
	(0.005)	(0.007)	(0.060)	(−0.127)	(0.019)
Observations	1689	1689	1689	1689	1689
Countries	60	60	60	60	60
New controls	Yes	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes
Fischer	0.000	0.000	0.000	0.000	0.000

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence.

Table F
First stage regression of Table 6.

	(1) Overall	(2) RR	(3) ER	(4) BBR	(5) DR
	Dependent variable: **FRSI**				
Instrument	0.369***	0.717***	−0.551***	0.824***	1.042***
	(0.080)	(0.086)	(0.100)	(0.129)	(0.119)
Instrument * Democracy	1.147***	−0.814***	2.598***	1.099***	0.354*
	(0.134)	(0.109)	(0.182)	(0.222)	(0.193)
Democracy	0.043***	0.195***	−0.203***	0.205***	0.155***
	(0.017)	(0.016)	(0.021)	(0.031)	(0.027)
Lagged debt	−0.008	−0.007*	0.011	0.003	−0.023**
	(0.006)	(0.004)	(0.007)	(0.012)	(0.009)
GDP growth	0.024	0.036	0.057	0.025	0.093
	(0.037)	(0.029)	(0.052)	(0.076)	(0.060)
GDP per capita (in log)	−0.010***	0.003***	−0.011***	−0.015***	−0.015***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Constant	0.052**	−0.289***	0.275***	0.004	−0.045
	(0.022)	(0.022)	(0.028)	(0.039)	(0.038)
	Dependent variable: **FRSI * Democracy**				
Instrument	0.188**	0.717***	−0.357***	0.638***	0.742***
	(0.077)	(0.086)	(0.106)	(0.130)	(0.124)
Instrument * Democracy	1.323***	−0.814***	2.304***	1.248***	0.670***
	(0.132)	(0.109)	(0.184)	(0.222)	(0.195)
Democracy	0.050***	0.195***	−0.078***	0.193***	0.083***
	(0.014)	(0.016)	(0.017)	(0.028)	(0.023)
Lagged debt	0.000	−0.007*	0.015*	0.015	−0.010
	(0.006)	(0.004)	(0.008)	(0.013)	(0.009)

(*continued on next page*)

Table F (*continued*)

	(1) Overall	(2) RR	(3) ER	(4) BBR	(5) DR
GDP growth	−0.015	0.036	0.091*	−0.037	0.008
	(0.040)	(0.029)	(0.052)	(0.080)	(0.063)
GDP per capita (in log)	−0.009***	−0.038***	−0.044***	−0.104***	−0.063***
	(0.001)	(0.006)	(0.010)	(0.015)	(0.014)
Constant	0.093***	−0.289***	0.149***	0.192***	0.229***
	(0.019)	(0.022)	(0.026)	(0.037)	(0.032)
Observations	2254	2254	2254	2254	2254
Countries	97	97	97	97	97
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes
Fischer	0.000	0.000	0.000	0.000	0.000

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence.

Table G

First stage regression of Table 7.

	(1) ER_DR	(2) ER_BBR	(3) BBR_DR	(4) ER_BBR_DR	(5) RR_BBR_DR	(6) RR_ER_BBR_DR
	Dependent variable: **FRSI**					
Instrument	0.154**	0.528***	1.906***	−2.414***	0.393***	0.168**
	(0.067)	(0.136)	(0.208)	(0.351)	(0.102)	(0.076)
Instrument * Democracy	−0.166***	−0.278***	−2.809***	9.678***	−0.190**	0.145***
	(0.013)	(0.084)	(0.303)	(0.696)	(0.009)	(0.052)
Democracy	0.011	0.070***	0.375***	−0.322***	−0.081**	0.153***
	(0.009)	(0.017)	(0.044)	(0.068)	(0.032)	(0.048)
Lagged debt	−0.001	0.033***	0.012	0.008	−0.010	0.014
	(0.001)	(0.010)	(0.015)	(0.028)	(0.014)	(0.009)
GDP growth	−0.012	0.004	−0.229	0.415*	−0.167*	−0.042
	(0.017)	(0.064)	(0.139)	(0.216)	(0.088)	(0.075)
GDP per capita (in log)	−0.001***	−0.004*	−0.017***	−0.038***	0.013***	0.001
	(0.000)	(0.002)	(0.003)	(0.006)	(0.002)	(0.002)
Constant	−0.000	−0.024	0.124**	0.464***	−0.040	−0.096*
	(0.005)	(0.030)	(0.049)	(0.092)	(0.034)	(0.054)
	Dependent variable: **FRSI * Democracy**					
Instrument	0.151**	0.581***	1.869***	−2.713***	0.520***	0.583**
	(0.063)	(0.136)	(0.209)	(0.357)	(0.196)	(0.280)
Instrument * Democracy	−0.159***	−0.408**	−2.718***	10.419***	−0.505**	0.956**
	(0.004)	(0.178)	(0.307)	(0.708)	(0.221)	(0.465)
Democracy	0.007**	0.152***	0.318***	−0.788***	0.116***	0.021
	(0.003)	(0.022)	(0.046)	(0.087)	(0.033)	(0.052)
Lagged debt	−0.002**	0.041***	0.006	−0.036	0.008	0.002
	(0.001)	(0.011)	(0.014)	(0.027)	(0.014)	(0.009)
GDP growth	−0.012	0.003	−0.228	0.419**	−0.169*	−0.041
	(0.017)	(0.064)	(0.139)	(0.210)	(0.089)	(0.074)
GDP per capita (in log)	−0.001***	−0.004**	−0.017***	−0.036***	0.012***	0.001
	(0.000)	(0.002)	(0.003)	(0.005)	(0.002)	(0.002)
Constant	0.001	−0.047*	0.140***	0.594***	−0.096***	−0.059
	(0.004)	(0.028)	(0.048)	(0.091)	(0.035)	(0.055)
Observations	2320	2320	2320	2320	2320	2320
Countries	97	97	97	97	97	97
Country fixed effect	Yes	Yes	Yes	Yes	Yes	
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Fischer	0.000	0.000	0.000	0.000	0.000	0.000

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence.

Table H

First stage regression of Table 8.

	(1) AUTHOR	(2) AUTOCR	(3) HYBRID	(4) FULL
	Dependent variable: **FRSI**			
Instrument	1.072***	1.056**	1.067***	−1.195***
	(0.345)	(0.430)	(0.232)	(0.181)
Instrument * Political regime	−1.226***	−1.234**	0.703**	−1.243***
	(0.433)	(0.527)	(0.295)	(0.243)
Political regime	−0.714***	−0.994***	0.127**	1.581***
	(0.071)	(0.085)	(0.050)	(0.040)
Lagged debt	0.000	0.037**	−0.097***	0.060***

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Table H (*continued*)

	(1) AUTHOR	(2) AUTOCR	(3) HYBRID	(4) FULL
	(0.014)	(0.019)	(0.022)	(0.014)
GDP growth	0.282**	−0.352**	0.070	−0.001
	(0.137)	(0.168)	(0.153)	(0.113)
GDP per capita (in log)	0.002	−0.002	0.000	−0.000
	(0.003)	(0.003)	(0.004)	(0.003)
Constant	0.063***	0.027**	−0.248***	0.158***
	(0.010)	(0.014)	(0.022)	(0.015)
	Dependent variable: **FRSI * Political regime**			
Instrument	2.126***	3.079***	−1.146***	−2.059***
	(0.347)	(0.429)	(0.248)	(0.195)
Instrument * Democracy	−1.359***	−1.291**	1.229***	−0.578**
	(0.436)	(0.527)	(0.313)	(0.259)
Democracy	−0.631***	−0.958***	−0.203***	1.792***
	(0.067)	(0.082)	(0.043)	(0.036)
Lagged debt	0.008	0.040**	−0.129***	0.080***
	(0.014)	(0.018)	(0.026)	(0.017)
GDP growth	0.282**	−0.352**	0.074	−0.003
	(0.138)	(0.168)	(0.160)	(0.117)
GDP per capita (in log)	0.002	−0.002	0.001	−0.001
	(0.003)	(0.003)	(0.004)	(0.003)
Constant	0.480***	0.854***	0.316***	−0.650***
	(0.067)	(0.082)	(0.071)	(0.049)
Observations	2254	2254	2254	2254
Countries	97	97	97	97
Country fixed effect	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes
Fischer	0.000	0.000	0.000	0.000

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence. **FULL**: full democratic regimes, **HYBRID**: hybrid democracies, **AUTOCR**: autocratic regimes, **AUTHOR**: authoritarian regimes.

Table I
The effect of fiscal rules and democracy on primary budget balance, GMM estimates.

	FRSI (1)	RR (2)	ER (3)	BBR (4)	DR (5)
Lagged public budget balance	0.697***	0.461***	0.646***	0.549***	0.516***
	(0.081)	(0.071)	(0.084)	(0.081)	(0.068)
FRSI	0.886***	1.545**	1.192**	0.389*	0.575*
	(0.332)	(0.709)	(0.479)	(0.214)	(0.332)
FRSI * Democracy	−1.205***	−2.587**	−1.690***	−0.589**	−0.836*
	(0.427)	(1.173)	(0.634)	(0.276)	(0.457)
Democracy	0.408***	0.562***	0.350***	0.460***	0.440**
	(0.108)	(0.178)	(0.093)	(0.131)	(0.180)
Constant	−0.214***	−0.384***	−0.296***	−0.246***	−0.228**
	(0.065)	(0.127)	(0.078)	(0.070)	(0.090)
Observations	1532	1532	1523	1523	1532
Countries	96	96	96	96	96
Controls	Yes	Yes	Yes	Yes	Yes
Instruments	21	18	13	15	18
Hansen J-test	0.347	0.281	0.530	0.605	0.460
AR (1)	0.002	0.001	0.003	0.000	0.001
AR (2)	0.653	0.637	0.340	0.593	0.675

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence. RR=Revenue rule, ER= Expenditures rule, BBR= Balance budget rule, DR= Debt rule.

Table J
The effect of fiscal rules and democracy on primary budget balance, SLPD estimates.

	FRSI (1)	RR (2)	ER (3)	BBR (4)	DR (5)
Time-variant/First stage					
Lagged public budget balance	0.718***	0.718***	0.718***	0.718***	0.718***
	(0.065)	(0.065)	(0.065)	(0.065)	(0.065)
Lagged debt	−0.140	−0.140	−0.140	−0.140	−0.140
	(0.095)	(0.095)	(0.095)	(0.095)	(0.095)
GDP growth	0.403***	0.403***	0.403***	0.403***	0.403***
	(0.095)	(0.095)	(0.095)	(0.095)	(0.095)
GDP per capita (in log)	−0.012***	−0.013***	−0.015***	0.015***	−0.016***

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Table J (*continued*)

	FRSI (1)	RR (2)	ER (3)	BBR (4)	DR (5)
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Constant	0.059	0.059	0.059	0.059	0.059
	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)
Time-invariant/second stage					
Democracy	0.055**	0.089**	0.023	0.076***	0.086**
	(0.027)	(0.040)	(0.020)	(0.027)	(0.035)
FRSI	0.393**	1.144**	0.525**	0.309***	0.401*
	(0.159)	(0.479)	(0.250)	(0.090)	(0.206)
FRSI * Democracy	−0.460**	−1.418**	−0.603**	−0.365***	−0.508**
	(0.202)	(0.688)	(0.299)	(0.116)	(0.256)
Constant	−0.058**	−0.062*	−0.032	−0.075***	−0.090**
	(0.023)	(0.034)	(0.021)	(0.023)	(0.046)
Observations	2362	2362	2362	2362	2362
Countries	97	97	97	97	97
Controls	Yes	Yes	Yes	Yes	Yes

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence. RR=Revenue rule, ER= Expenditures rule, BBR= Balance budget rule, DR= Debt rule.

Table K
Additional finding regressions.

	Indebtedness		Age of Democracy	
	High (1)	Low (2)	New (3)	Established (4)
FRSI	3.105**	−0.312***	4.463***	−0.399***
	(1.067)	(0.094)	(1.548)	(0.116)
FRSI * Democracy	−3.809***	0.318***	−9.849***	0.518***
	(1.330)	(0.116)	(3.435)	(0.136)
Democracy	−0.006	0.562***	0.888***	0.002
	(0.013)	(0.203)	(0.323)	(0.021)
Constant	−0.400***	0.037**	−0.371***	−0.015
	(0.118)	(0.018)	(0.126)	(0.018)
Observations	1110	1210	724	1569
Controls	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes
Cragg-Donald weak identification test	14.254***	242.609***	10.237***	78.903***
Kleibergen-Paap underindentification test	0.000	0.000	0.000	0.000
Hausman endogeneity test	0.011	0.000	0.000	0.000

The numbers in parentheses represent robust standard errors. ***, **, **, * indicate significance at the 1 %, 5 % and 10 % levels of confidence.

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