

Growth-Friendly Fiscal Rules?

Safeguarding Public Investment from Budget Cuts through Fiscal Rule Design

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DISCUSSION
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Growth friendly fiscal rules? Safeguarding public investment from budget cuts through fiscal rule design*

Martin Ardanaz Eduardo Cavallo Alejandro Izquierdo Jorge Puig

Abstract

Fiscal adjustment episodes tend to be accompanied by large public investment cuts, contributing to the well documented procyclical bias in public capital expenditures. We study patterns of public investment behavior during fiscal consolidations in a sample of 75 advanced and emerging economies during 1990-2018 and find that results differ significantly depending on fiscal rule design. Fiscal rules can be “flexible”, which are rules that include mechanisms to accommodate exogenous shocks (e.g. cyclically adjusted fiscal targets, well defined escape clauses, and differential treatment of investment expenditures) or “rigid” –i.e., establish numerical limits on fiscal targets without taking into account flexible features. We find that in countries with either no fiscal rule, or with a rigid fiscal rule, a fiscal consolidation of at least 2% of GDP is associated with a 9% cut public investment, on average. Instead, in countries with flexible fiscal rules, the decline in public investment is less than 2% on average. The results hold after controlling for possible endogeneity bias in the estimations. We show that by reducing procyclical biases in public investment spending, flexible fiscal rules can add a growth enhancing dimension to the fiscal sustainability concerns that have been the focus of fiscal rules to date.

JEL CODES: E32, E60, H12, H50, H54

KEYWORDS: Fiscal Rules, Public Investment, Fiscal Consolidations, Spending Cyclicity.

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1 Introduction

There is a growing consensus in the macroeconomic literature about the potential growth enhancing properties of public investment, especially during downturns (Abiad et al., 2016), when investment efficiency is high (Furceri and Li, 2017), or when the initial stock of public capital is low (Izquierdo, Lama, et al., 2018). Public investment directly improves the productive capacity of the economy by increasing the marginal product of private capital and labor. This, in turn, generates positive effects both on private investment (crowding-in) and private consumption over time.¹ Yet, despite its growth boosting potential, the macroeconomic literature has also long acknowledged that fiscal adjustment episodes tend to be accompanied by disproportionate public investment cuts, a behavior common across industrial economies and specially, developing countries (Serven 2007; Easterly and Serven 2003) and related to the fact that capital expenditure cuts may prove to be more politically palatable than cuts in current expenditure (Ardanaz and Izquierdo 2017; Arezki and Ismail 2013). Thus, designing tools to protect productive public investment during fiscal adjustment periods is a relevant and timely policy issue given sizable infrastructure gaps particularly across emerging economies (McKinsey Global Institute 2016) .

Among the policy toolset, rules-based fiscal frameworks have traditionally been under scrutiny for unintendedly encouraging fiscal procyclicality (Clemens and Miran 2012; Fatas and Mihov 2006; Alesina and Bayouni 1996) and large cuts in public investments (Blanchard and Giavazzi 2004), as pressure to comply with fiscal targets provides an additional incentive for myopic policymakers to reallocate spending away from spending itmes with longer-term benefits (Beetsma and Debrun 2007; Peletier et al. 1999). In the language of optimal fiscal rule theory, higher commitment to fiscal discipline, in the form of a fiscal rule, comes at the expense of lower adaptability to shocks, including less responsive public good provision in the short-run (Azzimonti et al. 2016), such as for example, the over-compression of public investment during fiscal consolidations.

Yet, this view neglects the fact that there is great variation in fiscal rule design around the world (Eyraud et al., 2018; IMF 2009). In particular, countries have been designing fiscal rules with more flexible features over time, such as cyclically adjusted fiscal targets, well-defined escape clauses in the case of unanticipated shocks², and investment friendly provisions, which are rules

¹Of course, distortions in the public investment management process may generate countervailing (crowding out) effects (Cavallo and Daude 2011). On the relationship between institutional quality and public investment, see Gupta et al. (2014); Grigoli and Mills (2013); Keefer and Knack (2007).

²These include (i) a very limited range of factors that allow such escape clauses to be triggered in legislation, (ii) clear guidelines on the interpretation and determination of events (including voting rules), and (iii) specification on the path back to the rule and treatment of accumulated deviations (see IMF, 2009).

that exclude capital expenditures from the numerical targets imposed on fiscal aggregates (Guerguil et al., 2017; Schaetter et al., 2012). Figure 1 shows these types of rules have become increasingly popular around the world. While by 1995 there were less than fifteen countries that had adopted at least one such flexible feature, by 2015 the figure increased to more than fifty countries, such that over 55% of countries with a fiscal rule contain at least one flexible feature. Moreover, flexibility mechanisms are usually introduced in combination with each other, or with other types of standard rules (expenditure rules, debt rules). For example, 60% of countries with fiscal rules containing escape clauses, have introduced this feature together with investment-friendly provisions and/or cyclically adjusted targets (Figure 2). Have flexibility mechanisms been effective at safeguarding public investment from budget cuts?

In this paper, we study the behavior of public investment during fiscal consolidations episodes conditional on fiscal rule characteristics. Based on a sample of 75 countries during 1990-2018, our results show that the response of public investment during fiscal adjustment episodes differs significantly depending on the fiscal rule design. In countries without flexible fiscal rules, a fiscal consolidation of at least 2% of GDP is associated with a 9% cut in capital expenditures on average. However, in countries where the fiscal rule includes flexibility mechanisms, the ensuing decline in investment is less than 2% and not statistically significant. Thus, fiscal rule design dampens the negative effect of fiscal adjustments on public investment. These results are robust to alternative definitions and measures of fiscal consolidation episodes, and importantly, hold even after controlling for the endogeneity of fiscal rules. We argue these results can be explained by the fact that flexibility features contribute to make public investment less procyclical. At the same time, we find flexible fiscal rules to be as good as any other typical rule in reducing the probability of debt crisis, suggesting that the protection of public investment over time is compatible with fiscal sustainability concerns.

Figure 1: Flexible rules around the world: 1995-2015.

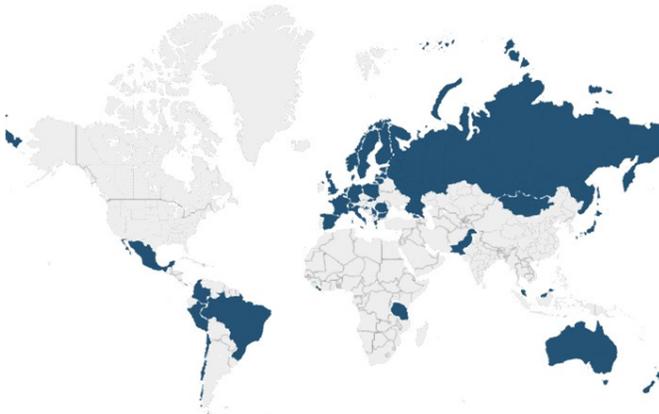
Panel A. 1995



Panel B. 2005

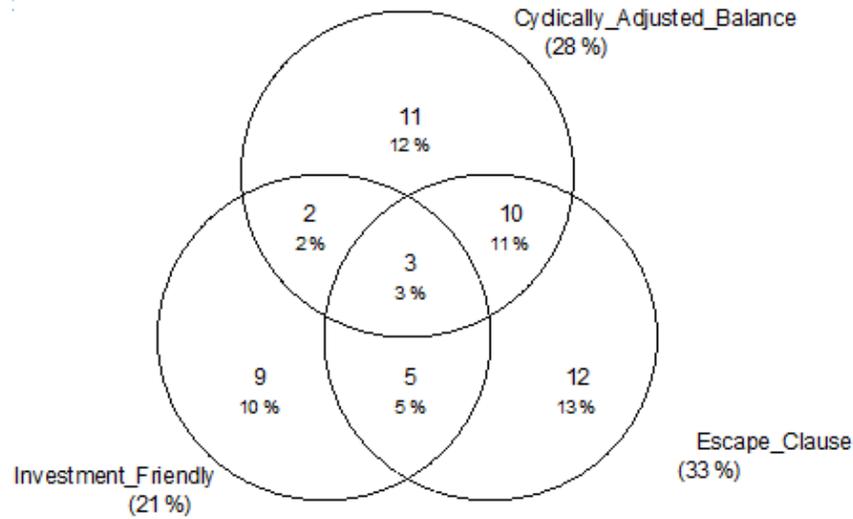


Panel C. 2015



Source: Own elaboration based on IMF fiscal rules dataset (IMF 2017).

Figure 2: Overlaps between flexibility features



Source: Own elaboration based on IMF fiscal rules dataset (IMF 2017).

This paper contributes to existing research on fiscal rules in four main ways. First, it studies fiscal policy outcomes other than those traditionally found in the fiscal rule literature, by concentrating on public investment growth rates and levels (both as share of GDP and total outlays). Second, it differentiates among different types of fiscal rules, by exploiting variation in flexibility features over time and across countries. Thirdly, it explores a mechanism through which fiscal rule design affects public investment behavior, by arguing that the cyclical stance of public investment spending is significantly affected by the presence of flexibility features. Finally, we contribute to recent debates about the general equilibrium effects of fiscal rules, by analyzing the implications of fiscal rule design in terms of the commitment vs. flexibility trade-off surrounding fiscal policymaking.

The remainder of the paper is organized as follows. After a review of previous literature on Section 2, Section 3 presents the data and describes our empirical strategy. Section 4 presents the main results, while Section 5 considers several robustness tests. Section 6 addresses endogeneity concerns, and Section 7 explores a possible mechanism linking fiscal rule design to improved public investment management over the cycle. Section 8 asks whether there are trade-offs between the ability of fiscal rules to protect public investment and ensuring fiscal sustainability. Section 9 concludes by discussing the policy implications of our results.

2 Related literature

There is a vast theoretical and empirical literature studying the effects of budget institutions on fiscal performance in general, and fiscal rules in particular.³ The theoretical literature on optimal design of fiscal rules discusses the benefits and costs of rules-based fiscal frameworks, based on a fundamental trade-off between commitment and flexibility considerations (Azzimonti et al. 2016; Halac and Yared 2014; Armador et al. 2006).⁴ On the one hand, fiscal rules act as a commitment device to constrain excessive deficit accumulation arising from distorted political incentives, while on the other, rules reduce the scope for adjusting policy to unexpected shocks. Thus, less flexibility should have costs in terms of increased output variability both in a neoclassical framework (Barro 1979) because it limits the ability to tax smooth, and in a Keynesian setup, because of limited space to implement countercyclical policies needed to sustain aggregate demand.⁵

Given its focus on fiscal sustainability concerns, such theoretical frameworks usually abstract from discussing the effects of fiscal rules on the behavior of specific expenditure categories. An exception is Peletier et al. (1999) who draw on Alesina and Tabellini (1990) seminal political economy model of budget deficits⁶ to discuss the implications of balanced-budget rules in terms of public investment outcomes. They discuss an equilibrium in which a balanced-budget rule coexists with suboptimal levels of public investment. In this context, the theoretical literature discusses how alternative fiscal frameworks can mitigate this potential negative effect of fiscal rules on public investment. For example, Basetto and Sargent (2006) present an overlapping generations model assessing the potential efficiency gains of “golden rules”, namely a balanced budget rule which allows budget deficits to finance public investments but not current expenditures.

The empirical literature on the effects of fiscal rules on public investment outcomes is

³Budget institutions affect fiscal policy outcomes by either imposing restrictions on the results of the budget process (fiscal or numerical rules), by distributing agenda power and responsibilities among the various actors that participate in budget negotiations (procedural rules), or by increasing access and quality of information (transparency rules) (Alesina and Perotti 1999). In this paper, we concentrate on numerical fiscal rules.

⁴In addition to flexibility and commitment, the international experience with fiscal rules suggests an additional desirable feature: simplicity. For complications in striving the right balance between such properties in practice, see Eyraud et al. (2018) and Debrun and Jonug (2018).

⁵Using subnational level data across the US states, Fatas and Mihov (2006) provide evidence that fiscal rules, even though they limit the ability to react to changes in economic conditions, are also useful in restricting discretionary policy changes. As a result, constraints on politicians lead to lower output volatility.

⁶In this model, electoral uncertainty over the identity of future majorities leads the current median voter to run excessive deficits.

limited. Previous papers examine the pros and cons of the so-called “golden rule”. For example, Blanchard and Giavazzi (2004) show that reformulating the Stability and Growth Pact in terms of a golden rule would allow European Union member countries to devote more resources to improving their infrastructure without violating the deficit limits thus redefined. However, Balassone and Franco (2000) suggest these types of rules provide leeway for opportunistic politicians to engage in “creative accounting” (Milesi Ferreti 2003): namely simply reporting as spending in infrastructures what is really current spending.

The bulk of the literature on fiscal rules is mostly concentrated on studying aggregate level fiscal outcomes, with typical measures including the fiscal balance, debt, or the size of government (Heinemann et al. 2018; Asatryan et al. 2018). Moreover, only until very recently has the empirical literature turned to exploit variation in fiscal rule design to explain fiscal performance (Caselli et al 2019; Guerguil et al. 2017). For example, empirical studies focus on the relationship between different types of fiscal rules and the cyclical behavior of public expenditures. Bova et al. (2014) focus on “second generation” fiscal rules (such as the use of cyclically adjusted fiscal targets or well-defined escape clauses) and find that these have contributed to less procyclicality in the developing world. Similarly, Guerguil et al. (2017) use propensity score matching techniques to show that flexible rules and “investment friendly” provisions reduce the procyclicality of capital expenditures in a broad panel of countries.

3 Empirical strategy and data

The way flexible fiscal rules affect public investment changes is estimated using the following empirical specification:

$$\Delta G_{i,t}^{PI} = \alpha_i + \phi_t + \beta_{flxr} FLXR_{i,t} + \beta_{fc} FC_{i,t} + \beta_{fcflxr} FC_{i,t} * FLXR_{i,t} + \theta X_{i,t} + \mu_{i,t} \quad (1)$$

where $G_{i,t}^{PI}$ is real public investment in country i at year t , $FLXR_{i,t}$ is a dummy equaling 1 if a flexible rule (in the form of investment-friendly rule, cyclically-adjusted budget balance rule, or rules with escape clauses), is in place at time t and 0 otherwise. $FC_{i,t}$ is a dummy variable that equals one when country i has in place a fiscal consolidation in year t . We follow Alesina and Ardagna (2013) and define a fiscal consolidation as a two year period in which the cyclically adjusted primary balance/GDP ratio improves in each year and the cumulative improvement is at least two percentage points of GDP. Finally, $X_{i,t}$ is a vector of control variables, including population and GDP growth rates, debt to GDP level, α_i are country fixed effects and ϕ_t are time fixed effects.

Our data covers the 1990-2018 period, for a total of 75 countries, spanning different regions and levels of economic development.⁷ Public investment, cyclically adjusted primary balance and control variables were obtained from the World Economic Outlook (WEO). Information on fiscal rules draws on the IMF fiscal rules dataset (IMF, 2017).

Before estimating Equation 1, it is useful to provide some basic descriptive statistics on our main variables of interest. Given our definition of fiscal adjustments, we count 299 episodes of fiscal consolidations between 1990 and 2018 in our sample, of which close 60% accrue in developing economies (Figure A1). While the likelihood of a fiscal consolidation is somewhat larger for countries with fiscal rules (181 cases) than without them (118 cases), the median growth rate of public investment during fiscal adjustments is similar under both scenarios: -2.5% and -3%, respectively. Interestingly, across countries whose fiscal rules include flexible mechanisms, the median drop in investment is only 0.4%, while above 4.5% among countries with fiscal rules lacking flexibility features, that is, countries with "rigid" rules.⁸

4 Results

4.1 Baseline results

Table 1 presents baseline results from the specification presented in Equation 1. Column 1 shows that public investment falls close to 11 percent during fiscal consolidations. This drop in public investment is reduced to 9 percent if control variables are introduced (Column 2). However, the size and sign of our interaction term suggests flexible rules mitigate the negative effects of fiscal consolidation on public investment behavior. Indeed, according to the marginal effects estimated from Column 2, it is possible to argue that public investment does not fall when flexible features are incorporated. As shown by Figure 3 (panel A), the 1.7 percent drop in public investment is not statistically different from zero when countries adopt flexible mechanisms.

Notice that in our definition of flexibility, countries that lack fiscal rules and those without flexibility mechanisms or rigid rules are treated similarly ($FLXR=0$). Columns 3 and 4 separate these cases into two different default categories. Public investment drops 8.9 for countries where there are fiscal rules in place, but flexibility mechanisms are lacking (rigid rules), and 9.1 percent for countries without fiscal rules. However, the response of public investment in both cases differs

⁷See Appendix for the country list (Table A1) and descriptive statistics (Table A2).

⁸See Table A3 in Appendix.

when flexible mechanisms are introduced, as no significant evidence can be found that public investment is negatively affected by fiscal consolidations (see Figure 3, panels B and C). These results imply that the introduction of flexible features could not only be relevant for countries that have not yet introduced fiscal rules, but also make a difference across fiscal rule adopters, stressing the importance of fiscal rule design for public investment outcomes.

If as argued above rule design matters, it becomes important to discard the possibility that the presence of a fiscal rule per se is driving our results. Column 5 shows that introducing a fiscal rule of any sort is not as useful to protect public investment.⁹ In the presence of fiscal rules, public investment falls by 4.8 percent (se=1.8 percent), and this effect cannot be distinguished from a situation without fiscal rules (see Figure 3, panel D). Finally, Column 6 provides an important insight: flexible fiscal rules are not useful at protecting every type of public spending. Current primary spending falls during fiscal consolidations approximately between approximately 2 and 4 percent regardless of having a flexible fiscal rule or not (see Figure 3, panel E). This result, together with our previous finding about the role of flexible rules in protecting public investment, points to the ability of fiscal rule design to affect the growth-friendliness of fiscal adjustment strategies.

⁹In this specification we define any sort of fiscal rule with a dummy equaling 1 if a numerical constraint is imposed on any fiscal aggregates at time t and 0 otherwise.

Table 1: Baseline Panel Regressions. Effect of fiscal rules on public investment and current spending growth rate, during fiscal consolidations.

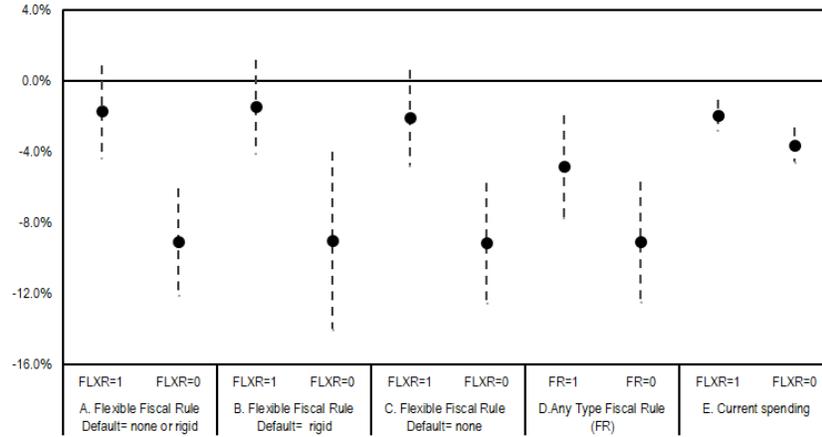
	Dep. Var					
	Public Investment					Current Spending
	[1]	[2]	[3]	[4]	[5]	[6]
Fiscal Consolidation (FC)	-0.107*** (0.0153)	-0.0908*** (0.0183)	-0.0899*** (0.0306)	-0.0914*** (0.0208)	-0.0905*** (0.0207)	-0.0360*** (0.00597)
Flexible Fiscal Rule (FLXR)	-0.00651 (0.0119)	-0.00906 (0.0107)	-0.00919 (0.0156)	-0.00331 (0.0147)		0.00263 (0.00486)
FC * FLXR	0.0829*** (0.0217)	0.0739*** (0.0231)				0.0170** (0.00801)
FC * FLXR (Default = rigid)			0.0756** (0.0344)			
FC * FLXR (Default= no rule)				0.0710*** (0.0247)		
Anytype of Fiscal Rule (FR)					-0.00989 (0.0124)	
FC * FR					0.0423 (0.0254)	
Population		1.201 (1.218)	1.153 (1.500)	1.701 (1.393)	1.314 (1.220)	0.210 (0.352)
Growth Real GDP		2.119*** (0.262)	2.036*** (0.377)	2.318*** (0.337)	2.146*** (0.264)	0.475*** (0.128)
Debt to GDP		0.0183 (0.0337)	-0.00769 (0.0289)	0.0310 (0.0411)	0.0175 (0.0353)	-0.0479*** (0.0128)
Observations	1,530	1,508	844	1,146	1,508	1,458
R-squared	0.080	0.164	0.207	0.148	0.160	0.172
Number of countries	75	75	52	70	75	73
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes	Yes	Yes

Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017).

Note: robust cluster standard errors in brackets. Significance level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, respectively.

Intercepts are included but not reported.

Figure 3: Marginal Effects. Effect of fiscal rules on public investment and current spending growth rate, during fiscal consolidations.



Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017). Note: confidence intervals (IC) of 90% (dashed line).

Finally, to uncover the medium-term effects of our baseline results, we estimate a dynamic version of Equation 1 through the construction of impulse response functions (IRF). To do so, we follow the single-equation approach advocated by Jorda (2005) and Stock and Watson (2007). For this purpose, linear local projections(LP) of public investment growth on lags and current change of independent variables and other controls are used for the construction of IRF.¹⁰ The accumulated response of public investment growth at the horizon h is estimated by modifying Equation 1 as follows:

$$\Delta G_{i,t+h}^{PI} = \alpha_{i,h} + \phi_{t,h} + \beta_{flxr,h} FLXR_{i,t} + \beta_{fc,h} FC_{i,t} + \beta_{fcflxr,h} FC_{i,t} * FLXR_{i,t} + \theta_h(L)X_{i,t-1} + \lambda_h(L)\Delta G_{i,t-1}^{PI} + \mu_{i,t,h} \quad (2)$$

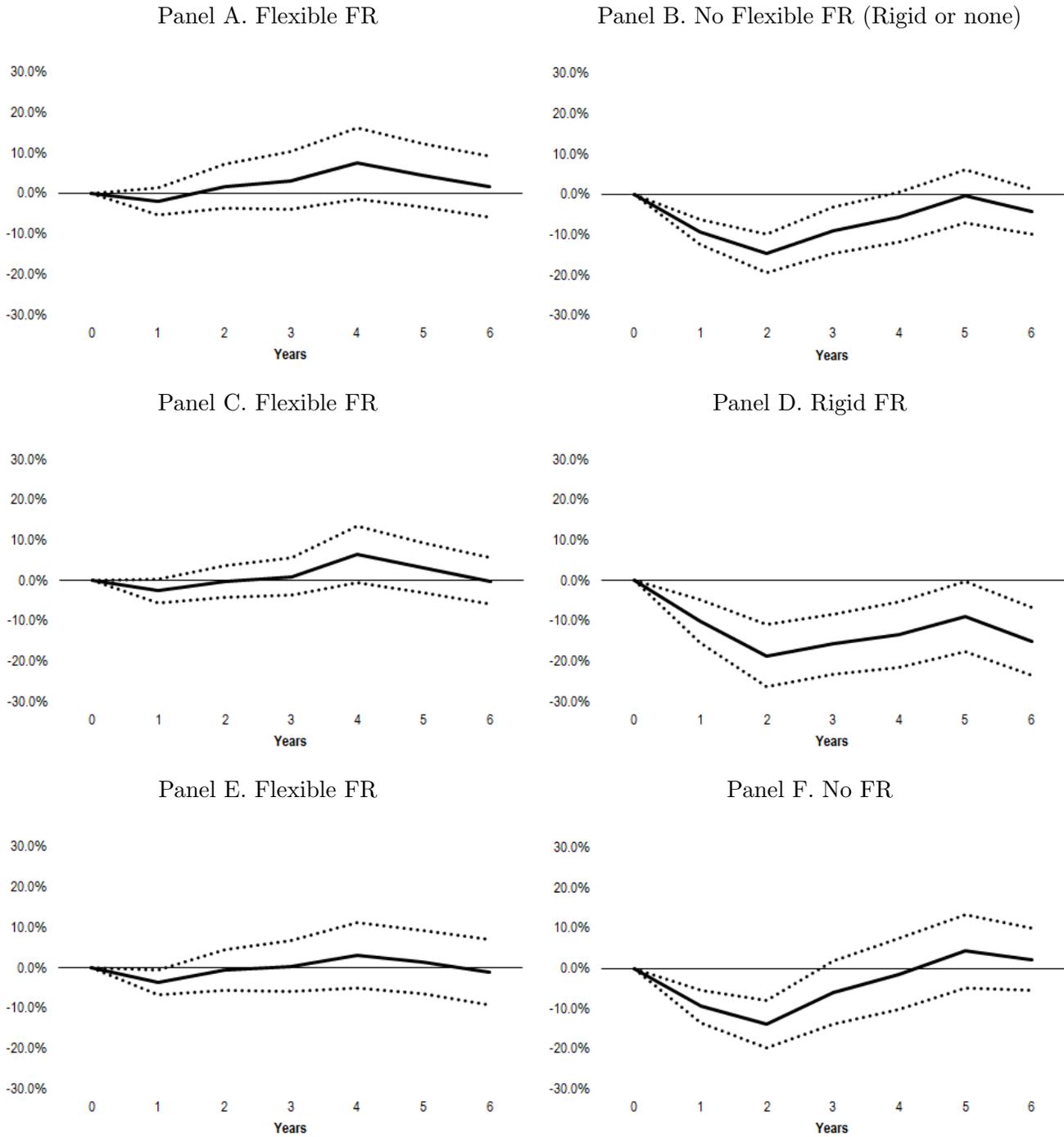
It is important to note that, in this approach, each step in the accumulated IRF is obtained from a different individual equation (Riera-Crichton, Vegh and Vuletin, 2014). We thus obtain the IRF values directly from the $\beta_{fc,h}$ estimated coefficients. The estimated coefficients contained in $\lambda(L)$ and $\theta(L)$ are not use directly to build the IRF values but only serve as controls, "cleaning" the $\beta_{fc,h}$ from the dynamic effects of public investment and the dynamics effects of other controls.

¹⁰As discussed in Jorda (2005), there are multiple advantages in the use of LP. In particular, LP (i) can be estimated by single-regression techniques (least-squares dummy variables), (ii) are more robust to potential misspecifications, and (iii) can easily accommodate highly non-linear and exible specifications.

Figure 4 presents results allowing for different types of comparisons or default scenarios. Panels A and Panel B contrast the behavior of public investment over time between countries with flexible rules against those countries without fiscal rules, or those without flexibility mechanisms (rigid rules). Panels C and D compare the performance of public investment *across* fiscal rule adopters: that is, those countries with flexible rules vs. those with rigid rules, and finally, Panels E and F do the same for the case of countries with flexible rules vs. those no fiscal rules. In all panels, $t = 1$ is the year of the fiscal consolidation shock.

It can be appreciated that in the presence of flexible fiscal rules, public investment does not fall during fiscal consolidation periods, neither in the year of consolidation nor in subsequent years. However, for countries without flexible fiscal features or no rules, the adjustment in public investment is persistent: it is significantly reduced for at least two consecutive years, and never approaches positive values. Concentrating on panels C and D, and relaxing the interval estimator through the use one-standard error bands, it can be noted that public investment starts *growing* over the medium term ($t=4$) under the presence of flexible fiscal rules. Instead, public investment falls in $t=1$ and all consecutive years in the absence of flexibility mechanisms.

Figure 4: Dynamic effect of having a flexible fiscal rule).



Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017). *Note:* confidence intervals (IC) of 90% (dashed line).

5 Robustness

We add to the above baseline results several robustness checks, by introducing: (1) additional control variables¹¹, (2) alternative definitions and measures of fiscal consolidations, (3) alternative measures of the dependent variable, and (4) checking whether there is a particular flexible feature driving our results. Table A4 of the Appendix shows results from this robustness exercise, and Figure 5 presents the relevant marginal effects.¹²

In Panel A, we first define a fiscal consolidation as a single year in which the cyclically adjusted primary balance improves by at least 1.5 of GDP (Alesina and Ardagna 2010). Based on this alternative definition, public investment falls approximately 10.4 percent during one-year fiscal adjustments, but this negative effect is neutralized when there is a flexible fiscal rule in place. Secondly, we draw on the so called “narrative” approach to identify fiscal consolidations episodes across developed economies.¹³ In particular, data on narrative fiscal consolidation episodes is available from Guajardo et al. (2014) and Alesina et al. (2017) for 17 OECD countries (1978-2014). This dataset is based on a careful reading of fiscal legislation and relevant historical records and measures concrete policy actions taken to affect the budget balance, both on the spending and tax side. Using this data, it is possible to observe reactions to actual policies rather than reactions to variables that may be affected by government actions or not, such as changes in the cyclically adjusted fiscal balance over a given period of time. Even in this reduced sample of advanced economies, our main result remains robust.¹⁴

Panel B uses our baseline fiscal consolidation measure based on two years episodes, but the dependent variable is now expressed as the change in the public investment to GDP ratio from one year to the next. It can be appreciated that a fiscal consolidation reduces this ratio by 0.5 percentage points if there is no flexible fiscal rule in place. In contrast, flexibility mechanisms help to neutralize the negative effect of fiscal adjustments. Finally, if we replicate the analysis but

¹¹We control for the per capita stock of public capital, old age dependency ratio, a measure of the quality of governance (control of corruption), and GDP per capita levels.

¹²We have also checked whether the composition of fiscal adjustment affects our results. Results from restricting the analysis to expenditure driven fiscal consolidations show results consistent with baseline findings (available upon request).

¹³The narrative approach was pioneered by Romer and Romer (2010) to examine the effects on US output of changes in tax rates identified from the historical record.

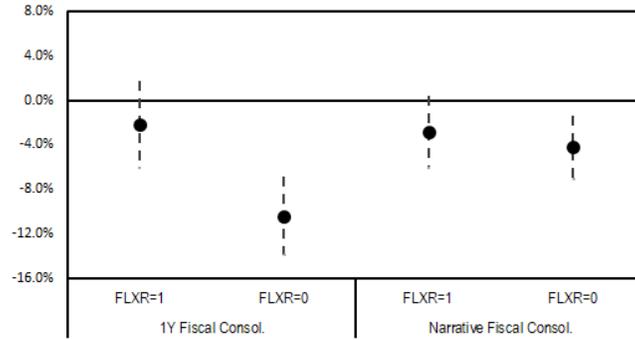
¹⁴In addition to cyclically adjusted and narrative episodes, we also used the observed primary balance to identify fiscal consolidation episodes, allowing us to expand the sample significantly. Results (available upon request) are consistent with our baseline findings.

using the share of public investment on total expenditure (TE) as a dependent variable, we obtain conclusions in line with our baseline results.

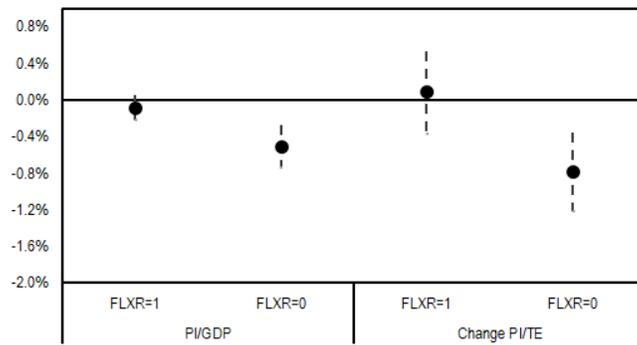
Finally, Panel C considers each of the flexible features separately. Across the three cases, flexible mechanisms tend to counteract the negative effects of fiscal adjustments on public investment, with estimated effects less precisely estimated in the case of escape clause provisions, and balance rules with cyclically adjusted targets.

Figure 5: Robustness checks. Marginal Effects using alternative definitions of independent and dependent variables, and considering flexible mechanisms separately.

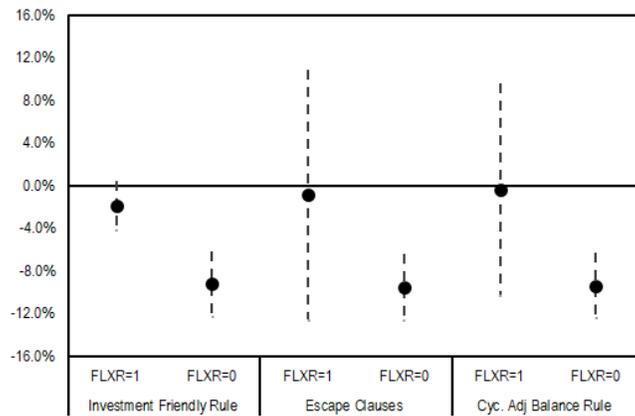
Panel A. Alternative definition and measure of fiscal consolidation.



Panel B. Alternative dependent variables.



Panel C. Considering flexibility features separately.



Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017). Note: Marginal effects computed from Table A3, Columns 2-8. Confidence intervals (IC) of 90% (dashed line).

6 Addressing endogeneity

An important aspect that may be biasing our results is the presence of endogeneity between fiscal rules and the behavior of public investment. Fiscal rules will typically be endogenous in many empirical applications of interest since governments may have an incentive to change fiscal institutions in response to changes in fiscal performance (Poterba, 1994; Badinger and Reuter, 2015; Asatryan et al. 2018). Thus, in order to control for potential endogeneity concerns, we turn to an instrumental variable approach next.

We begin by using a measure of institutional quality (IQ) as an instrument of flexible fiscal rules, since it is plausible to think that countries with stronger political institutions are more likely to adopt fiscal rules in the first place¹⁵. As an instrumental variable, IQ must satisfy relevance and exogeneity conditions. Relevance is tested in Table 2, Column 1. It can be appreciated that IQ is a significant determinant of flexible fiscal rule presence. Additionally, we guarantee exogeneity by using an initial IQ value for 1984 as instrument, given that our sample runs from 1990 to 2018. Since the IQ value we use is constant for each country in the sample, we exclude fixed effects from the regressions.

Table 2 presents pooled IV estimates. Column 2 reports the second stage of our instrumental variable regression and indicates that public investment falls close to 12 percent during fiscal adjustment episodes. At the same time, our main result continues to hold: introducing a flexible fiscal rule neutralizes the fall in public investment during fiscal adjustments. The interaction term results statistically significant at standard levels of confidence and the marginal effect is not statistically different from zero (Figure 6).

Column 3 presents two additional instruments typically found in the literature on the determinants of fiscal rules: government fragmentation and check and balances (Badinger and Reuter, 2015). Again, relevance condition is shown in Table 2, Column 3. While first stage estimates present the expected signs, IQ is the only relevant factor to explain whether a country has a flexible fiscal rule or not. Exogeneity condition of these instruments is guaranteed in the same way as IQ, by including them with their out of sample value in 1984. Column 4 shows the second stage of our instrumental variable regression.¹⁶ It shows that public investment falls by around 12.3

¹⁵To define IQ we follow Frankel, Vegh and Vuletin (2012). We construct an index of IQ by calculating the average of four variables from the International Country Risk Guide dataset: investment profile, corruption, law and order and bureaucratic quality.

¹⁶Both in the specification with one instrumental variable and in that with several instruments we cannot reject that FLXR can be treated as exogenous (see p-value for Wu-Hausman). F statistic for testing weak instrument is

percent during fiscal consolidation episodes. However, having a flexible fiscal rule neutralizes the negative effect on public investment, since the interaction term is statistically significant. Marginal effects are plotted and presented in Figure 6.

Table 2: IV Regressions. Effect of fiscal rules on public investment growth rate, during fiscal consolidations.

	Instrumented: Flexible Fiscal Rule			
	IV: IQ		IV: IQ, Check and Balances and Gov. Fragmentation	
	First Stage Flexible FR	Second Stage % Change PI	First Stage Flexible FR	Second Stage % Change PI
	[1]	[2]	[3]	[4]
FC		-0.119*** (0.0423)		-0.123*** (0.0395)
FLXR		-0.0165 (0.0294)		-0.0161 (0.0281)
FC * FLXR		0.162* (0.0913)		0.181** (0.0854)
Institutional Quality	0.130*** (0.0390)		0.121** (0.0563)	
Institutional Quality * FC	0.0126 (0.0127)		-0.0546 (0.0335)	
Government Fragmentation			0.00647 (0.202)	
Checks and Balances			0.0176 (0.0472)	
Government Fragmentation * FC			-0.257 (0.214)	
Checks and Balances * FC			0.102** (0.0500)	
Population	-2.377 (4.661)	0.152 (0.444)	-0.615 (5.566)	0.260 (0.498)
Growth Real GDP	-0.580 (1.006)	1.415*** (0.331)	-0.592 (0.997)	1.405*** (0.322)
Debt to GDP	-0.194 (0.149)	-0.0123 (0.00974)	-0.154 (0.166)	-0.0125 (0.00938)
Observations	1,092	947	1,048	903
R-squared	0.224	0.187	0.231	0.193
Country Fixed Effect	No	No	No	No
Year Dummies	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Wu-Hausman (p-value)		0.7694		0.6566
Robust F (first stage)		3.724		2.194
Prob > F		0.032		0.063
Min. Eigenvalue stat		33.41		13.78
Sargan Test (p-value)				0.8471

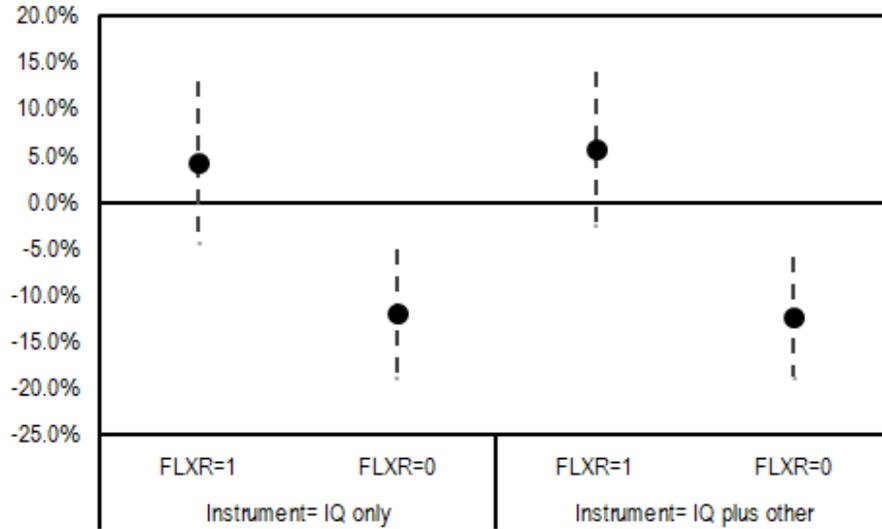
Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017).

Note: robust cluster standard errors in brackets. Significance level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, respectively.

Intercepts are included but not reported.

significant at the typical 10% level, but is lower than 10 as Stock, Wright, and Yogo (2002) suggests. If we are willing to accept at most a rejection rate of 15% of a nominal 5% Wald test, we can reject the null hypothesis that the instruments are weak, because the Min. Eigenvalue statistic exceeds its critical value in both specifications (Stock and Yogo, 2005). For the specification with several instruments Sargan's (1958) test statistics is not significant at standard significance levels, which means that our structural model is correctly specified.

Figure 6: Addressing endogeneity. Marginal Effects using Instrumental Variables.



Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017). *Note:* Marginal effects computed from Table 2, Columns 2 and 4. Confidence intervals (IC) of 90% (dashed line).

7 Mechanisms

Why would flexible fiscal rules help to protect public investment from budget cuts? One possibility is that such rules are more likely to be associated with lower levels of public investment procyclicality. Consider each of the design features included in the definition of flexible rules and their implications in terms of the cyclical behavior of public spending. First, rules with structural (as opposed to nominal) fiscal targets allow automatic stabilizers to operate over the business cycle; secondly, escape clauses allow discretionary fiscal support when needed the most (bad times), and finally, investment friendly rules do not constrain public investment levels by definition. Thus, for different but complementary reasons, flexible rules should help contain procyclical biases in public investment. In this section, we examine the plausibility of this mechanism empirically, while controlling for the traditional determinants of fiscal cyclicality usually discussed in the literature, such as limited creditworthiness (Gavin and Perotti 1997) and political economy factors (Frankel et al. 2012; Alesina et al. 2008).¹⁷

¹⁷The notion that flexible features affect the cyclical stance of fiscal policy was first discussed in Guerguil et al. (2017). The authors use propensity score matching techniques to estimate the effects of different fiscal rule features on public spending cyclicality. Our exercise differs in two main ways: we use standard panel techniques, and measure public investment cyclicality with alternative estimation strategies.

7.1 Cross-sectional evidence

Following Kaminsky, Reinhart and Vegh (2004), we first measure variation in cyclicity levels using the correlation coefficient between the cyclical component of output and public investment over the period 1990-2018 for each country in our sample. Figure A2 (Appendix) presents cyclicity coefficients conditional on the presence of flexible features. As the Figure indicates, public investment cyclicity is significantly higher in countries without flexible fiscal rules: the median correlation is 0.23 for countries without such features, and only 0.03 in countries that include at least one flexible characteristic. Moreover, the frequency of countercyclical policy responses is two times higher among flexible rule adopters: while only 25 percent of countries without flexible features show a negative correlation between GDP and capital expenditure, this share is 50 percent among countries including flexible design characteristics.

7.2 Panel-level evidence

To exploit within country variation in cyclicity levels over time, we estimate the following Equation in a panel of yearly data:

$$ccG_{i,t}^{PI} = \alpha_i + \phi_t + \beta_{ccY} ccY_{i,t} + \beta_{ccYflxr} ccY_{i,t} * FLXR_{i,t} + \theta X_{i,t} + \mu_{i,t} \quad (3)$$

Where $ccG_{i,t}^{PI}$ and $ccY_{i,t}$ are cyclical components of public investment and output, respectively.¹⁸ $X_{i,t}$ is a vector of control variables, α_i are country fixed effects and ϕ_t are time fixed effects. Our main coefficient of interest, $\beta_{ccYflxr}$, is the interaction between the cycle and our flexible fiscal rule dummy. As the sign of β_{ccY} consistent with a procyclical policy response is positive, we interpret a negative $\beta_{ccYflxr}$ coefficient as evidence in favor of our proposed mechanism.

In testing our argument against alternative explanations, we include in our specifications two other important determinants of fiscal cyclicity. First, we use the financial openness index from Chinn and Ito (2006) and the debt to GDP ratio as alternative proxies for borrowing constraints. Secondly, to allow for differences in the quality of governance over time, we draw on World Bank's Governance Indicators and include a control of corruption measure, which has been found to ameliorate procyclical fiscal biases in the literature (Alesina et al. 2008).

¹⁸We use the the Hodrick-Prescott (HP) filtering technique to estimate output gaps, setting the lambda parameter to 6.25.

We estimate Equation 3 using two econometric methods: Columns 1-5 in Table 3 present OLS fixed effects regressions, and Columns 6-10 present Instrumental Variables (IV) estimations, in which we instrument the output gap of each country in our sample with the export weighted output gap of its trading partners using the Atlas of Economic complexity data¹⁹, in order to account for the fact that the output gap is affected by fiscal policy through the spending multiplier.²⁰ Each column reports results from introducing the relevant interactions one at a time until all interactions are present. For inference, we cluster the standard errors at the level of countries.²¹

The main result of Table 3 is a negative, statistically significant, and economically large association between fiscal rule design and public investment procyclicality. In particular, the level of procyclicality is significantly lower in the presence of flexible fiscal rule features. For example, coefficients from Model 5 suggest that in the absence of flexible rules, a 1 percentage point deterioration in the output gap is associated with a 3 percent decrease in real public investment. However, procyclicality is reduced by almost 50% when flexible features are introduced. These results hold and are economically larger after accounting for reverse causality problems. For example, in Models 6,7, and 9, public investment falls between 3 and 4.5 percentage points for every percentage point worsening in the output gap.²² However, this effect is neutralized when countries adopt flexible features, turning public investment patterns from procyclical to at least acyclical. Regarding the control variables, there is some evidence that lower levels of financial openness (a proxy for credit constraints) are positively related to public investment cyclicality (Columns 4 and 5), and lower values of the control of corruption index positively related to procyclical biases. Even after accounting for such standard determinants, fiscal rule design remains a strong predictor of cyclical behavior, which is consistent with our previous findings regarding the role of flexible features in protecting public investment from large budget cuts.

¹⁹See <http://atlas.cid.harvard.edu/data>

²⁰Our IV strategy follows Lane (2003); Gali and Perotti (2003), Jaimovich and Panizza (2007); Lledo et al. (2011), among others.

²¹See Table A5 (Appendix) for the first stage regressions of IV estimates.

²²In all IV estimations, we reject the null of no correlation in the underidentification test (Kleibergen-Paap rk LM statistic). The Kleibergen-Paap Wald rk F statistic is reported to test weak instruments and the critical values for Stock and Yogo test are: 10% = 7.03; 15% = 4.58; 20% = 3.95; 25% = 3.63. We can reject the null of weak instrument in estimations [6] and [7].

Table 3: Panel Fixed Effects Regressions between Cyclical Components of Public Investment and GDP conditional on fiscal rule design.

	Dep. Var.:Cyclical component of public investment									
	OLS Fixed Effect					IV Fixed Effect				
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Cyclical component of GDP	2.312*** (0.332)	2.616*** (0.341)	2.827*** (0.509)	2.330*** (0.390)	3.268*** (0.564)	3.789** (1.658)	4.586** (2.123)	2.563 (1.761)	3.904** (1.782)	3.443 (2.498)
FLXR	0.0157 (0.0181)	0.0143 (0.0167)	0.0179 (0.0182)	0.0241 (0.0194)	0.0183 (0.0167)	0.0188 (0.0169)	0.0189 (0.0154)	0.0204 (0.0174)	0.0300 (0.0216)	0.0236 (0.0185)
Cyclical component of GDP * FLXR	-1.809*** (0.587)	-1.456** (0.574)	-1.791*** (0.598)	-1.880** (0.758)	-1.600** (0.740)	-2.741** (1.228)	-2.196** (1.000)	-2.562* (1.458)	-2.537* (1.354)	-2.418* (1.253)
Financial openness		0.0203 (0.0230)			0.0325 (0.0280)		0.0209 (0.0238)			0.0357 (0.0297)
Cyclical component of GDP * Financial openness		-0.359** (0.157)			-0.450** (0.185)		-0.577 (0.474)			-0.816 (0.632)
Debt to GDP			-0.0222 (0.0160)		-0.0397* (0.0216)			0.0711 (0.0943)		0.0854 (0.132)
Cyclical component of GDP * Debt to GDP			-1.113 (0.672)		-1.448** (0.639)			3.907 (3.962)		4.661 (5.729)
Control of Corruption				0.00529 (0.0378)	0.00825 (0.0339)				-0.0258 (0.0364)	-0.0401 (0.0411)
Cyclical component of GDP * Control of Corruption				-0.0609 (0.277)	0.383* (0.202)				-0.0315 (0.386)	0.0275 (0.958)
Observations	1,451	1,415	1,429	1,178	1,145	1,306	1,277	1,316	1,105	1,076
R-squared	0.041	0.047	0.042	0.039	0.048					
Number of countries	71	69	71	71	69	71	69	73	71	69
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Underidentification Test						48.25	46.88	15.38	36.65	5.548
Chi-sq p-value						0.000	0.000	0.000	0.000	0.0185
Weak Instrument Test						15.92	11.97	3.526	7.392	0.876

Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017).

Note: robust cluster standard errors in brackets. Significance level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, respectively. Intercepts are included but not reported.

Underidentification Test: Kleibergen-Paap rk LM statistic. Weak Instrument Test: Kleibergen-Paap rk Wald F statistic.

8 Policy trade-offs?

As discussed in Section 2, the literature on optimal fiscal rules draws on a theoretical trade-off between commitment and flexibility. So far, our empirical analysis has concentrated on understanding the implications of certain fiscal rule features on one side of this trade-off: the ability to protect public investment during fiscal adjustments, and more generally, to improve public investment management over the business cycle by avoiding procyclical biases. However, by allowing greater scope for countercyclical policy, is it the case that flexible rules do a worse job in terms of assuring fiscal sustainability?

This section provides a first attempt at answering this question empirically. Specifically, we focus on the relationship between different types of fiscal rules and the occurrence of sovereign debt crisis using data from Reinhart and Rogoff (2011). These events are defined as the failure by governments to meet an interest or principal payment on time, and include domestic or external

types of crisis.

We model the probability of observing debt crisis as a function of the presence of a fiscal rule of any sort, and compare coefficients with the effect of flexible rules on the same outcome of interest. Following Asatryan et al. (2018), our control variables include population size, per capita income, the level of democracy²³, and public debt-to-GDP ratios. Columns 1-4 in Table 4 present results from pooled probit regressions, and Columns 5-8 introduce or IV setup in which flexible rules are instrumented with initial institutional quality.^{24 25}

The main result is that fiscal rules in general, and flexible rules in particular, are associated with a reduced probability of observing debt crises. According to Models 1-4, the magnitude of this average effect oscillates between 10-13%, once we account for the public debt-to-GDP ratio in even numbered columns. As shown by Figure 7, the marginal effects of general fiscal rules and flexible features are of similar magnitude. This fact does not allow us to conclude that the latter lack fiscal rigor, at least seen through the lens of the broad measure of fiscal sustainability used here.²⁶

²³As measured by Polity2 scores which subtracts the country's score in an "autocracy" index from its score in a "democracy" index (resulting in a range from -10 to 10).

²⁴We have tried using a generalized diff-in-diff design following Equations 1 and 2 as in previous sections, but the fact that in several countries sovereign debt crisis are never observed results in a significant loss of observations.

²⁵See Table A6 (Appendix) for the first stage regressions of IV estimates.

²⁶This analysis can be expanded in several ways by introducing other measures of fiscal performance traditionally found in the fiscal rule literature (debt levels, government size, etc).

Table 4: Determinants of the probability of debt crises.

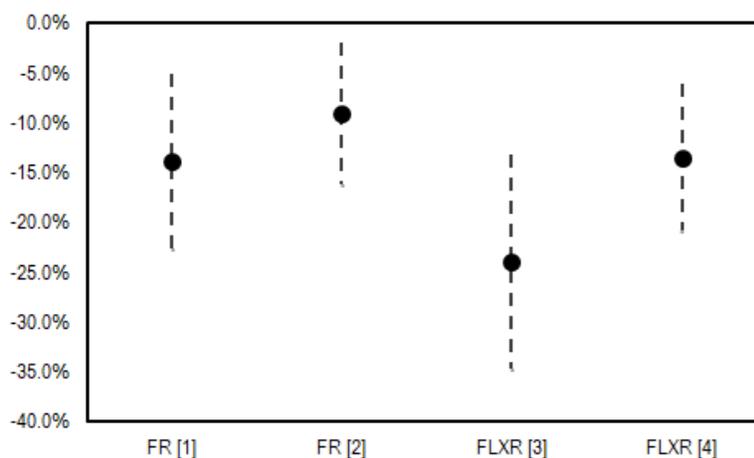
	Dep. Var.:Probability of debt crisis							
	Probit				IV Probit			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
FR	-0.745** (0.294)	-0.764** (0.358)			-2.420*** (0.213)	-2.320*** (0.180)		
FLXR			-1.484*** (0.423)	-1.399*** (0.491)			-2.500*** (0.226)	-2.268*** (0.268)
Real GDP	-0.0263 (0.0244)	0.00460 (0.0327)	-0.0372 (0.0230)	-0.00424 (0.0326)	-0.00713 (0.0316)	0.00406 (0.0319)	-0.00398 (0.0296)	0.0172 (0.0355)
Population	-0.237** (0.115)	-0.335** (0.133)	-0.267** (0.120)	-0.386*** (0.142)	-0.141 (0.0939)	-0.187** (0.0924)	-0.101 (0.116)	-0.143 (0.131)
Polity	-0.0560** (0.0251)	-0.0626** (0.0303)	-0.0627** (0.0247)	-0.0770*** (0.0285)	0.0349 (0.0259)	0.0428 (0.0295)	-0.0169 (0.0270)	-0.0333 (0.0310)
Debt to GDP		0.419 (0.349)		0.184 (0.326)		0.343 (0.332)		-0.599 (0.397)
Observations	1,309	1,054	1,309	1,054	979	800	979	800
Country Fixed Effect	No	No	No	No	No	No	No	No
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald (p value)					0.000	0.000	0.000	0.000

Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017).

Note: robust cluster standard errors in brackets. Significance level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, respectively.

Intercepts are included but not reported.

Figure 7: Marginal effects . Probability of having a debt crisis.



Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017). *Note:* Marginal effects computed from Table 4, Columns 1 and 4. Confidence intervals (IC) of 90% (dashed line).

9 Conclusions and policy implications

This paper has shown how certain features of fiscal rules can help safeguard public investment during fiscal consolidation episodes. These results may have important policy implications. Across emerging economies, there is a growing concern about the decline in public investment in recent years, which has fallen below 1 per cent of GDP for the first time in 20 years on average.²⁷ At the same time, several countries have either recently introduced fiscal rules or are considering strengthening the policy management toolkit through rules-based fiscal frameworks. Including elements related to the protection of public investment in the design of these rules can add a growth enhancing dimension to the fiscal sustainability concerns that have typically been the focus of fiscal rules in the past. Of course, reforms in rules-based fiscal frameworks aimed at safeguarding growth friendly expenditure items should be accompanied by several safeguards. First, to ensure that additional capital expenditures effectively contribute to increasing potential GDP growth, improvements to public investment management institutions are needed in all phases of the cycle from project appraisal through selection, implementation (Gupta et al. 2014). Second, investment-friendly fiscal rules should mitigate opportunistic classifications of capital expenditures (e.g. reporting as spending in infrastructures what is in fact current spending) by strengthening international transparency standards in government finance statistics. Third, strengthening medium-term fiscal frameworks would support an effective implementation of fiscal rules. Finally, enforcement and monitoring mechanisms should be in place to foster rule compliance. For instance, independent fiscal coun-

²⁷Financial Times: Investment in emerging markets falls to historic low (May 10, 2019).

cils can verify whether rules are being complied with or provide ex-ante regular quality control to macroeconomic and fiscal assumptions underpinning the budget process. Further research on how these features interact at the country level could advance our understanding of the general equilibrium or welfare effects of fiscal rules.

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Appendix

Table A1: List of Countries.

Advanced Economies	Developing Asia	Developing Europe and Ex-USSR	Latin America and Caribe	Middle East, North Africa and Sub-Saharan Africa
Australia	China	Bosnia and Herze	Argentina	Algeria
Austria	India	Bulgaria	Barbados	Egypt
Belgium	Indonesia	Croatia	Brazil	Jordan
Canada	Malaysia	Lithuania	Chile	Lebanon
Czech Republic	Philippines	Poland	Colombia	Morocco
Estonia	Thailand	Romania	Costa Rica	Tunisia
Finland	Vietnam	Serbia	Dominican Republ	Angola
France		Turkey	Ecuador	Botswana
Germany		Georgia	El Salvador	Kenya
Greece		Kazakhstan	Grenada	Mauritius
Hong Kong SAR		Russia	Guatemala	Senegal
Iceland		Ukraine	Guyana	South Africa
Ireland			Mexico	
Israel			Panama	
Italy			Paraguay	
Japan			Peru	
Korea			Suriname	
Latvia			Uruguay	
Luxembourg				
Netherlands				
New Zealand				
Portugal				
Slovak Republic				
Switzerland				
United Kingdom				
United States				

Source: Own elaboration based on WEO-IMF country classification.

Table A2: Descriptive Statistics.

	Mean	Sd	Min	10th pct	90th pct	Max	Observations	Source
Public Investment Growth Rate	0.03	0.18	-1.09	-0.15	0.21	1.75	1530	WEO-IMF, October 2018
Fiscal Consolidation (2 Year definition)	0.20	0.40	0.00	0.00	1.00	1.00	1530	WEO-IMF, October 2018
Fiscal Rule (FR)	0.55	0.50	0.00	0.00	1.00	1.00	1530	IMF Fiscal Rules Dataset
Flexible FR	0.32	0.46	0.00	0.00	1.00	1.00	1530	IMF Fiscal Rules Dataset
Other design FR	0.13	0.33	0.00	0.00	1.00	1.00	700	IMF Fiscal Rules Dataset
Population Growth Rate	0.01	0.01	-0.06	0.00	0.02	0.05	1530	WEO-IMF, October 2018
Real GDP Growth Rate	0.03	0.03	-0.16	0.00	0.07	0.22	1530	WEO-IMF, October 2018
Debt to GDP ratio	0.54	0.36	0.00	0.17	1.00	2.38	1508	WEO-IMF, October 2018
Current spending growth rate	0.04	0.07	-0.33	-0.02	0.11	0.46	1480	WEO-IMF, October 2018
Institutional Quality	4.14	1.17	1.85	2.78	5.87	6.45	1281	International Country Risk Guide
Stock of Public Capital per capita	13.76	10.64	0.62	2.87	28.63	57.01	1290	IMF (2015)
Old Age Dependency	17.24	8.06	4.53	7.51	27.64	45.03	1085	World Bank
Control of Corruption	0.42	0.99	-1.39	-0.73	1.94	2.46	1245	World Bank
Real GDP per capita (log)	18.12	2.26	13.91	15.89	22.07	24.39	1530	WEO-IMF, October 2018
Fiscal Consolidation (1 Year definition)	0.15	0.36	0.00	0.00	1.00	1.00	1530	WEO-IMF, October 2018
Narrative Fiscal Consolidation	0.29	0.46	0.00	0.00	1.00	1.00	503	Guajardo et al. (2014)
Change in share of Public investment over GDP from t-1 to t	0.00	0.01	-0.06	-0.01	0.01	0.06	1530	WEO-IMF, October 2018
Change in share of public investment over total expenditure from t-1 to t	0.00	0.02	-0.17	-0.03	0.02	0.19	1480	WEO-IMF, October 2018
Government Fragmentation	0.28	0.28	0.00	0.00	0.69	0.91	1413	Database of Political Institutions IADB
Checks and Balances	3.48	1.74	1.00	1.00	5.00	18.00	1414	Database of Political Institutions IADB
Financial openness	1.01	1.48	-1.91	-1.20	2.36	2.36	1494	Chinn-Ito Financial Openness Index
Polity2	7.04	4.62	-7.00	-2.00	10.00	10.00	1328	Center for Systemic Peace

Source: Own elaboration.

Table A3: Public investment growth rates during fiscal consolidations episodes.

	All Episodes	Episodes with Fiscal rules	Episodes w/o Fiscal Rules
		Growth rate public investment	
Median	-2.6%	-2.5%	-3.0%
N	299	181	118
		Of wich, flexible features in place	W/o flexible features
Median		-0.4%	-4.6%
N		102	79

Source: Own elaboration based on WEO-IMF.

Table A4: Robustness of baseline results. Effects of fiscal rules on public investment during fiscal consolidations.

	Dep. Var							
	% Change PI			Change PI/GDP	Change PI/TE	% Change PI		
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
FC	-0.0790*** (0.0256)			-0.00507*** (0.00138)	-0.00783*** (0.00261)	-0.0921*** (0.0187)	-0.0949*** (0.0189)	-0.0937*** (0.0185)
FLXR	0.0388* (0.0216)	-0.00544 (0.0114)	-0.0118 (0.0232)	-0.000295 (0.000698)	-0.00116 (0.00222)			
FC * FLXR	0.0691** (0.0309)			0.00422** (0.00169)	0.00871** (0.00379)			
Control of Corruption	0.0179 (0.0297)							
Stock of Capital per capita	-0.0155*** (0.00389)							
Old Age Dependency	0.00511 (0.00436)							
Real GDP per capita (log)	-0.0439 (0.0746)							
1Y Fiscal Consolidation		-0.104*** (0.0213)						
1Y Fiscal Consolidation * FLXR		0.0827*** (0.0313)						
Narrative Fiscal Consolidation			-0.0419** (0.0174)					
Narrative Fiscal Consolidation * FLXR			0.0137 (0.0318)					
Investment Friendly Fiscal Rule (IFR)						0.00192 (0.0167)		
FC * IFR						0.0738*** (0.0234)		
Escape Clause (EC)							0.0262 (0.0275)	
FC * EC							0.0868 (0.0742)	
Cyc. Adj. Balance (CAB)								0.00539 (0.0242)
FC * CAB								0.0903 (0.0630)
Population Growth Rate	-0.635 (1.714)	1.190 (1.199)	6.364*** (1.563)	-0.0336 (0.0439)	-0.104 (0.117)	1.008 (1.256)	0.725 (1.397)	0.789 (1.423)
Real GDP Growth Rate	2.283*** (0.398)	2.108*** (0.261)	1.707** (0.606)	0.0378*** (0.0138)	0.142*** (0.0405)	2.194*** (0.278)	2.106*** (0.278)	2.037*** (0.264)
Debt to GDP	-0.0325 (0.0601)	0.0130 (0.0346)	-0.00213 (0.0169)	0.000844 (0.00163)	0.00319 (0.00596)	0.0256 (0.0366)	0.00752 (0.0475)	0.0175 (0.0477)
Observations	859	1,508	318	1,525	1,475	1,294	1,151	1,150
R-squared	0.217	0.169	0.273	0.080	0.043	0.177	0.176	0.181
Number of Countries	72	75	14	75	73	75	71	71
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017).

Note: robust cluster standard errors in brackets. Significance level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, respectively.

Intercepts are included but not reported.

Table A5: First Stage Regression of Instrumental variables regressions between cyclical components (cyc. comp.) of public investment and GDP conditional on fiscal rule design. Table 3 in the main text.

	First Stage Regression						
	Column 6 at Table 3		Column 10 at Table 3				
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
	cyc. comp. of GDP	cyc. comp. of GDP*FLXR	cyc. comp. of GDP	cyc. comp. of GDP*FLXR	cyc. comp. of GDP*Financial openness	cyc. comp. of GDP*Debt to GDP	cyc. comp. of GDP*Control of Corruption
TP cyc. comp.	0.988*** (0.277)	0.0361 (0.0428)	1.401*** (0.316)	0.00481 (0.0513)	0.728 (0.622)	0.181 (0.210)	0.0978 (0.240)
TP cyc. comp.*FLXR	0.135 (0.150)	1.137*** (0.103)	-0.0940 (0.170)	1.094*** (0.0881)	-0.0194 (0.299)	0.0180 (0.105)	-0.0867 (0.169)
TP cyc. comp.*Financial openness			0.0615 (0.0788)	0.0115 (0.00908)	1.143*** (0.169)	-0.00482 (0.0270)	-0.0407 (0.0744)
TP cyc. comp.*Control of Corruption			0.151* (0.0874)	-0.00177 (0.0332)	0.0886 (0.147)	0.155*** (0.0540)	1.149*** (0.145)
TP cyc. comp.*Debt to GDP			-0.971*** (0.311)	-0.0151 (0.0608)	-1.507** (0.610)	0.221 (0.339)	0.125 (0.266)
Financial openness			-0.00116 (0.000747)	-8.44e-05 (0.000377)	0.000223 (0.00117)	-0.000704 (0.000698)	8.38e-05 (0.000911)
Control of Corruption			0.00535* (0.00298)	0.000618 (0.000772)	0.00466 (0.00543)	0.00450** (0.00198)	0.00406 (0.00294)
Debt to GDP			-0.0256*** (0.00474)	-0.00247** (0.000976)	-0.0316*** (0.0112)	-0.0226*** (0.00469)	-0.00725 (0.00735)
FLXR	-0.000788 (0.00136)	-0.000414 (0.000820)	-0.00173 (0.00150)	-0.00133 (0.000903)	-0.00273 (0.00339)	-0.000313 (0.00118)	-0.000126 (0.00111)
Observations	1,306	1,306	1,076	1,076	1,076	1,076	1,076
R-squared	0.382	0.554	0.471	0.588	0.489	0.320	0.510
Number of Countries	71	71	69	69	69	69	69
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017).

Note: robust cluster standard errors in brackets. Significance level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, respectively. Intercepts are included but not reported. TP is the abbreviation for Trading partners. First stages associated with Columns 7 -9 are not reported for brevity.

Table A6: First Stage Regression of Instrumental variables regressions between probability of having a debt crisis and fiscal rule design. Table 4 in the main text.

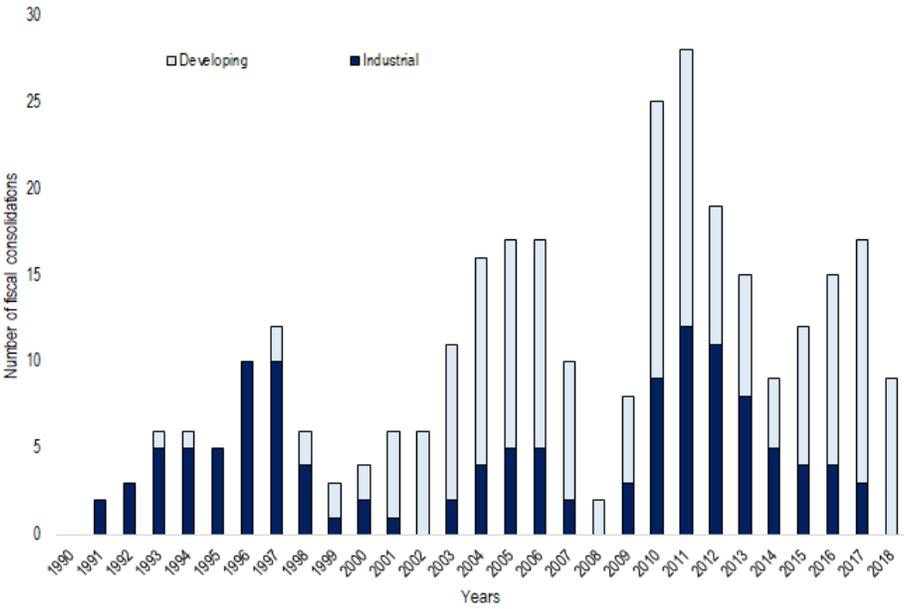
	First stage regressions. Columns 5-8 at Table 4			
	Dep. Var. FR		Dep. Var. FLXR	
	[1]	[2]	[3]	[4]
Institutional Quality	0.117*** (0.0336)	0.0883** (0.0383)	0.126*** (0.0388)	0.131*** (0.0423)
Real GDP per capita (log)	0.00885 (0.0105)	0.00929 (0.0132)	0.0115 (0.0105)	0.0190 (0.0150)
Population (log)	-0.0238 (0.0238)	-0.0438 (0.0296)	-0.00337 (0.0294)	-0.0111 (0.0382)
Polity 2	0.0183** (0.00797)	0.0255*** (0.00929)	-0.00335 (0.00859)	-0.00480 (0.0109)
Debt to GDP		0.217** (0.102)		-0.164 (0.154)
Observations	979	800	979	800
Country Fixed Effect	No	No	No	No
Year Dummies	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017).

Note: robust cluster standard errors in brackets. Significance level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, respectively.

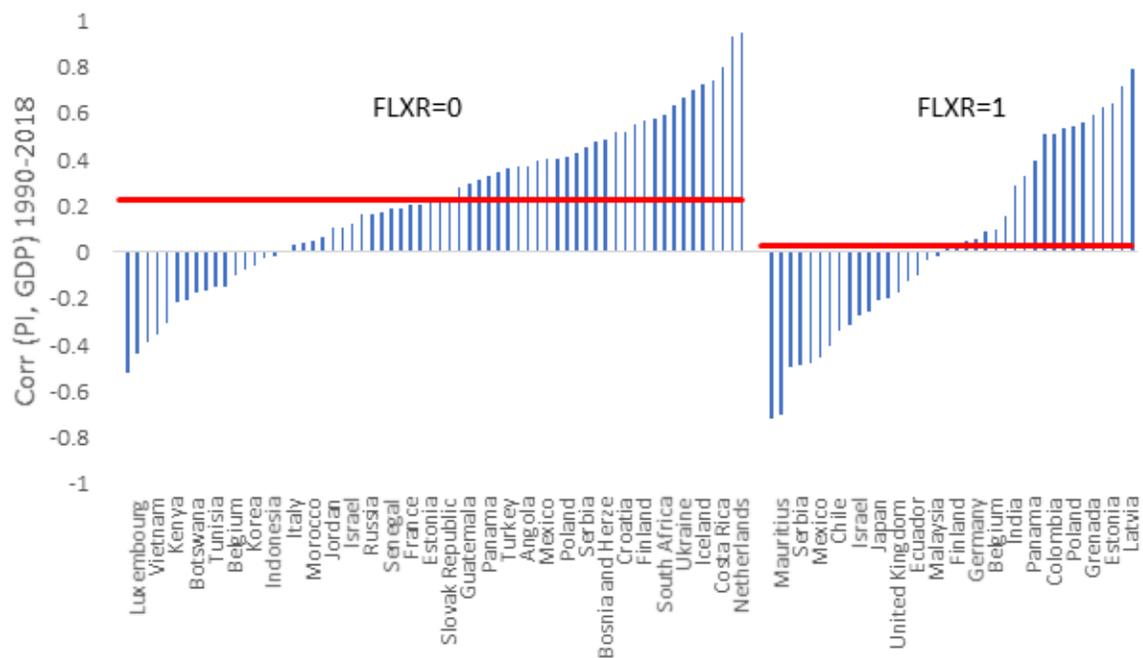
Intercepts are included but not reported.

Figure A1: Distribution of fiscal consolidations over time. Developing and industrial countries. 1990 - 2018.



Source: Own elaboration based on WEO-IMF.

Figure A2: Country Correlations between Cyclical Components of Public Investment and GDP conditional on fiscal rule design.



Source: Own elaboration based on WEO-IMF and IMF fiscal rules dataset (IMF 2017).