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Fiscal rules and economic cycles: Quality (always) matters

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Fiscal Rules and Economic Cycles: Quality (Always) Matters

Leandro Andrián, Jorge Hirs-Garzón, Iván Urrea, and Oscar Valencia

Abstract

Governments can issue public debt for both good and bad reasons. The former include intertemporal tax smoothing, fiscal stimulus, and asset management. In contrast, the bad reasons, which generate higher indebtedness, are mainly associated with political cycles, rent capture, intergenerational transfers, and common pool problems. Fiscal rules aim to eliminate the problem of time inconsistency of public finances and minimize debt accumulation by setting debt limits. Despite the theoretical relevance of fiscal rules and institutions to the proper management of fiscal processes in different countries, the evidence indicates mixed results regarding the effectiveness of this type of mechanism for fiscal performance. To understand the effect that fiscal rules have on public debt, this paper studies the effect of different types of rules on debt behavior and their differential effects with respect to the economic cycle. Using a dynamic panel, which enables us to control for endogeneity problems, and the use of a fiscal rule quality index (Schaechter et. al., 2012), this paper finds that fiscal rules only have a significant effect on the reduction of public debt during the positive side of the economic cycle if adequate institutional arrangements accompany them. Furthermore, only some types of fiscal rules (expenditure rules) show a significant effect during the negative part of the cycle. These results have relevant policy implications, as they underscore the importance of (1) developing institutional arrangements that promote the proper functioning of fiscal rules and (2) considering economic cycle asymmetries in order to ensure the appropriate operation of fiscal rules and the fulfillment of policy objectives.

JEL classifications: E32, E61, E62, H30, H63

Keywords: Fiscal rules, public debt, Business cycle

1. Introduction

Public debt has increased steadily during the last few decades, reaching levels above 100% of global GDP in 2020 (IMF 2022). Although these increases in debt have occurred in the context of lower global interest rates, changes in global financing conditions could have significant negative consequences for highly indebted countries (Rogoff, 2020). High indebtedness can generate a negative effect on economic growth and private investment (Fatás et al., 2020; Yared, 2019), as well as diminish the capacity of governments to respond to adverse shocks such as natural disasters, financial crises, or wars (Obstfeld, 2013; Battaglini & Coate, 2016; Romer & Romer, 2018). Additionally, countries with higher indebtedness present a greater sensitivity to spillover effects, because their economies are more vulnerable to macroeconomic shocks (Burriel et al., 2020). Moreover, in default episodes, financial institutions and private companies have less access to financial systems and export markets (Borensztein & Panizza, 2008; Hébert & Schreger, 2017).

Governments can issue public debt for both good and bad reasons. The good reasons include intertemporal tax smoothing, fiscal stimulus, and asset management (Fatás et al., 2020). In contrast, the bad reasons that generate higher indebtedness are mainly related to political cycles and rent capture (Buchanan & Wagner, 1977; Rogoff & Sibert, 1988; Yared, 2010), intergenerational transfers (Cukierman & Meltzer, 1989; Tabellini, 1991; Song et al., 2012), strategic manipulation (Persson & Svensson, 1989; Alesina & Tabellini, 1990), and common pool problems¹ (Olson, 1965; Ostrom, 1990; Alesina & Perotti, 1996; Tornell & Lane, 1999). Although the good reasons for issuing public debt explain part of the indebtedness observed in some countries during the last few years, they are not sufficient to explain the observed dynamics (Fatás et al., 2020). In this sense, recent studies indicate that the observed accumulation of public debt is explained by political distortions that generate time inconsistencies and biases toward present consumption (Yared, 2019). In this regard, the common pool problem is one of the leading causes of fiscal indiscipline worldwide. Thus, an appropriate solution to the problems of fiscal discipline requires adequate institutions and rules for the management of public finances (Wyplosz, 2012).

¹ A common-pool resource is a hybrid between a public and a private good in that it is shared (nonrival) but with a finite supply. This type of pool can give rise to the tragedy of the commons. By having a common pool, individual agents acting for their own benefit can overconsume the resources, causing them to be exhausted for everyone.

The literature identifies three elements that can be used to control high indebtedness: changes in the electoral system, the establishment of fiscal rules, and better budgetary institutions/processes (Wyplosz, 2012; Fatás et al., 2020). In terms of the electoral system, studies such as Battaglini (2010, 2014) show that proportional electoral systems suffer a deficit bias with respect to majoritarian electoral systems. Other studies, such as Persson and Tabellini (2003, 2004), show that the size of government tends to be smaller in presidential democracies than in parliamentary democracies. They also find that parliamentary democracies are less likely to cut spending during expansions.

Fiscal rules aim to eliminate the problem of time inconsistency of public finances and limit debt accumulation by setting limits on budget deficits. The number of countries that have fiscal rules has grown steadily, going from less than 20 in the 1990s to nearly 100 in recent years (Eyraud et al., 2018). While rules vary across countries, they frequently stipulate limits on deficits, spending, borrowing, or set a floor on tax revenues (Fatás et al., 2020). Although, in theory well-designed and implemented fiscal rules can eliminate the deficit bias in countries, empirical results show that this does not always occur. This lack of effectiveness is because fiscal rules cannot be entirely contingent on exogenous shocks. In addition, these rules can be manipulated, because many of the targets are constructed based on projected assumptions about different macroeconomic variables, both local and global. This generates a vast maneuvering capacity that governments can use, resulting in a loss of effectiveness in the implemented fiscal rules (Wyplosz, 2012).

Because of these weaknesses in fiscal rules, various fiscal institutions have been developed to bring more discipline to fiscal processes. These institutions include a wide variety of arrangements, including the delegation of budgetary processes to independent bodies, intrainstitutional arrangements for managing public finances, multiyear budget programming, and the establishment of good budgetary management practices (see Wyplosz, 2012 for a discussion). The establishment of these types of fiscal institution can reduce time-inconsistency problems by providing greater flexibility to respond to unforeseen contingencies. In this way, fiscal institutions have greater flexibility, and if the decision-makers have such tools at their disposal and are independent, they will be more effective in improving fiscal accounts than

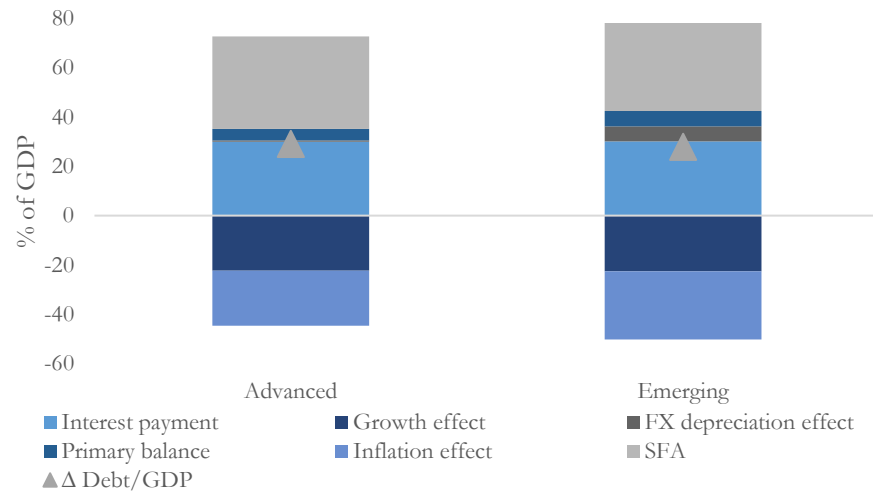
mechanisms based solely on the establishment of numerical rules. Thus, the establishment of fiscal rules within a framework of appropriate institutions could provide greater fiscal discipline and reduce high public debt levels (Wyplosz, 2012; Eyraud et al., 2018; Caselli & Reynaud, 2020).

Despite the theoretical relevance that fiscal rules and institutions have for the proper management of fiscal processes in different countries, the evidence indicates mixed results regarding the effectiveness of this type of mechanism in relation to the fiscal performance of countries (Caselli & Reynaud, 2020; Barbier-Gauchard et al., 2021; Debrun & Kumar, 2007; Heinemann et al., 2018). In addition, there are simultaneous critical effects of adopting fiscal rules that could generate spurious results, making it difficult to correctly identify the effect of this type of rule (Poterba 1996; Alesina & Perrotti, 1996; Heinemann et al., 2018).

Increases in debt are due not only to declines in the overall balance (primary balance plus interest payments) of government budgets. Figure 1 shows the debt decomposition² for advanced and emerging economies. It is observed that the overall balance has the same importance as the stock-flow adjustment (SFA) in explaining the positive change in debt. The size of the SFA may have several drivers, among them: tax skeletons (such as the materialization of contingent liabilities), off-budget expenditures, or measurement errors. Afonso and Jalles (2020) find that fiscal rules per se do not enable governments to reduce budget deficits through a reduction of SFA, but that the existence of fiscal rules with control mechanisms does contribute to reducing the level of the debt, though the cyclical deficit partly counteracts this effect. Thus, well-designed fiscal rules have been shown to be a desirable instrument for controlling the growth of public debt.

² The government's budget constraint is equal to $b_t = \frac{b_{t-1}}{1+\gamma_t} [\alpha_{t-1}(1+i_t^d) + (1-\alpha_{t-1})(1+i_t^e)(1+\Delta F_t)] - ps_t$ (1), where γ_t is the rate of growth of nominal GDP; α is the percentage of total debt denominated in domestic currency; i_t^d and i_t^e are the nominal interest rates in domestic and foreign currency, respectively; ΔF is the annual variation of the exchange rate; and ps is the fiscal primary surplus. This equation is adjusted with the stock flow adjustment (SFA) so that the observed values matches b_t and the different summands of the left-hand side of equation (1). From equation (1), the decomposition of the change in debt is equal to $b_t - b_{t-1} = [int_t - ps_t] + \frac{\Delta F_t(1-\alpha_{t-1})b_{t-1}}{1+\gamma_t} + b_{t-1} \left(\frac{-g_t}{1+\gamma_t} \right) + b_{t-1} \left(\frac{-\pi_t - \pi_t g_t}{1+\gamma_t} \right) + SFA_t$ (2), where int_t is interest payments. It is also possible to show that the change in debt between T and T=t is equal to the summands of equation (2).

Figure 1. Debt decomposition accumulated, 2000–2021



Source: Authors' elaboration based on International Monetary Found

Note: Average values for advanced and emerging economies.

To contribute to the understanding of the effect that fiscal rules have on public accounts, this paper studies the effect that these types of mechanisms have on debt behavior and their differential effects with respect to the business cycle. Using a dynamic panel, which enables us to control for the endogeneity problems highlighted by the literature, and a fiscal rule quality index (Schaechter et. al., 2012), we find that fiscal rules only have a significant effect on the reduction of public debt in the positive part of the business cycle, and furthermore adequate institutional arrangements must be in place. The corollary to our finding is that fiscal rules do not significantly reduce debt during the negative part of the business cycle. The results are robust to the inclusion of variables commonly used in the literature and of variables such as political stability and political regime change (see Heinemann et al., 2018). The results have important policy implications, especially as they underscore the value of developing institutional arrangements that enable the proper functioning of fiscal rules. In addition, the results highlight the importance of considering business cycle asymmetries for the proper functioning of fiscal rules and the fulfillment of policy objectives.

The remainder of the paper is structured as follows: Section 2 provides a short literature review. Section 3 presents the data. Section 4 introduces the empirical methodology. Section 5 describes our main results and the last section concludes.

2. Literature Review

Different empirical studies have found a positive effect of fiscal rule setting on public finances. At the country level, Grembi et al. (2016) found, using a quasi-experimental identification strategy, that the relaxation of fiscal rules generated higher deficits and lower tax rates in Italian municipalities, with a more significant effect in those places where the mayor could be reelected. Below the country level, Burret and Feld (2018) report that the introduction of vertical fiscal rules in local governments in Switzerland shows an association with better local finances and greater fiscal decentralization.

When exploring the effect of fiscal rules, including through cross-country samples, different studies have found positive effects in terms of the stabilizing of fiscal variables. In addition, some of these studies have highlighted the importance of robust fiscal institutions for the proper functioning of fiscal rules. Wyplosz (2012) finds that fiscal rules can be helpful if they increase the political cost of fiscal indiscipline, arguing further that there must be an adequate institutional arrangement for the correct application of these rules. In this sense, Azzimonti et al. (2016) find that balance sheet rules can gradually reduce public debt as policy makers take action to do so in periods of low demand for public goods, because the fiscal rule increases the expected political cost of higher future debt. Asatryan et al. (2018) report that balance sheet rules enacted at the constitutional level have a positive effect on reducing both public debt and the likelihood of a country's experiencing debt crises. The authors report finding no evidence that fiscal rules that are not incorporated into a country's constitution have this type of effect on public finances.

Debrun et al. (2008) show that the introduction of fiscal rules in European Union (EU) countries exhibits a positive result with regard to the countries' fiscal accounts. In addition, the authors report that rules designed to prevent conflicts with the stabilization function of fiscal policy are indeed associated with less-procyclical policies. On the other hand, Reuter (2015) shows that despite low compliance, fiscal rules in European countries have acted as a benchmark for policy makers and the public, tilting economic policy toward achieving the numerical limits dictated by the rules. Additionally, Nerlich and Reuter (2015) find that fiscal rules are strongly associated with more-significant fiscal space across countries. Furthermore, in those countries with more fiscal space, fiscal rules reduce discretionary spending. Bergman et al. (2016) show that for 27

European countries, fiscal rules effectively reduce primary deficits, although this effect is reduced in the presence of higher levels of government efficiency. According to the authors, this effect indicates a substitutionary effect between fiscal rules and institutional quality in achieving fiscal sustainability. In contrast, Eyraud et al. (2018) provide evidence that well-designed fiscal rules supported by robust institutional arrangements positively affect the reduction of excessive deficits. In the same vein, Caselli and Reynaud (2020), using an instrumental variables approach, find that properly designed fiscal rules significantly improve countries' fiscal balances. In addition, Gómez-González et al. (2022a) report a positive and significant effect of the application of fiscal rules on the affordability of public debt in both advanced and emerging countries. Finally, Arbeláez et al. (2021) highlight, in the case of Colombia, the importance of having debt anchors in the fiscal rule and robust independent technical committees that contribute to the achievement of fiscal targets.

Fiscal rules can also generate positive effects in terms of reducing the cost of borrowing and sovereign default risk. Iara and Wolff (2014) find that introducing fiscal rules in Eurozone member countries reduced sovereign risk in periods of market stress. Badinger and Reuter (2017) report that countries with more-stringent fiscal rules have lower fiscal deficits, lower output volatility, and a lower interest rate spread. Thornton and Vasilakis (2017) indicate that the adoption of fiscal rules reduces sovereign risk in both advanced and emerging countries. Finally, Gómez-González et al. (2022b) show that fiscal rules are beneficial for macroeconomic stability, reducing both sovereign risk and the probability of a sudden stop in countries that adopt them.

Several papers have found a positive effect of fiscal rules with regard to reducing the procyclicality of fiscal policy. Bergman and Hutchison (2015) report that fiscal rules reduce fiscal procyclicality once appropriate levels of government efficiency have been achieved. Similar results are provided by Calderón et al. (2016). On the other hand, Larch et al. (2021) report that while compliance with fiscal rules does help reduce the likelihood of procyclical policies, high debt levels may diminish the efficiency of fiscal rules. In this same vein, Combes et al. (2017) indicate that only some types of fiscal rules can mitigate the procyclical bias of fiscal policy in high debt contexts. Finally, Gootjes & de Haan (2022) report that government efficiency and fiscal rules contribute to reducing fiscal procyclicality.

During the last few years, emerging economies, especially in Latin America, have included fiscal rules within their institutional arrangements to restore fiscal sustainability and reduce debt growth Kopits, G. (Ed.) (2004). In addition, papers such as Bergman & Hutchison (2020) find that fiscal rules can help mitigate the procyclicality of fiscal policy in emerging markets. However, deviations from fiscal rules have been frequent in emerging and resource-rich countries, which are more prone to negative economic shocks Davoodi et al. (2022).

Despite many papers that find a positive effect of fiscal rules on fiscal variables and the reduction of sovereign risk, the effectiveness of these rules continues to be a matter of debate in the literature due to empirical identification problems. This is because those countries that implement fiscal rules may have unobservable characteristics that affect the rules efficiency (Poterba, 1996). Additionally, countries may adopt fiscal rules in periods of fiscal stress, during economic crises, or after fiscal consolidation processes. This makes it challenging to identify a causal effect of fiscal rules on public accounts. In this sense, recent works such as the meta-analysis by Heinemann et al. (2018) find that the positive association between fiscal rules and the public accounts disappears after controlling for possible sources of endogeneity.

3. Data

The analysis is based on panel data spanning a 25-year period, 1995–2020, covering 69 countries worldwide. The source of the debt data used in this research is the Global Debt Database, which has the most updated and harmonized public debt data for a wide range of countries, providing comparable data across countries. Full details about the construction of the dataset are provided in Mbaye et al. (2018). In addition to debt data, resource revenues and grants data are sourced from the World Economic Outlook (WEO) database and the Government Finance Statistics dataset. Other variables used in the analysis were sourced from the World Bank's World Development Indicators (WDI), World Governance Indicators (WGI), and Herre (2021) (see Table 1).

Table 1. Description of variables

Variable	Notation	Source
Debt Change	Debt Change	IMF Global Debt Database; The World Economic Outlook (WEO) database
Primary Balance	Primary Balance	WEO database
General Fiscal Rule (dummy variable)	Fiscal Rule	Fiscal Rules Dataset - IMF; Schaechter et al. (2012)
General Fiscal Rule Quality Index (multinomial variable)	Fiscal Rule Quality Index	Constructed based on Schaechter et al. (2012) and Fiscal Rules Dataset - IMF
Balance Rule (dummy variable)	Balance Rule	Fiscal Rules Dataset - IMF; Schaechter et al. (2012)
Balance Rule Quality Index (multinomial variable)	Balance Rule Quality Index	Constructed based on Schaechter et al. (2012) and Fiscal Rules Dataset - IMF
Expenditure Rule (dummy variable)	Expenditure Rule	Fiscal Rules Dataset - IMF; Schaechter et al. (2012)
Expenditure Rule Quality Index (multinomial variable)	Expenditure Rule Quality Index	Constructed based on Schaechter et al. (2012) and Fiscal Rules Dataset - IMF
Debt Rule (dummy variable)	Debt Rule	Fiscal Rules Dataset - IMF; Schaechter et al. (2012)
Debt Rule (multinomial variable)	Debt Rule Quality Index	Constructed based on Schaechter et al. (2012) and Fiscal Rules Dataset - IMF
Exchange Rate Change	Exchange Rate Change	WEO database
Economic Growth	Economic Growth	WEO database
Fiscal Crisis	Fiscal Crisis	Constructed based on Medas et al. (2018)
GDP Per Capita	GDP Per Capita	World Development Indicators (The World Bank)
Economic Crisis (negative economic growth)	Economic Crisis	Constructed based on WEO database
Political Regime Change (dummy variable)	Political Regime Change	Herre (2021) https://www.bastianherre.com/research
Political Stability	Political Stability	Worldwide Governance Indicators (The World Bank)

The quality of the fiscal rules index is built based on the insights of Schaechter et al. (2012). The International Monetary Fund (IMF) built a fiscal rules dataset based on an exercise of the identification of fiscal rules implemented by all IMF members from 1985 to 2015. The primary sources of the dataset are IMF analysis of published documents, fiscal framework legislations, interviews with staff of the relevant government entities in the countries, and the EU fiscal rules

database mentioned above. The dataset built by the IMF includes quantitative and qualitative information on various features such as the type of rules, legal basis, coverage, escape clauses, enforcement, and supporting procedures (Schaechter et al., 2012). Within the dataset, each feature has a value (almost all indicators between 0 and 1) that indicates its existence or not. If a value has a greater range (for example, 0 to 4), a higher score illustrates a stronger feature that, based on earlier studies, supports the effectiveness of the specific fiscal rule (e.g., Kumar et al., 2009;³ Debrun et al., 2008; Ter-Minassian, 2010; Eyraud et al., 2018; Caselli & Reynaud, 2020) The dataset collects the values of the variables for four types of fiscal rules: a debt rule, a balance rule, an expenditure rule, and a revenue rule. Additionally, the IMF incorporates the year of implementation and the year of significant revisions. The scores assigned by the IMF in the dataset are shown in the appendix of this paper.

To synthesize the fiscal rules' main features, we develop an overall index that is based on a combination of subindices for each type of rule and each key characteristic.⁴ Given the challenge of capturing commitment to fiscal discipline through a set of indicators that vary in importance in terms of fostering fiscal restraint, the overall index does not include the flexibility characteristic. The flexibility component was excluded to address the fact that more-sophisticated rules may not be equally suited to all countries, in particular when fiscal sustainability is the main objective, and also because such rules create new challenges for monitoring and effective implementation as a result of their greater complexity. When well-designed and well-communicated flexibility features are present, they can raise credibility and performance; however, this is not measured within scope of the index.

The subindices for each type of rule or key characteristic of the rules are combined (by sum) to generate the overall fiscal rules index. The defined subindices are summed to create the overall index, standardized from 0 to 5. Hence, we can build up the overall index through aggregation by type of rule or by features such as supporting procedures (multiyear expenditures ceilings,

³ Kumar et al. (2009) define an index of strength of fiscal rules by aggregating the following variables using principal component analysis: (1) enforcement score, (2) coverage score, (3) legal basis score, (4) supranational rules score, (5) index of supporting procedures for monitoring of compliance and enforcement, (6) flexibility score; (7) average number of fiscal rules, and (8) the ratio of national to total fiscal rules in each country.

⁴ The structure of the index establishes that each type of rule has a subindex that is a simple sum of its five or six indicators (legal basis, coverage, formal enforcement procedure, expenditure ceilings, fiscal responsibility law, and independent body setting budget assumptions and monitoring budget implementation), which range between 0 and 1, with the exception of coverage and legal basis variables that take a wider set of values. The aggregation of the standardized values by simple sum produces the subindices, which in turn are standardized between 0 and 5.

existence of a fiscal responsibility law, existence of an independent fiscal body), formal enforcement, coverage, and the legal basis. Based on this index and given its characteristics, in this paper we construct a multinomial index⁵ (0–4), where 0 implies the existence of no fiscal rule and 4 implies the existence of a fiscal rule of the highest quality in the sample. The reported results do not include income rules, because their identification is not possible due to the simultaneity of this fiscal rule with other types of rules.

4. Methodology

Due to the persistent behavior of debt and in order to control for endogeneity problems that may arise due to unobserved country effects that influence the behavior of fiscal variables (Poterba, 1996; Alesina & Perrotti, 1996; Heinemann et al., 2018), in this paper we use a dynamic panel model after Blundell and Bond (1998) to study the impact of fiscal rules on debt behavior. Results are presented for the total sample and each economic cycle state (positive or negative). The economic cycle is calculated using the Hodrick-Prescott filter (Hodrick & Prescott, 1981).

Equation 1 below shows the specification of the System-GMM model used, where D_{it}^j corresponds to the dependent variable, which in our case is the change in debt as a percentage of GDP. FR_{it} represents the variable that captures the effect of fiscal rules. In our case, this variable can be a dummy variable with a value of 1 if the country presents some type of fiscal rule or it can be a specific dummy variable according to the type of fiscal rule used (expenditure, debt, or balance sheet). In addition, when calculating the quality of fiscal rules, this variable can also represent a quality index for each type of rule (captured by a multinomial variable), as described in the previous section. It should be noted that in order to avoid endogeneity problems, the fiscal rule variables are included with a lag of at least three periods. X_{it}' includes the control variables described in the previous section, and $DumTi$ represents the time fixed controls.

⁵ This index allows us to identify with greater precision the differences associated to the quality of the fiscal rule throughout the economic cycle. Additionally, this specification is the most appropriate, given the clusters generated in the continuous index.

$$D_{it}^j = \alpha + \rho D_{it-1}^j + \gamma FR_{it} + X_{it}'\beta + \sum_t^{T-1} \delta_t DumT_i + \varepsilon_{it} \quad (1)$$

The Primary Balance variable is also modeled as an endogenous variable under the GMM specification to avoid possible endogeneity problems. Thus, the primary balance, like the debt, is instrumented through transformed (differenced) lags exogenous to the possibly existing fixed effects⁶. Furthermore, the number of instruments used is restricted and collapsed to avoid instrument proliferation. The results found are robust to different specifications and the exclusion of the Primary Balance⁷.

5. Results

Table 2 reports the main results when considering the existence of at least one type of fiscal rule in the countries. Columns 1 and 2 show the results obtained when the total sample is considered. Columns 3 to 5 show the results obtained when the sample is restricted to the positive part of the cycle. In addition, Columns 6 to 8 show the results when only the negative part of the cycle is considered. For the sample as a whole, fiscal rules do not show a significant effect on the behavior of public debt, either when the existence of a fiscal rule (column 1) and the rule quality index (column 2) are considered. Even at the highest quality levels, fiscal rules do not show a significant effect on debt dynamics.

In contrast, fiscal rules significantly affect the positive part of the business cycle, although this effect is only present for high-quality rules⁸. While column 3 shows no significant effect of the existence of the fiscal rule on debt dynamics, column 4 shows that high levels of fiscal rule quality significantly affect the reduction of public debt. This effect remains statistically significant when control variables highlighted in the literature are added (Column 5). It is worth noting that

⁶ The results are robust when additional regressions are run without including the primary balance as a regressor.

⁷ The results found are robust to the use of different econometric techniques for the definition of the economic cycle, in particular when using the Boosted HP filter Phillips & Shi (2021).

⁸ In addition, estimations with the sample restricted to emerging countries were performed. The conclusions are similar to the ones obtained for the full sample. However, these results are not included because there are only 39 emerging countries in the sample and making inference under econometric framework could be misleading given the sample size.

although the first levels of quality of the fiscal rule do not have a significant effect, higher levels of quality do have a significant effect on debt reduction, and this effect has a greater magnitude at higher levels of the index. This reflects the fact that establishing a fiscal rule is not enough to reduce debt; it must have a high level of quality. The results of the Hansen test do not reject the null hypothesis of exogeneity of the instruments. Additionally, the autocorrelation test rejects the presence of autocorrelation of order 2, discarding the presence of relevant information in the error term. The effect of fiscal rules on debt is therefore robust to the different specifications used.

Columns 6 to 9 show the effect of fiscal rules (at least one) when only the negative part of the business cycle is considered. We did not find a significant robust effect of fiscal rules on public debt in the negative part of the cycle, even when the highest levels of rule quality are considered. This could be associated with the design of many rules: the authorities may be accorded greater flexibility to deviate from the medium-term fiscal targets set in the fiscal rules during the negative parts of the economic cycle. There is also the possibility that social pressures may produce deviations in spending not projected in the budgets.

Table 2. System-GMM estimation with Debt Change as dependent variable and at least one fiscal rule present

	(1) Full Sample	(2) Full Sample	(3) Positive Part of Cycle	(4) Positive Part of Cycle	(5) Positive Part of Cycle	(6) Negative Part of Cycle	(7) Negative Part of Cycle	(8) Negative Part of Cycle
Debt Change (t-1)	0.0882 [0.388]	0.1034 [0.390]	-0.0742 [0.151]	-0.0897 [0.147]	-0.0155 [0.118]	0.9920** [0.474]	0.8491 [0.588]	0.8133* [0.468]
Debt Change (t-2)	0.1816** [0.087]	0.1727** [0.086]	0.1500** [0.069]	0.1313* [0.070]	0.1685** [0.072]			
Primary Balance (t-1)	-0.6369 [0.433]	-0.6048 [0.426]	-0.6669*** [0.199]	-0.6670*** [0.188]	-0.5582*** [0.135]	0.2137 [0.620]	0.1093 [0.812]	-0.1844 [0.537]
Fiscal Rule (t-5)	0.4528 [0.380]		-0.0532 [0.451]			0.3052 [0.473]		
Fiscal Rule Quality Index 1 (t-3)					0.0913 [0.536]		0.2900 [0.801]	0.1308 [0.453]
Fiscal Rule Quality Index 2 (t-3)					-0.5622 [0.574]		-0.1497 [0.774]	0.1158 [0.445]
Fiscal Rule Quality Index 3 (t-3)					-1.7620** [0.785]		-0.8013 [0.693]	-1.0030 [0.813]
Fiscal Rule Quality Index 4 (t-3)					-1.8217*** [0.604]		-0.8041 [0.561]	-0.5874 [0.471]
Fiscal Rule Quality Index 1 (t-5)		0.4556 [0.463]		0.4284 [0.712]				
Fiscal Rule Quality Index 2 (t-5)		0.5401 [0.392]		-0.0979 [0.492]				
Fiscal Rule Quality Index 3 (t-5)		-0.0770 [0.518]		-1.2791 [0.784]				
Fiscal Rule Quality Index 4 (t-5)		-0.4605 [0.832]		-1.8380*** [0.676]				
Economic Growth					-0.1222** [0.050]			-0.0741 [0.138]
Fiscal Crisis					0.6878 [0.434]			-1.9670*** [0.556]
Exchange Rate Change					6.9013*** [1.848]			9.5494** [4.059]
GDP Per Capita					-0.0000 [0.000]			-0.0000 [0.000]
Economic Crisis					3.9277*** [1.082]			1.2539 [1.297]
Political Regime Change					0.0213 [0.389]			1.0481 [0.745]
Political Stability					0.3386 [0.248]			-0.1499 [0.362]
Constant	-0.8705 [0.622]	0.5107 [0.621]	-0.5615 [0.391]	-0.6991 [0.521]	1.1644 [0.798]	4.3387*** [1.234]	5.2550*** [1.124]	-0.8222 [1.523]
Observations	1,149	1,149	557	557	590	604	651	613
Number of ID	69	69	69	69	69	68	69	69
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instruments	39	42	37	40	49	34	39	44
Hansen	15.70	15.84	15.97	15.40	13.24	8.137	9.816	9.886
Hansen <i>p</i> -value	0.402	0.393	0.315	0.351	0.655	0.701	0.547	0.541
AR(1)	0.215	0.212	0.0265	0.0263	0.0191	0.0173	0.0629	0.0267
AR(2)	0.614	0.654	0.506	0.505	0.680	0.0751	0.258	0.249

Note: Debt Change is represented as a p.p. of GDP. A two-step estimator is used. Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

When considering the effect by type of rule, the results of the balance sheet rule are similar to those obtained in the previous case when the positive part of the economic cycle is considered. Thus, Table 3 shows that the highest quality levels of fiscal balance rules are associated with the

reduction of public debt. Such levels alone show a significant effect. The balance sheet rules show no significant effect during the negative part of the cycle at any quality level.

Table 3. System-GMM estimation with Debt Change as dependent variable and balance-sheet rule present

	(1) Full Sample	(2) Full Sample	(3) Positive Part of Cycle	(4) Positive Part of Cycle	(5) Positive Part of Cycle	(6) Negative Part of Cycle	(7) Negative Part of Cycle	(8) Negative Part of Cycle
Debt Change (t-1)	0.1296 [0.391]	0.0924 [0.394]	-0.0574 [0.155]	-0.0223 [0.111]	-0.0149 [0.110]	0.9804** [0.466]	1.0119** [0.491]	0.8398* [0.473]
Debt Change (t-2)	0.1632* [0.089]	0.1763** [0.086]	0.1461** [0.068]	0.1565** [0.061]	0.1641** [0.072]			
Primary Balance (t-1)	-0.6144 [0.433]	-0.6234 [0.433]	-0.6552*** [0.198]	-0.6284*** [0.118]	-0.5683*** [0.138]	0.2237 [0.617]	0.2284 [0.637]	-0.1324 [0.557]
Balance Rule (t-5)	0.1689 [0.314]		-0.2689 [0.414]			0.2135 [0.483]		
Balance Rule Quality Index 1 (t-3)				0.5553 [0.795]	0.4844 [0.787]			0.1541 [0.626]
Balance Rule Quality Index 2 (t-3)				-0.2416 [0.507]	-0.5137 [0.512]			-0.0057 [0.513]
Balance Rule Quality Index 3 (t-3)				-0.5999 [0.504]	-1.3347** [0.602]			-0.0590 [0.496]
Balance Rule Quality Index 4 (t-3)				-1.5446** [0.631]	-1.9381** [0.798]			-0.3956 [0.793]
Balance Rule Quality Index 1 (t-5)		0.3043 [0.472]					0.3615 [0.807]	
Balance Rule Quality Index 2 (t-5)		0.3265 [0.431]					0.0949 [0.624]	
Balance Rule Quality Index 3 (t-5)		0.4071 [0.407]					0.5903 [0.593]	
Balance Rule Quality Index 4 (t-5)		-0.2127 [0.406]					-0.0968 [0.750]	
Economic Growth					-0.1297** [0.053]			-0.0699 [0.139]
Fiscal Crisis					0.6595 [0.440]			-1.9556*** [0.606]
Exchange Rate Change					7.0455*** [1.864]			9.6286** [4.116]
GDP Per Capita					-0.0000 [0.000]			-0.0000 [0.000]
Economic Crisis					4.1506*** [1.087]			1.1980 [1.364]
Political Regime Change					0.1645 [0.386]			1.0970 [0.756]
Political Stability					0.3947 [0.265]			-0.1203 [0.374]
Constant	0.6187 [0.606]	0.5496 [0.655]	-0.7352 [0.494]	-0.7740 [0.491]	1.0564 [0.768]	4.4621*** [1.237]	4.2788*** [1.256]	5.4655*** [1.028]
Observations	1,162	1,149	560	634	590	614	604	613
Number of ID	69	69	69	69	69	68	68	69
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instruments	39	42	37	44	49	34	37	44
Hansen	15.21	15.62	15.51	14.61	13.27	6.914	8.119	10
Hansen <i>p</i> -value	0.437	0.408	0.344	0.553	0.653	0.806	0.703	0.530
AR(1)	0.195	0.221	0.0258	0.0247	0.0171	0.0183	0.0193	0.0270
AR(2)	0.713	0.637	0.537	0.676	0.627	0.0971	0.0774	0.259

Note: Debt Change is represented as a p.p. of GDP. A two-step estimator is used. Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

When the effect of fiscal expenditure rules is considered, the results (Table 4) obtained in the positive part of the cycle are similar to those of the previous case. However, when the negative part of the cycle is considered, fiscal spending rules show a significant effect on reducing public debt, although this effect is robust only at the highest level of quality. In other words, high-

quality fiscal expenditure rules show a significant effect on reducing public debt in both the positive part of the cycle and the negative part of the cycle. However, in the negative part of the cycle, a higher level of quality of the fiscal rule is required to achieve the same degree of effectiveness as in the positive part of the cycle.

Table 4. System-GMM estimation with Debt Change as dependent variable and expenditure rule present

	(1) Full Sample	(2) Full Sample	(3) Positive Part of Cycle	(4) Positive Part of Cycle	(5) Positive Part of Cycle	(6) Negative Part of Cycle	(7) Negative Part of Cycle	(8) Negative Part of Cycle
Debt Change (t-1)	0.1307 [0.386]	0.1104 [0.379]	-0.0771 [0.147]	-0.0941 [0.147]	-0.0154 [0.119]	0.9712** [0.458]	0.9580** [0.473]	0.7822* [0.463]
Debt Change (t-2)	0.1637* [0.089]	0.1745** [0.087]	0.1363** [0.065]	0.1356** [0.066]	0.1677** [0.067]			
Primary Balance (t-1)	-0.6152 [0.425]	-0.6018 [0.411]	-0.6752*** [0.179]	-0.6604*** [0.176]	-0.5624*** [0.137]	0.2096 [0.596]	0.1846 [0.593]	-0.1667 [0.535]
Expenditure Rule (t-5)	0.0974 [0.297]		-1.0778** [0.453]			0.9107** [0.452]		
Expenditure Rule Quality Index 1 (t-3)					-0.4745 [0.566]			0.7663 [0.469]
Expenditure Rule Quality Index 2 (t-3)					-0.4256 [0.534]			-0.3224 [0.421]
Expenditure Rule Quality Index 3 (t-3)					-1.4364** [0.628]			-0.6991 [0.783]
Expenditure Rule Quality Index 4 (t-3)					-1.7291*** [0.635]			-1.4571* [0.822]
Expenditure Rule Quality Index 1 (t-5)		0.2743 [0.339]		0.0986 [0.665]			0.4154 [0.428]	
Expenditure Rule Quality Index 2 (t-5)		0.2833 [0.313]		-0.4263 [0.497]			0.7993 [0.679]	
Expenditure Rule Quality Index 3 (t-5)		-0.0936 [0.540]		-1.5875** [0.698]			1.8992 [1.239]	
Expenditure Rule Quality Index 4 (t-5)		-0.6527 [0.804]		-2.1308*** [0.610]			-0.1113 [1.702]	
Economic Growth					-0.1214** [0.049]			-0.0608 [0.134]
Fiscal Crisis					0.6776 [0.443]			-1.9571*** [0.568]
Exchange Rate Change					6.8107*** [1.859]			9.9318** [4.036]
GDP Per Capita					-0.0000 [0.000]			-0.0000 [0.000]
Economic Crisis					3.8926*** [1.030]			1.5054 [1.366]
Political Regime Change					-0.0676 [0.382]			1.1101 [0.704]
Political Stability					0.3280 [0.226]			-0.1603 [0.360]
Constant	0.7108 [0.573]	0.4996 [0.730]	-0.3474 [0.458]	0.0566 [0.452]	1.2896* [0.763]	0.3938 [0.869]	4.3831*** [1.392]	5.2278*** [0.998]
Observations	1,162	1,149	560	557	590	614	604	613
Number of ID	69	69	69	69	69	68	68	69
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instruments	39	42	37	40	49	34	37	44
Hansen	15.20	15.69	14.95	14.53	13.12	6.982	7.992	9.860
Hansen <i>p</i> -value	0.437	0.403	0.382	0.411	0.664	0.801	0.714	0.543
AR(1)	0.190	0.198	0.0241	0.0257	0.0184	0.0176	0.0197	0.0303
AR(2)	0.713	0.654	0.511	0.495	0.646	0.0938	0.0765	0.268

Note: Debt Change is represented as a p.p. of GDP. A two-step estimator is used. Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Regarding debt rules, the results (Table 5) show a positive effect of this type of rule in the positive part of the cycle. However, as in the previous cases, this result is only present for the highest quality rules. In addition, as with the other types of fiscal rules, no significant effect is found in the negative part of the cycle (columns 6 to 8).

Table 5. System-GMM estimation with Debt Change as dependent variable and debt rule present

	(1) Full Sample	(2) Full Sample	(3) Positive Part of Cycle	(4) Positive Part of Cycle	(5) Positive Part of Cycle	(6) Negative Part of Cycle	(7) Negative Part of Cycle	(8) Negative Part of Cycle
Debt Change (t-1)	0.1190 [0.391]	0.0988 [0.396]	-0.0421 [0.153]	-0.0823 [0.154]	-0.0038 [0.122]	0.9784** [0.463]	1.0283** [0.478]	0.7651 [0.474]
Debt Change (t-2)	0.1650* [0.089]	0.1701** [0.085]	0.1435** [0.066]	0.1428** [0.067]	0.1778*** [0.067]			
Primary Balance (t-1)	-0.6247 [0.434]	-0.6171 [0.433]	-0.6510*** [0.188]	-0.6669*** [0.191]	-0.5497*** [0.132]	0.2238 [0.608]	0.2536 [0.631]	-0.2044 [0.541]
Debt Rule (t-5)	0.3365 [0.322]		-0.2759 [0.429]			0.2427 [0.495]		
Debt Rule Quality Index 1 (t-3)					-0.2303 [0.587]		0.9754 [0.855]	0.1443 [0.597]
Debt Rule Quality Index 2 (t-3)					-0.4819 [0.625]		-0.0240 [0.673]	-0.0297 [0.488]
Debt Rule Quality Index 3 (t-3)					-1.1831** [0.601]		1.0397 [0.734]	-0.0277 [0.529]
Debt Rule Quality Index 4 (t-3)					-1.8659** [0.826]		-0.0947 [0.833]	-0.7313 [0.822]
Debt Rule Quality Index 1 (t-5)		-0.0073 [0.401]		-0.2365 [0.561]				
Debt Rule Quality Index 2 (t-5)		0.5889 [0.464]		0.2461 [0.577]				
Debt Rule Quality Index 3 (t-5)		0.4019 [0.421]		-0.3811 [0.665]				
Debt Rule Quality Index 4 (t-5)		-0.4283 [0.467]		-1.3024* [0.758]				
Economic Growth					-0.1222** [0.049]			-0.0811 [0.131]
Fiscal Crisis					0.6446 [0.431]			-1.9340*** [0.571]
Exchange Rate Change					6.6509*** [1.903]			9.8019** [4.042]
GDP Per Capita					-0.0000 [0.000]			-0.0000 [0.000]
Economic Crisis					4.0426*** [1.071]			1.4132 [1.316]
Political Regime Change					-0.0275 [0.393]			1.0454 [0.736]
Political_Stability					0.3799 [0.278]			-0.0824 [0.330]
Constant	0.5310 [0.591]	0.5327 [0.636]	-0.7517* [0.456]	-0.4129 [0.421]	1.2431 [0.784]	4.4820*** [1.244]	4.1749*** [1.358]	-1.2334 [1.553]
Observations	1,162	1,149	560	557	590	614	604	613
Number of ID	69	69	69	69	69	68	68	69
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instruments	39	42	37	40	49	34	37	44
Hansen	15.16	15.57	15.61	15.10	13.71	6.925	7.792	10.05
Hansen <i>p</i> -value	0.440	0.411	0.338	0.371	0.620	0.805	0.732	0.526
AR(1)	0.200	0.218	0.0237	0.0286	0.0201	0.0175	0.0152	0.0278
AR(2)	0.695	0.661	0.556	0.505	0.646	0.0952	0.0695	0.284

Note: Debt Change is represented as a p.p. of GDP. Two-step estimator. Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In summary, the results show a positive effect on debt reduction in the positive part of the cycle for all of the fiscal rules studied (balance sheet, expenditure, debt). However, this result is only significant for the highest quality fiscal rules. In the negative part of the cycle, the impact of fiscal rules is much more limited, as only the highest quality expenditure rules significantly affect public debt reduction.

6. Conclusions

This paper studies the impact of three types of fiscal rules on the behavior of public debt. The results show that although these types of fiscal rules significantly affect debt reduction, this effect is determined by the quality of the existing fiscal arrangements. In other words, it is not enough to have a fiscal rule in place to reduce indebtedness; the fiscal rule must be of high quality.

The results also show a heterogeneous effect of fiscal rules that is related to economic cycle stage. The fiscal rules studied all show a significant effect in the positive part of the cycle, but only the expenditure rules (specifically, those of very high quality) contribute to the reduction of public debt in the negative part of the economic cycle.

These results have important policy implications. First, the establishment of fiscal rules by countries is not enough to control indebtedness. For the rules to be effective, appropriate institutional arrangements must be developed to enable the achievement of fiscal targets. Second, the effect of fiscal rules is conditioned not only by their quality but also by the type of rule used (especially in the negative part of the cycle). Policy makers should take this result into account when designing the type of fiscal rule that best suits the expected results.

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Appendix

Main characteristics of the Schaechter et al. (2012) fiscal rule index

<i>Criterion 1: Legal basis: (national rules only): What is the highest legal basis of the rule?</i>	
Value	
4	Constitutional
3	Statutory
2	Coalition agreement
1	Political commitment
<i>Criterion 2: Coverage: Which sector of the government is covered by the rule?</i>	
Value	
2	Central government
1	General government or wider public sector
<i>Criterion 3: Enforcement: Are these enforcement mechanisms in place?</i>	
Value	
(sum)	
1	Formal enforcement procedure (Yes: 1, No: 0).
1	Monitoring mechanism of compliance outside the government (Yes: 1, No: 0).
<i>Criterion 4: Supporting procedures and institutions (national rules only): Are these procedures or institutions in place?</i>	
Value (sum)	
1	Multi-year expenditure ceilings (Yes: 1, No: 0).
1	Fiscal responsibility law (Yes: 1, No: 0).
1	Independent body setting budget assumptions (Yes: 1, No: 0).
1	Independent body monitoring budget implementation (Yes: 1, No: 0).
<i>Criterion 5: Flexibility: Are these flexibility characteristics in place?</i>	
Value	
(sum)	
1	- Clearly-defined escape clauses (Yes: 1, No: 0).
1	- Fiscal balances defined in cyclically adjusted terms (Yes: 1, No: 0).

List of Countries Considered in the study

<i>List of Countries</i>	
Algeria	Kazakhstan
Argentina	Kyrgyz Republic
Australia	Latvia
Austria	Lithuania
Barbados	Malaysia
Belarus	Mauritius
Belgium	Mexico
Brazil	Morocco
Bulgaria	Netherlands
Canada	New Zealand
Chile	Norway
Colombia	Panama
Costa Rica	Paraguay
Croatia	Peru
Cyprus	Philippines
Czech Republic	Poland
Denmark	Portugal
Dominican Republic	Romania
Ecuador	Russia
Egypt	Slovak Republic
El Salvador	Slovenia
Estonia	South Africa
Finland	Spain
France	Suriname
Georgia	Sweden
Germany	Switzerland
Greece	Thailand
Hungary	Tunisia
Iceland	Turkey
Indonesia	Ukraine
Ireland	United Kingdom
Israel	United States
Italy	Uruguay
Japan	Vietnam
Jordan	