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Fiscal Affairs Department

Flexible Fiscal Rules and Countercyclical Fiscal Policy[1]

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Abstract

This paper assesses the impact of different types of flexible fiscal rules on the procyclicality of fiscal policy with propensity scores-matching techniques, thus mitigating traditional self-selection problems. It finds that not all fiscal rules have the same impact: the design matters. Specifically, investment-friendly rules reduce the procyclicality of both overall and investment spending. The effect appears stronger in bad times and when the rule is enacted at the national level. The introduction of escape clauses in fiscal rules does not seem to affect the cyclical stance of public spending. The inclusion of cyclical adjustment features in spending rules yields broadly similar results. The results are mixed for cyclically-adjusted budget balance rules: enacting the latter is associated with countercyclical movements in overall spending, but with procyclical changes in investment spending. Structural factors, such as past debt, the level of development, the volatility of terms of trade, natural resources endowment, government stability, and the legal enforcement and monitoring arrangements backing the rule also influence the link between fiscal rules and countercyclicality. The results are robust to a wide set of alternative specifications.

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Keywords: Fiscal Policy Rules, Flexibility, Investment-friendly Rules, Cyclically-adjusted Balance Rules, Propensity Scores-matching.

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I. INTRODUCTION

The aftermath of the recent Great Recession has seen renewed calls for the use of fiscal policy as a countercyclical instrument, owing to the large and protracted growth and employment costs of the crisis, the limited power of monetary policy when interest rates are at the zero-lower-bound, and the perceived potential for increased public investment to avoid a "secular stagnation" in this environment. At the same time, calls have also abounded for a more decisive strengthening of fiscal institutions, and particularly of fiscal rules, as an instrument to ensure prudent fiscal management and bring public debt ratios to safer levels. There is a tension between the two recommendations, as fiscal rules have often been associated with a procyclical bias, and activist fiscal policy with a weakening of fiscal discipline.[2]

Empirical studies have generally found fiscal rules to be discipline-enhancing (Alesina and Bayoumi, 1996; Bohn and Inman, 1996; Brzozowski and Gorzelak, 2010; Debrun and others, 2008; Fatas and Mihov, 2006; de Haan and others, 1999; Hallerberg and von Hagen, 1997; Manasse, 2006; Perotti and Kontopoulos, 2002; and Tapsoba, 2012). However, the evidence regarding their impact on the cyclical stance of fiscal policy is largely inconclusive. On the one hand, a number of papers have concluded that governments subject to fiscal rules are more prone to procyclical fiscal behavior (Alesina and Bayoumi, 1996; Alt and Lowry, 1994; Lane, 2003; Levinson, 1998; Poterba, 1994; Roubini and Sachs, 1989; and Sorensen and others, 2001). Among spending categories, investment outlays have been found to be more procyclical—countries under pressure to reduce their budget deficits find it politically easier to cut public investment than current outlays (Arezki and Ismail, 2013; Blanchard and Giavazzi, 2004; Dessus and others, 2013). However, other empirical work found that numerical fiscal rules had been associated with less procyclical fiscal behaviors in the European Union (Galí and Perotti, 2003 and Manasse, 2006).

More recently, Ayuso-i-Casals and others (2007), Bova and others (2014), and Combes and others (2014) concluded that fiscal rules could be associated with more countercyclical fiscal policy, provided their design allowed for flexibility, including proper escape clauses, cyclically-adjusted targets, or the extension over several years of the timeframe needed for assessing the compliance with the rule. In a close vein, Bergman and Hutchison (2015) pointed out that fiscal rules are very effective in curbing procyclical fiscal policy once a minimum threshold of government efficiency or quality has been reached.

This paper tries to expand our understanding of the links between fiscal rules and the cyclicality of fiscal policy on three counts. First, it differentiates among types of fiscal rules and explores whether more flexible rules are associated with more, or less, cyclicality. Second, it looks in parallel at the cyclicality of overall spending and that of investment spending. This is important because of the potential growth-enhancing properties of public investment, especially during periods of economic slack and when investment efficiency is high (Afonso and Furceri, 2010; Barro, 1990; IMF, 2014; and Lucas, 1988). And third, it uses propensity scores-matching techniques, borrowed from the microeconomic literature on impact analysis, to handle the self-selection issue that arises

[2] On procyclical bias, a petition signed by 1,100 economists and 11 Nobel laureates in the New-York Times claimed that attempts to strictly keep the budget balanced (in US states) would aggravate recession (see Levinson, 1998). More recently, the former French Minister of Economy, Arnaud Montebourg, stated during the 2014 summer that the binding fiscal rules underpinning the European Stability and Growth Pact are responsible for the painful job crisis in which the Euro area is stuck (http://www.lemonde.fr/politique/article/2014/08/23/arnaud-montebourg-les-choix-politiques-ne-sont-pas-figes_4475668_823448.html).

from the fact that a country's decision to introduce a fiscal rule may well be correlated with factors that also affect the cyclical stance of its fiscal policy.

We find that not all fiscal rules have the same impact on the cyclicality of fiscal policy: the design of the rule matters.

- Among standard rules, budget balance rules are associated with countercyclical changes in overall spending and in investment spending. Expenditure rules are associated with countercyclical changes in overall spending, but with procyclical changes in investment spending, as cuts in the latter during bad times are more politically palatable. Debt rules do not appear to affect the cyclical stance of either overall or investment spending.

- Flexibility in design seems however, to have the strongest impact. Specifically, investment-friendly rules, or those where public investment or other priority outlays are excluded from the perimeter of the rule, are associated with larger countercyclical movements in both overall public spending and investment public spending. The inclusion of cyclical adjustment features in spending rules yields broadly similar results. The adoption of cyclically-adjusted BBRs is associated with countercyclical movements in overall spending, but with procyclical movements in investment spending. The introduction of escape clauses in fiscal rules does not seem to affect the cyclical stance of fiscal policy.

- We also confirm that structural factors, including past debt-to-GDP ratio, the level of development, the volatility of terms of trade, natural resources endowment, government stability, the legal enforcement, and monitoring arrangements backing the rule, can influence the link between fiscal rules and countercyclicality. The results are robust to a wide set of alternative specifications.

These findings suggest that an expenditure rule, and to a lesser extent a budget balance rule, may cohabit with countercyclical fiscal policy when investment spending or other priority spending is excluded from the rule target. These findings are in line with recent studies, which concludes that the introduction of investment-friendly rules could help increase investment spending without necessarily undermining fiscal discipline and public debt sustainability, should investment efficiency be high (Blanchard and Giavazzi, 2004; IMF, 2014; IMF 2015b). However, the larger countercyclicality of fiscal policy found in the present paper to be associated with investment-friendly rules is not synonymous with superiority of investment-friendly rules compared with other types of rules. Indeed, investment-friendly fiscal rules may give rise to creative accounting practices, as the lack of a clear-cut conceptual distinction between current expenditure and investment expenditure may provide an incentive for opportunistic misclassification of unproductive expenditures as 'investment,' with a view to circumventing the binding constraint of the fiscal rule (IMF, 2014; Serven, 2007)

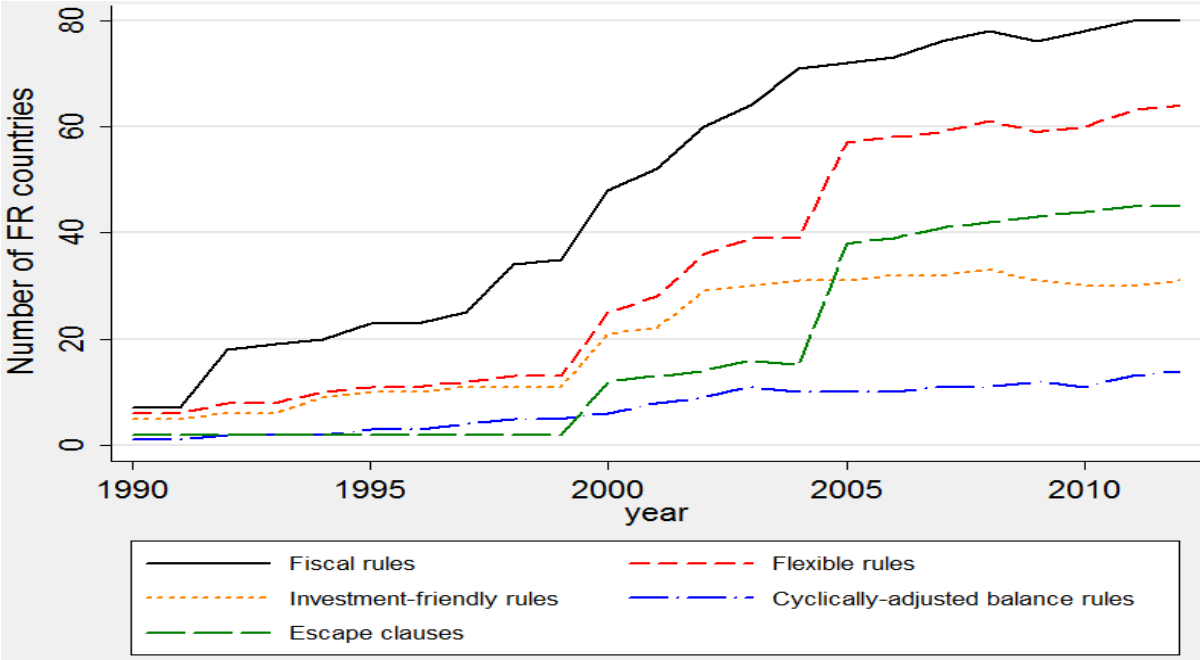
Of particular importance, fiscal rules have traditionally been enacted to counter the deficit bias and foster fiscal discipline, though a large body of literature has emphasized unpleasant side effects, including procyclicality (Blanchard and Giavazzi, 2004) and lower quality spending (Peletier, Dur, and Swank, 1999). This paper aims at assessing whether certain design features of fiscal rules can alleviate those side effects. Our empirical analysis shows that design matters, which carries potentially important implications for the design of fiscal rules in cases where these side effects are believed to be large. The operational challenge of course is to amend rules in a way that does not jeopardize their effectiveness, an issue we plan to take up in future research.

The rest of the paper is structured as follows. Section 2 introduces the dataset and highlights key stylized facts. Section 3 describes the methodological approach. Section 4 discusses the results and their robustness. Section 5 explores whether structural factors could affect the results. Section 6 concludes and draws some policy implications.

II. Data and Stylized Facts

Fiscal rules, or "permanent constraints on fiscal policy, expressed in terms of a summary indicator of fiscal performance" (Kopits and Symansky, 1998), have multiplied over the past decades. A quick glance at Figure 1 illustrates that by the end of 2012, 80 countries had some type of fiscal rule in place, compared to less than a dozen in the early 1990s. Fiscal rules are usually differentiated by the type of fiscal indicator that they target. Budget balance rules are most common, followed by debt rules, expenditure rules, and revenue rules far behind.

Figure 1. Fiscal Rules Adoption over Time (worldwide)*



*Note: this includes FR countries not retained in the sample considered in this analysis

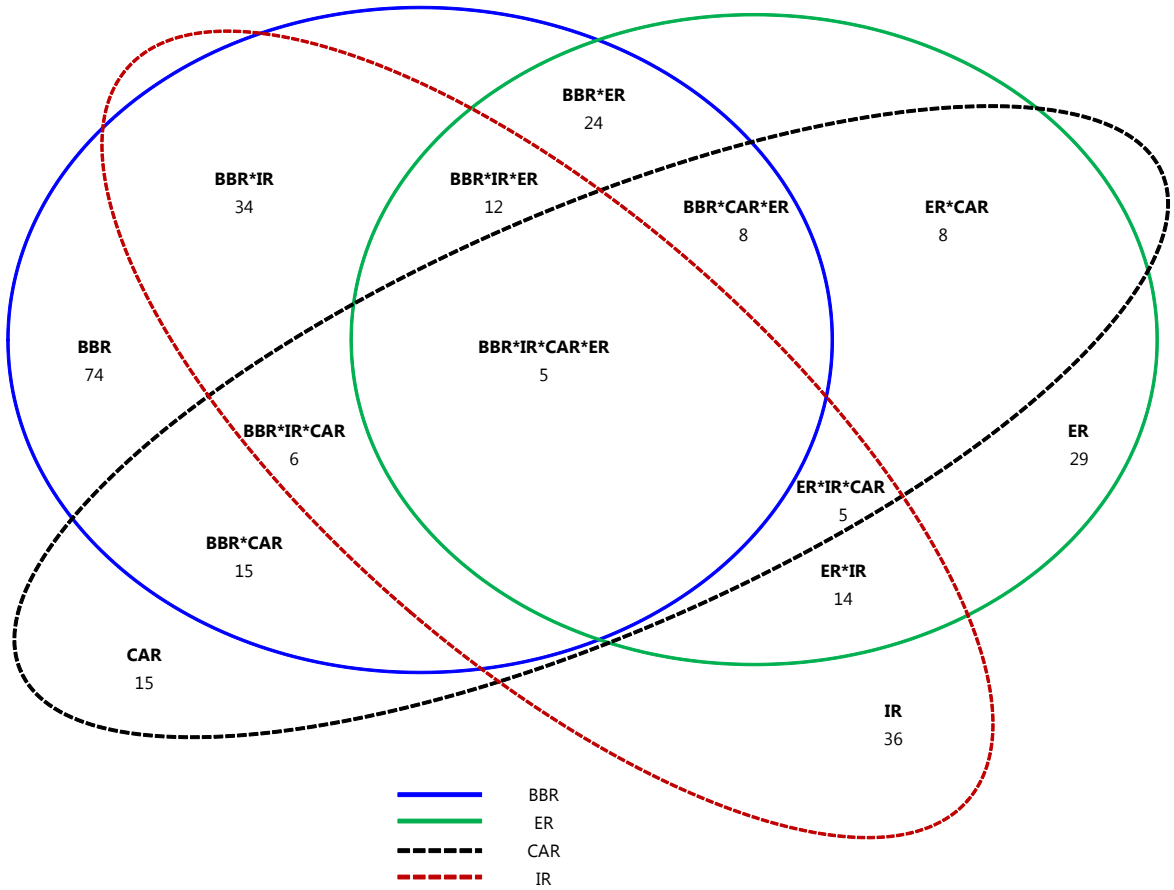
Over time, fiscal rules have become increasingly flexible in their design (Budina and others, 2012). Investment-friendly rules, which exclude public capital spending from the constraint, are the oldest form of flexible rule: they were adopted by some advanced and developing economies as early as the 1970s and 1980s. Investment-friendly rules seek to give space for potentially growth-enhancing public investment while maintaining fiscal discipline. Investment-friendly rules have been criticized for justifying fiscal laxity and encouraging opaque "creative" accounting, but have attracted renewed interest in the 2000s, as evidence emerged that standard fiscal rules were often associated with sizable cuts in public investment and the emergence of "infrastructure gaps" (Servén, 2007; Blanchard and Giavazzi, 2004).

Other approaches have been explored to introduce flexibility within a fiscal rule. Some rules exclude other specific types of spending, such as social transfers or interest payments, from the constraint. Some rules define their targets in cyclically adjusted or structural terms, to allow flexibility to respond to the cycle. More recently, a growing number of fiscal rules have come to

include escape clauses that allow for temporary deviations in the case of a large, unexpected shock. Overall, by 2012, 63 countries, or close to 80 percent of those using fiscal rules, had incorporated some form of flexibility in their rules. Of these, 45 had rules with escape clauses, 31 had rules that excluded investment or other priority spending, and 14 had rules that defined targets in cyclically adjusted or structural terms.

In practice, there are sizable overlaps between rules, making an assessment of the impact of a specific rule feature particularly challenging. For example, investment-friendly and cyclically-adjusted features are mostly associated with budget balance rules (Figure 2): budget balance rules account for 34 of the 36 cases of investment-friendly rules, and all of the 15 cases of cyclically-adjusted rules. By contrast, investment-friendly and cyclical adjustment features were less often enacted in the presence of spending rules: spending rules account for 14 of the 36 cases of investment-friendly rules and 8 out of the 15 cases of cyclically-adjusted rules.[3]

Figure 2. Overlaps between Standard Rules (BBR and ER) and Flexible Rules (IR and SR)



1/The numbers refer to the sample retained in this study.

[3] These figures on examples of overlaps between rules are derived from the sample retained in this study.

A. Dataset and Measure of Cyclicality

To explore the impact of fiscal rules on the procyclicality of fiscal policy, we use a broad, unbalanced panel of 167 countries over the period 1990–2012; the scarcity of reliable fiscal data prior to 1990, especially for developing countries and ex-Soviet Union members, prevents the use of a longer data period. Out of this sample, 82 countries had fiscal rules in place for at least one year between 1990 and 2012 (Table 1).[4] Among these "fiscal rule (FR) countries," 36 countries introduced investment-friendly rules that shield public investment or other priority spending from the perimeter of the rule. The remaining 85 countries in the sample did not adopt any form of fiscal rule throughout the chosen period. To ensure reasonable comparability across groups, the sample of non-FR countries excludes countries with a real per capita GDP lower than that of the poorest FR country, and a smaller population than the smallest FR country.[5]

Our data only captures the existence of a rule, but not the actual degree of implementation and observance of the rule, for which comprehensive, homogenous data is unfortunately not available. Information on the features of fiscal rules and the dates they were in place come from the 2013 vintage of the IMF Fiscal Affairs Department's Fiscal Rule Dataset; detailed information on the sample can be found in Appendices 1–3. Data on total public spending and public investment spending, used to calculate the cyclical stance of fiscal policy, comes from the IMF Fiscal Affairs Department's expenditure database. Appendix 4 documents the sources and definitions of the variables used in this study. Descriptive statistics are in Appendix 5.

Table 1. Fiscal Rule Countries (number)

	As of end 2012		Over a minimum of one year over 1990–2012	
	World	Sample	World	Sample
Countries with fiscal rules [1]	80	77	85	82
Countries with budget balance rules (BBRs)[2]	64	64	77	74
Countries with debt rules (DRs)[3]	65	62	67	64
Countries with expenditure rules (ERs)[4]	24	24	29	29
Countries with revenue rules (RRs)[5]	7	7	7	7
Countries with investment-friendly rules (narrow definition)[6]	19	18	24	23
Countries with investment-friendly (broad definition: IRs)[7]	31	30	38	36
Countries with cyclically-adjusted balance rules (CARs)[8]	14	14	15	15
Countries with rules containing well defined escape clauses (CRs)	45	45	45	45

Source: IMF.

[1/]The sum of categories may be larger than the total as some countries use multiple rules.

[2/]The rule targets the budget balance, usually as a percent of GDP.

[3/]The rule targets the level of public debt or public borrowing.

[4/]The rule targets the level or growth rate of public spending.

[5/]The rule targets the level of public revenue.

[6/]Public investment is excluded from the target of the rule.

[7/]Public investment and/or other specified spending categories are excluded from the target of the rule.

[8/]The target of the rule is defined in cyclically adjusted or structural terms.

To measure the cyclicality of the fiscal stance, we compute country-specific, time-varying cyclicality coefficients. This approach allows capturing the fact that a government's reaction to

[4] We focus on numerical fiscal rules and leave procedural rules aside.

[5] The poorest *FR country* in our sample is Niger, with an average real per capita GDP of US$ 270.23, while the smallest *FR country* in terms of population size is St. Kitts and Nevis, with an average population of 46,647 inhabitants.

business cycle fluctuations may vary over time or differ between the up and down phases of the cycle. Following Aghion and Marinescu (2008), we estimate the fiscal reaction function (1) with Local Gaussian-Weighted Ordinary Least Squares (LGWOLS):

$$\Delta\, logG_{it} = \alpha_{it} + B_{it}\, \Delta\, logY_{it} + \varepsilon_{it} \quad (1)$$

with $\varepsilon_{it} \rightarrow N(0, \frac{\sigma^2}{\omega_t(\tau)})$ and $\omega_t(\tau) = \frac{1}{\sigma\sqrt{2\pi}} \exp(-\frac{(\tau-t)^2}{2\sigma^2})$.

Subscripts i and t refer to country and time dimensions; $\Delta \log Y$ refers to the growth rate of real GDP;[6] and $\Delta \log G$ stands for the growth rate of public spending (total spending or investment spending).[7] The $\hat{\beta}_{it}$ coefficient captures the cyclical behavior of public spending, which is found to be countercyclical if $\beta_{it} < 0$, procyclical if $\beta_{it} > 0$, acyclical otherwise. Accordingly, the higher $\hat{\beta}_{it}$ the more procyclical (or less countercyclical) total public or investment spending is.

To ensure an unbiased estimate of $\hat{\beta}_{it}$, we extend equation (1) in three ways: we include the lagged value of the dependent variable, to capture the inertia in public spending; we run equation (1) with 2SLS to address possible reverse causality between changes in public spending and in real GDP; and we add a vector of covariates (X) to mitigate omission bias. As a result, (1) becomes

$$\Delta\, logG_{it} = \alpha_{it} + \delta_{it}\, \Delta\, logG_{it-1} + B_{it}\, \Delta\, logY_{it} + \gamma_{it} X_{it} + \varepsilon_{it} \quad (2)$$

Specifically, the change in real GDP is instrumented with its lagged values, and vector X includes the lagged debt-to-GDP ratio, government stability, volatility of terms of trade, trade openness and financial openness, and inflation rate.

Stylized facts

Figure 3 suggests that total public spending was countercyclical on average during 1990–2012 in FR countries as well as in non-FR countries (the coefficient is negative in both cases). However, the degree of countercyclicality was much more pronounced for FR countries. In contrast, investment spending was procyclical in both FR countries and non-FR countries, but more procyclical in the former. This is in line with the findings of a large body of literature that showed public investment spending to be largely procyclical: it expands during booms but falls during slumps (Arezki and Ismail, 2013; Blanchard and Giavazzi, 2004; Dessus and others, 2013).

[6] We use the growth rate of real GDP instead of the output gap itself, given data constraints for measuring properly the latter in developing countries, a large share of our sample.

[7] We use LGWOLS computations to mobilize all observations available for each country at each date t while weighting them proportionally to their closeness to the considered period t. In line with the recent literature, we use public expenditure, rather than the fiscal balance or tax revenue, as a proxy for the fiscal policy trend because its evolution is less endogenous, and thus likely to capture more accurately the non-cyclical stance of fiscal policy (See Bova and others, 2014; Dabla-Norris and others, 2010; Frankel and others, 2013; Ilzetzki and Végh, 2008; Kaminsky and others, 2004; and Mpatswe and others, 2011). We set the smoothing parameter (σ) to 5, in line with Aghion and Marinescu (2008), but the results are qualitatively robust to changes in this parameter.

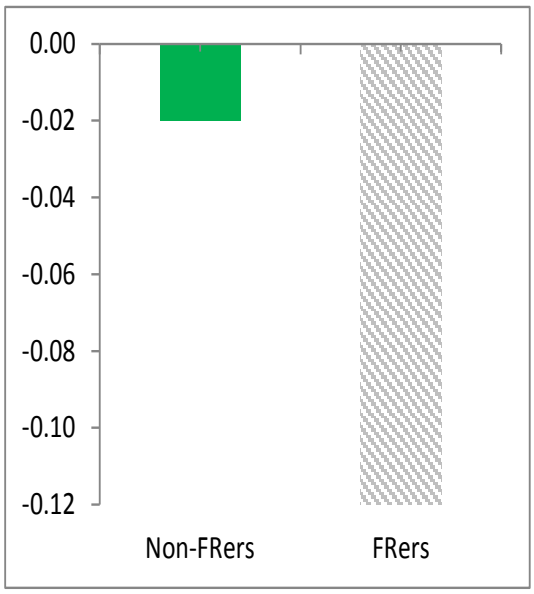
Figure 4 shows the level of cyclicality coefficients among FR countries before and after the adoption of a fiscal rule. It suggests that the adoption of a fiscal rule was associated with a subsequent strengthening of the countercyclicality of public spending, and a reduction in the procyclicality of investment spending.

As illustrated in Figures 5 to 7, the results vary with the type of rules adopted. The changes in the coefficients go in the same direction, but are quite more marked, after the adoption of an investment-friendly rule (Figure 5). But for cyclically-adjusted balance rules (CAR) or well-designed escape clauses (CR), different patterns emerge: the adoption of a cyclically-adjusted balance rule was associated with a subsequent reduction in the countercyclicality of public spending as a whole and a reduction in the procyclicality of investment spending, while the adoption of rules with escape clauses was associated with a reduction in the countercyclicality of overall spending and a strengthening in the procyclicality of the investment spending. By and large, the adoption of fiscal rules seems to reduce the procyclicality of public spending as well as that of investment spending, but investment-friendly rules seem to be associated with a stronger impact.

However, these stylized facts only show simple correlations, and do not address possible self-selection problems: if fiscal rules, and more specifically flexible rules, are only adopted by countries with strong fiscal positions, and thus with the capacity to undertake countercyclical policies, the results are biased.

Figure 3. FRs and Procyclicality of Public Spending (1990–2012)

Total spending



Investment spending

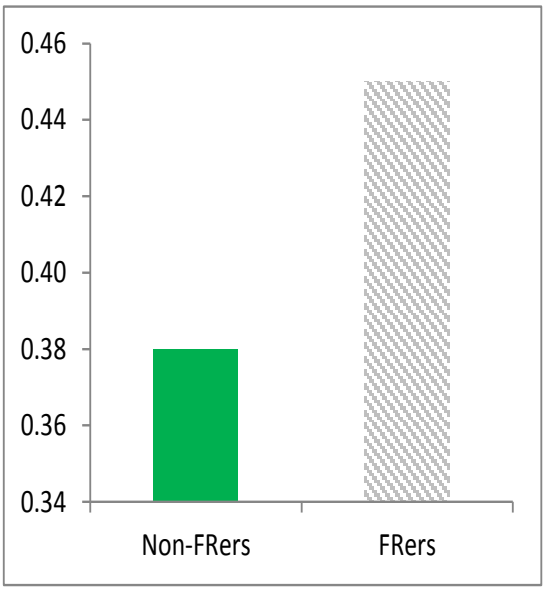
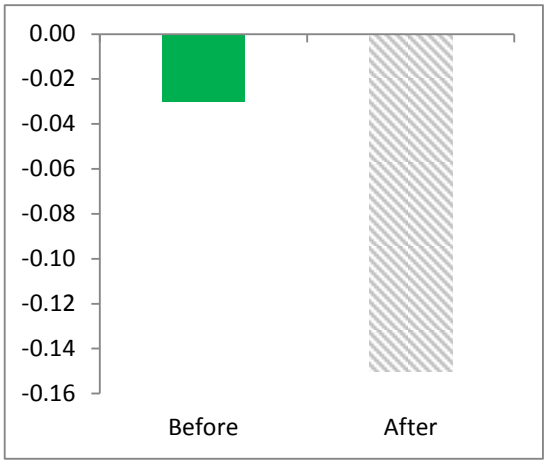


Figure 4. Procyclicality of Public Spending in FR countries (1990–2012)

Before versus After FRs Adoption

Total spending



Investment spending

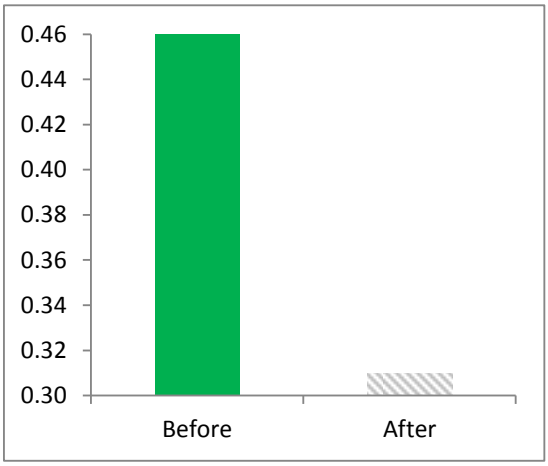
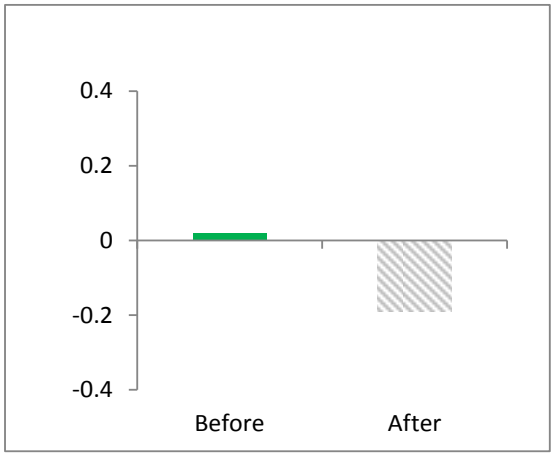


Figure 5. Public Spending Procyclicality in IR Countries (1990–2012)

Before versus After IR Adoption

Total spending



Investment spending

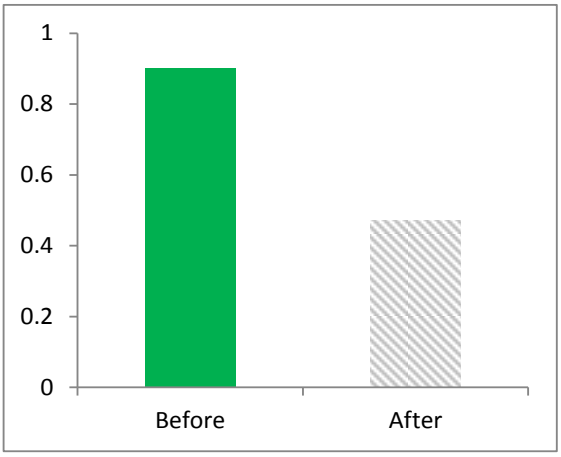
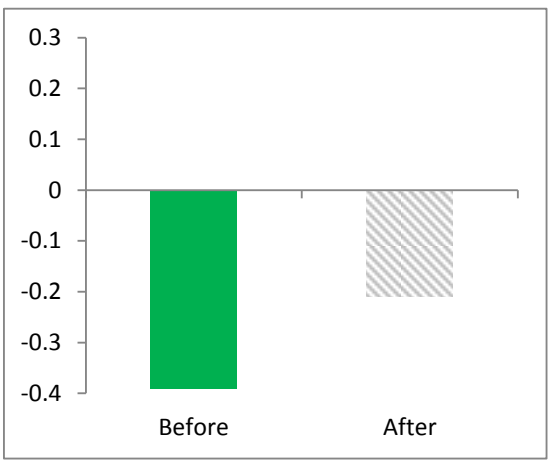


Figure 6. Public Spending Procyclicality in CAR Countries (1990–2012)

Before versus After CAR Adoption

Total spending



Investment spending

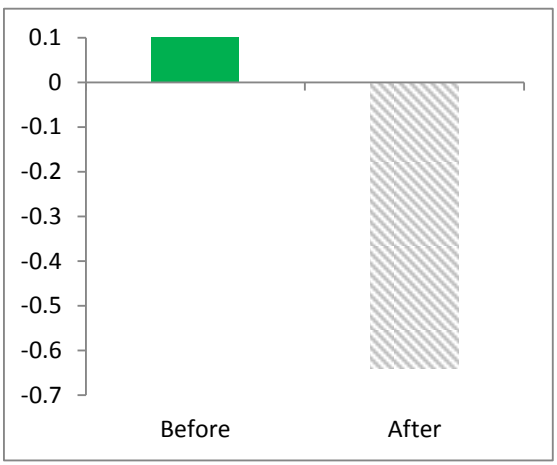
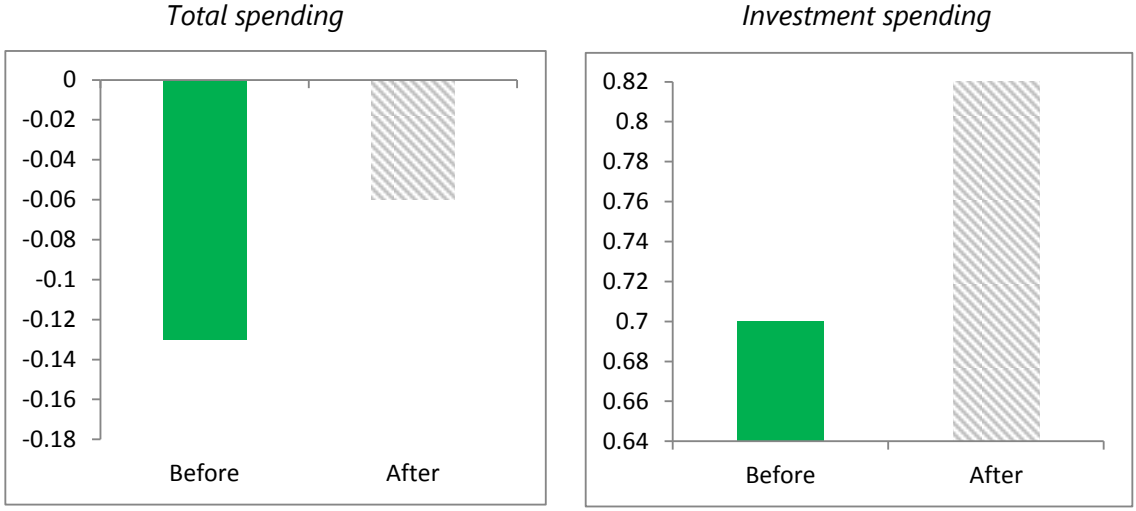


Figure 7. Public Spending Procyclicality in Escape Clause Rule Countries (1990–2012)
Before versus After CR Adoption



III. METHODOLOGICAL APPROACHES

We use propensity score matching (PSM), a method borrowed from the impact analysis literature, to address possible self-selection issues.[8] PSM consists of pairing countries that adopted a given policy measure (in our case, a fiscal rule) with countries that have not done so, but share certain characteristics associated with both the adoption of the policy measure and the outcome of interest (in our case, the cyclicality of the fiscal policy stance). These characteristics are synthesized in a propensity score that reflects the estimated probability for a country to adopt the given policy measure, conditional upon the defined characteristics. The propensity score is used to identify a control group (of countries not having adopted fiscal rules) that serves as counterfactual to the treatment group (of countries having adopted fiscal rules). Assuming that the variables used to measure the outcome of interest (here, the cyclicality of the fiscal policy stance) are statistically independent of the policy decision (establishment of a fiscal rule), given common characteristics between the treatment group and the control group, then the difference in outcome between the two groups (known in the literature as average treatment effect on the treated, or ATT) can be attributed to the presence of the fiscal rule.[9] More specifically, in this study, the average difference in the cyclicality coefficient (as defined above) between the matched FR countries and the non-FR countries, appropriately weighted by the propensity score distribution of the sample, will be used to estimate the causal effect of fiscal rules on the cyclical stance of fiscal policy.

The ATT can be expressed as follows:

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[8] See Dehejia and Wahba, 2002; Heckman and others, 1998; and Rosenbaum and Rubin, 1983. Similar applications of the PSM to macroeconomic studies can be found in the literature on the effects of Inflation targeting (see e.g., Lin and Ye, 2009; and Minea and Tapsoba, 2014).

[9] The assumption of conditional independence is required because variables that influence the outcome may also matter for the decision to implement the policy, leading to a self-selection bias (Dehejia and Wahba, 2002; and Heckman and others, 1998): a simple comparison of the mean value of the outcome between the two groups would yield biased ATTs. But if, conditional upon observable covariates X, the procyclicality coefficients (β_0 and β_1) are independent of the *treatment* variable ($\beta_0 \perp FR \mid X$ and $\beta_1 \perp FR \mid X$), differences in outcomes between the control group and the treatment group are attributable to FRs adoption (Caliendo and Kopeinig, 2008).

$$ATT = E[(\beta_{i1} - \beta_{i0})|FR_i = 1] = E[\beta_{i1}|FR_i = 1] - E[\beta_{i0}|FR_i = 1], \quad (3)$$

Where FR_i stands for a binary variable equaling 1 if country *i* has a fiscal rule in place, and 0 otherwise. $\beta_{i1} \mid FR_i = 1$ captures the procyclical behavior of fiscal policy if country *i* has adopted a fiscal rule, $\beta_{i0} \mid FR_i = 1$ measures the fiscal policy procyclicality that would have been observed should country *i* had not introduced a fiscal rule. Equation (3) therefore compares the outcome value observed in the treatment group (FR countries) with the outcome value that would have been observed in the same countries should they had not adopted a FR.

With the propensity score (PS) expressed as $P(X_i) = E[FR_i \mid X_i] = \Pr(FR_i = 1 \mid X_i)$, where X is a vector of observable variables associated with the decision to adopt a fiscal rule, and $P(X_i) < 1$ (so that there are comparable control countries, or non-FR countries, for each treated country, or FR country), equation (3) can be rewritten as:

$$ATT = E[\beta_{i1}|FR_i = 1,\ p(X_i)] - E[\beta_{i0}|FR_i = 0,\ p(X_i)] \quad (4)$$

A. Propensity Scores

We estimate the propensity scores with a probit model, and a dummy for a given fiscal rule as the dependent variable.[10] We use different dummies to capture the distinct impact of different fiscal rules: FR for any type of fiscal rule; BBR for budget balance rules; DR for debt rules; ER for expenditure rules; IR for investment-friendly rules (whereby public investment and priority sector spending are explicitly shielded from the target under the rule); CAR when the target of the rule is specified in cyclically-adjusted or structural terms; and CR if the rule includes clearly defined escape clauses.[11] Because of the overlap between different categories of rules, we also intersect some of these dummies (e.g., ER * IR, CAR * BBR) when relevant.

To ensure robust results, we use seven different algorithms for country matching, in line with the existing literature (Tapsoba, 2012): the nearest-neighbor matching with replacement, which matches each treated country to the n control countries having the closest PS (we consider $n = 1$ and $n = 3$); the radius matching, which matches a FR country to the FR countries with PS falling within a radius (or caliper) of length r (we consider a wide radius r = 0.05, a medium radius r = 0.03 and a narrow radius r = 0.01); the regression-adjusted local linear matching, which consists of pairing covariates-adjusted outcomes for the treatment group with the corresponding covariates-adjusted outcomes for the control group using local linear regression weights (Heckman and others, 1998); and (Epanechnikov) kernel matching, which matches a treated country to all control countries weighted proportionately by their closeness (in terms of PS) to the treated country. Since the matching estimator has no analytical variance, we compute standard errors by bootstrapping, in line with Dehejia and Wahba (2002).

We also use two diagnostic tools to check the validity of the conditional independence assumption, and thus of the matching.

- First, we follow Rosenbaum and Rubin (1985) and report key statistics to assess the balancing properties of the matched versus unmatched observations. For the conditional independence

[10] The results remain qualitatively unchanged with a *logit* model.

[11] We do not include revenue rules given the very small number of countries using such rules.

assumption to hold (i.e., no evidence of significant differences between the FR countries' and non-FR countries' observable characteristics within the matched data), the standardized bias score and the p-value associated with its t-test statistic have to stand below the 5% rule of thumb and above the critical threshold of 10%, respectively, (see Caliendo and Kopeinig, 2008; Lechner, 1999; or Sianesi, 2004).

- Second, we use Rosenbaum (2002) bounding sensitivity tests to check whether unobserved heterogeneity could pollute the results: the ATTs could be biased if countries that appear similar in terms of observed covariates actually differ in terms of important unmeasured covariates that influence both the procyclical behavior of fiscal policy and the decision to introduce a fiscal rule. The bounding sensitivity tests identify the size over which unobserved heterogeneity could impair the results (see Appendix 6 for a detailed presentation of the methodology).

B. Control Variables and Robustness Checks

We use a range of control variables to account for macroeconomic and politico-institutional factors associated in the literature with the adoption of fiscal rules and the cyclicality of fiscal policy. As a reminder, the PS estimation does not aim at finding the best statistical model for explaining the probability of FR adoption, but to control, to the extent possible, for variables that could influence both FR adoption and the outcome variable (fiscal policy procyclicality).[12] The selection of variables included in the probit model follows closely this central principle. As macroeconomic indicators, we include the past debt-to-GDP ratio, the rate and volatility of economic growth, and the rate of inflation. As political factors also play a pivotal role in the cyclicality of fiscal policy, we include indicators of political stability and the degree of democracy. Finally, on the institutional front, we include the type of presidential regime, the use of majority electoral rules, federal status and participation to a currency union. Appendix 7 provides details on the empirical literature and expected signs for the control variables.

As robustness checks, we augment the probit model with additional macroeconomic and institutional variables, including the squared value of past public debt (in view of a possible non-linearity in the influence of the debt dynamics); the fiscal balance; trade openness; financial openness; the level of development (seized by per capita real GDP); natural resources endowment; institutional quality (proxied by the quality of bureaucracy); the ruling party's ideology; the degree of government polarization; the size of the population; the dependency ratio (captured by the share of the population aged 65 and above) ;[13] the presence of an IMF program; and a dummy for the occurrence of a crisis.

[12] According to the *conditional independence* assumption, omitting in the probit regression variables that systematically affect FRs adoption but do not matter for the procyclical stance of fiscal policy has little influence on the results (Persson, 2001).

[13] Results remain broadly unchanged when using the share of the population aged below 14, or the sum of the population aged below 14 and aged above 65.

IV. Fiscal Rules and Procyclicality of Public Spending

A. Propensity Scores

Table 2 displays the probit estimates of propensity scores for different fiscal rules. In column 1, wherein the existence of any fiscal rule is the dependent variable, most coefficients are significant and bear the expected signs: the lagged debt-to-GDP ratio, growth instability, inflation, presidential-type regime, and majoritarian election rules are found to affect negatively and significantly the probability of adopting a fiscal rule, while stronger growth performance, political stability, democracy, federal states, and currency union membership enhance significantly the likelihood of joining the club of FR countries. Results remain broadly similar when budget balance rules, debt rules, expenditure rules, investment-friendly rules, cyclically-adjusted balance, and rules with well-established escape clauses, respectively, are the dependent variables (columns 2 to 7).

Table 2. Probit Estimates of the Propensity Scores

Dependent Variable	**[1] FR**	**[2] BBR**	**[3] DR**	**[4] ER**	**[5] IR**	**[6] CAR**	**[7] CR**
Log. Debt-to-GDP ratio (lagged)	-0.096***	-0.024	-0.087**	-0.024	0.059	-0.494***	0.013
	(0.037)	(0.039)	(0.041)	(0.048)	(0.041)	(0.075)	(0.041)
Growth instability	-0.132***	-0.148***	-0.192***	0.075	-0.106*	-0.217**	0.184***
	(0.051)	(0.055)	(0.056)	(0.058)	(0.058)	(0.106)	(0.051)
Economic growth	0.088*	0.084	0.002	0.104	-0.036	-0.093	-0.089
	(0.053)	(0.053)	(0.057)	(0.066)	(0.057)	(0.094)	(0.055)
Inflation rate	-0.469***	-0.519***	-0.173**	-0.362***	-0.434***	-0.190*	-0.315***
	(0.066)	(0.066)	(0.069)	(0.076)	(0.064)	(0.114)	(0.069)
Government stability	0.538***	0.213	0.372*	1.076***	0.551***	0.335	-0.113
	(0.203)	(0.209)	(0.212)	(0.263)	(0.213)	(0.347)	(0.223)
Degree of democracy	2.104***	2.063***	1.991***	2.046***	0.915***	13.25***	1.282***
	(0.124)	(0.127)	(0.128)	(0.183)	(0.118)	(1.758)	(0.128)
Presidential-type regime	-0.232***	-0.479***	-0.531***	-0.123	-0.173**	-0.144	-0.191**
	(0.075)	(0.077)	(0.092)	(0.087)	(0.085)	(0.122)	(0.087)
Majoritarian election rule	-0.269***	-0.445***	-0.074	-0.289***	-0.062	-0.391***	-0.444***
	(0.086)	(0.084)	(0.096)	(0.101)	(0.094)	(0.140)	(0.105)
Federal State	0.407***	0.416***	0.323***	0.387***	0.399***	0.607***	0.290***
	(0.082)	(0.083)	(0.090)	(0.083)	(0.086)	(0.118)	(0.089)
Currency Union member	1.206***	1.194***	1.584***	0.133	0.716***	-0.336***	1.041***
	(0.075)	(0.074)	(0.075)	(0.085)	(0.076)	(0.115)	(0.076)
Number of observations	2,618	2,618	2,618	2,618	2,618	2,618	2,618
Pseudo R^2	0.281	0.295	0.355	0.141	0.135	0.323	0.209

Note: In brackets the robust standard errors. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively. Constant terms are include but not reported.

Matching results

Table 3 reports the matching results associated with the propensity scores from the presence of any type of fiscal rule (estimates from column 1 of table 2 above). Regarding the cyclical behavior of total public spending, the coefficients are negative (indicating countercyclicality) but small, and significant in five cases (out of seven pairing methods). When looking at the impact on public investment spending (bottom panel of Table 3), the coefficients are also negative and larger, though they are significant only in four out of the seven matching cases. This would suggest that the introduction of a fiscal rule is not associated with a clear-cut reduction in the pro-cyclicality of fiscal policies.

Table 3. Matching Results: All Fiscal Rules

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
Dependent variable: Procyclicality of *Total Public Spending*							
[1] ATT	**-0.262***	**-0.159**	**-0.163**	**-0.188****	**-0.202****	**-0.272*****	**-0.199****
	(0.141)	**(0.129)**	**(0.107)**	**(0.089)**	**(0.096)**	**(0.093)**	**(0.090)**
Number of *Treated* observations	846	846	841	846	846	846	846
Number of *Control* observations	1,575	1,575	1,575	1,575	1,575	1,575	1,575
Total number of observations	2,421	2,421	2,416	2,421	2,421	2,421	2,421
Dependent variable: Procyclicality of *Public Investment Spending*							
[2] ATT	**-0.0993**	**-0.434**	**-0.415**	**-0.449***	**-0.423***	**-0.508****	**-0.428***
	(0.340)	**(0.289)**	**(0.265)**	**(0.234)**	**(0.241)**	**(0.231)**	**(0.229)**
Number of *Treated* observations	725	725	722	725	725	725	725
Number of *Control* observations	1,473	1,473	1,473	1,473	1,473	1,473	1,473
Total number of observations	2,198	2,198	2,195	2,198	2,198	2,198	2,198
Standardized biases (p-value)	0.055	0.320	0.203	0.333	0.435	0.055	0.414
Rosenbaum Bounds Sensitivity Tests	1.7	2.3	2.5	2.8	3	3	2.9

Note: Bootstrapped standard errors (with 500 replications) in brackets. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively.

Results could vary, however, according to the type of fiscal rule. Table 4 reports the estimated ATTs for BBRs, DRs, and ERs.

- For BBRs, the results clearly suggest that the adoption of rules is conducive to more countercyclicality for both overall spending and investment spending: coefficients are negative (indicating countercyclicality) and mostly significant (in six out the seven matching techniques), and larger for the latter.

- DRs appear unrelated to the cyclical behavior of fiscal policy: all the estimated coefficients turned statistically insignificant for overall spending as well as for investment spending.

- Regarding ERs, coefficients are negative and significant (in six out seven pairing techniques) for overall spending, but positive and significant (in five out seven pairing techniques) for investment spending. The finding that ERs are associated with countercyclical changes in total public spending is in line with the conclusions of previous studies that showed that ERs help curb pressures for additional spending in the presence of budgetary windfalls (Ayuso-i-Casals and others, 2007; and European Commission, 2006). But the procyclical behavior of investment spending associated with ER suggests that when investment outlays are not specifically shielded, they are more likely than other spending to be cut in downturns (and expanded in booms)—a finding also in line with the literature.

Table 4. Matching Results: BBRs, DRs, and ERs

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
Dependent variable: Procyclicality of *Total Public Spending*							
BBR as *treatment* variable							
[1] ATT	**-0.320****	**-0.221**	**-0.262****	**-0.214****	**-0.197****	**-0.325*****	**-0.196****
	(0.140)	**(0.135)**	**(0.112)**	**(0.100)**	**(0.092)**	**(0.101)**	**(0.091)**
Number of *Treated* observations	742	742	704	742	742	742	742
Number of *Control* observations	1,684	1,684	1,684	1,684	1,684	1,684	1,684
Total number of observations	2,426	2,426	2,388	2,426	2,426	2,426	2,426
DR as *treatment* variable							
[2] ATT	**0.055**	**0.065**	**-0.001**	**0.004**	**0.009**	**-0.08**	**0.0094**
	(0.140)	**(0.117)**	**(0.107)**	**(0.010)**	**(0.096)**	**(0.099)**	**(0.097)**
Number of *Treated* observations	629	629	622	627	629	629	629
Number of *Control* observations	1,802	1,802	1,802	1,802	1,802	1,802	1,802
Total number of observations	2,431	2,431	2,424	2,429	2,431	2,431	2,431
ER as *treatment* variable							
[3] ATT	**-0.269**	**-0.314****	**-0.246****	**-0.251*****	**-0.250*****	**-0.294*****	**-0.248*****
	(0.201)	**(0.157)**	**(0.098)**	**(0.088)**	**(0.093)**	**(0.089)**	**(0.092)**
Number of *Treated* observations	253	253	253	253	253	253	253
Number of *Control* observations	2,219	2,219	2,219	2,219	2,219	2,219	2,219
Total number of observations	2,472	2,472	2,472	2,472	2,472	2,472	2,472
Dependent variable: Procyclicality of *Public Investment Spending*							
BBR as *treatment* variable							
[1] ATT	**-0.893*****	**-0.856*****	**-0.857*****	**-0.813*****	**-0.745*****	**-0.810*****	**-0.756*****
	(0.338)	**(0.293)**	**(0.274)**	**(0.245)**	**(0.232)**	**(0.215)**	**(0.252)**
Number of *Treated* observations	617	617	562	617	617	617	617
Number of *Control* observations	1,565	1,565	1,565	1,565	1,565	1,565	1,565
Total number of observations	2,182	2,182	2,127	2,182	2,182	2,182	2,182
DR as *treatment* variable							
[2] ATT	**-0.182**	**-0.136**	**-0.151**	**-0.174**	**-0.130**	**-0.253**	**-0.146**
	(0.386)	**(0.341)**	**(0.311)**	**(0.312)**	**(0.305)**	**(0.325)**	**(0.312)**
Number of *Treated* observations	527	527	520	527	527	527	527
Number of *Control* observations	1,678	1,678	1,678	1,678	1,678	1,678	1,678
Total number of observations	2,205	2,205	2,198	2,205	2,205	2,205	2,205
ER as *treatment* variable							
[3] ATT	**0.507**	**0.498**	**0.460***	**0.488***	**0.510****	**0.503****	**0.506****
	(0.442)	**(0.353)**	**(0.254)**	**(0.263)**	**(0.226)**	**(0.230)**	**(0.234)**
Number of *Treated* observations	216	216	216	216	216	216	216
Number of *Control* observations	2,009	2,009	2,009	2,009	2,009	2,009	2,009
Total number of observations	2,225	2,225	2,225	2,225	2,225	2,225	2,225
Standardized biases (p-value)	0.704	0.993	1.000	0.999	0.988	0.704	0.992
Rosenbaum Bounds Sensitivity Tests	1.1	1.2	1.4	1.5	1.5	1.5	1.5

Note: Bootstrapped standard errors (with 500 replications) in brackets. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively.

Table 5 shows the results for investment-friendly rules. The coefficients are negative, significant and larger both for public spending as a whole and especially for investment spending. Among the whole set of rules, investment-friendly rules are the ones thus associated with the strongest and broadest countercyclicality. The results broadly hold when using a narrower definition of IR countries (see Appendix 8 for details).

To further probe this finding, we run the same exercise excluding investment-friendly rule countries from the treatment group (Table 6), and see a spectacular reversal in the results: most

coefficients lose significance, and when they are significant (for public investment spending), they are positive. This suggests that the countercyclicality evidenced for fiscal rules as a whole was in fact largely driven by the presence of investment-friendly rules.

Table 5. Matching Results: Investment-friendly Rules (IRs)

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
Dependent variable: Procyclicality of *Total Public Spending*							
[1] ATT	**-0.401** **(0.168)**	**-0.352** **(0.151)**	**-0.277** **(0.121)**	**-0.277** **(0.118)**	**-0.279** **(0.110)**	**-0.301*** **(0.102)**	**-0.279*** **(0.104)**
Number of *Treated* observations	391	391	390	391	391	391	391
Number of *Control* observations	2,081	2,081	2,081	2,081	2,081	2,081	2,081
Total number of observations	2,472	2,472	2,471	2,472	2,472	2,472	2,472
Dependent variable: Procyclicality of *Public Investment Spending*							
[2] ATT	**-1.035** **(0.433)**	**-1.155*** **(0.370)**	**-1.173*** **(0.339)**	**-1.193*** **(0.316)**	**-1.167*** **(0.340)**	**-1.115*** **(0.307)**	**-1.170*** **(0.330)**
Number of *Treated* observations	349	349	349	349	349	349	349
Number of *Control* observations	1,876	1,876	1,876	1,876	1,876	1,876	1,876
Total number of observations	2,225	2,225	2,225	2,225	2,225	2,225	2,225
Standardized biases (p-value)	0.631	0.893	0.742	0.835	0.857	0.631	0.859
Rosenbaum Bounds Sensitivity Tests	1.2	1.2	1.2	1.3	1.3	1.2	1.3

Note: bootstrapped standard errors (with 500 replications) In brackets the. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively.

Table 6. Matching Results: Excluding IR Countries from the Treatment Group

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
Dependent variable: Procyclicality of *Total Public Spending*							
[1] ATT	**0.078** **(0.132)**	**0.003** **(0.108)**	**0.0035** **(0.072)**	**-0.003** **(0.068)**	**-0.000** **(0.069)**	**0.012** **(0.066)**	**-0.002** **(0.070)**
Number of *Treated* observations	457	457	457	457	457	457	457
Number of *Control* observations	2,005	2,005	2,005	2,005	2,005	2,005	2,005
Total number of observations	2,462	2,462	2,462	2,462	2,462	2,462	2,462
Dependent variable: Procyclicality of *Public Investment Spending*							
[2] ATT	**0.708** **(0.361)**	**0.698** **(0.278)**	**0.581*** **(0.212)**	**0.626*** **(0.191)**	**0.643*** **(0.188)**	**0.615*** **(0.189)**	**0.645*** **(0.189)**
Number of *Treated* observations	363	363	362	363	363	363	363
Number of *Control* observations	1,854	1,854	1,854	1,854	1,854	1,854	1,854
Total number of observations	2,217	2,217	2,216	2,217	2,217	2,217	2,217
Standardized biases (p-value)	0.037	0.101	0.318	0.370	0.516	0.037	0.469
Rosenbaum Bounds Sensitivity Tests	1.2	1.4	1.4	1.5	1.5	1.5	1.5

Note: Bootstrapped standard errors (with 500 replications) in brackets. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively.

The inclusion of an investment-friendly feature in ERs and BBRs seems to increase the scope for countercyclical stances. For example, when IRs and ERs overlap (IR*ER), that is, when the treatment group comprises countries with expenditure rules that also exclude investment or priority spending from the ceilings, the adoption of rules is associated with negative coefficients that are larger than in the case of IRs or ERs alone—particularly for overall spending (Table 7). When IRs and BBRs overlap (Table 8), the coefficients are also negative, and particularly larger for public investment spending.

Table 7. Matching Results: IRs and ERs Jointly as Treatment Group

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
	Dependent variable: Procyclicality of Total Public Spending						
[1] ATT	-1.080***	-0.974***	-0.906***	-0.866***	-0.783***	-0.774***	-0.793***
	(0.316)	(0.254)	(0.180)	(0.170)	(0.152)	(0.162)	(0.152)
Number of Treated Obs.	118	118	112	118	118	118	118
Number of Control Obs.	2,081	2,081	2,081	2,081	2,081	2,081	2,081
Total Observations	2,199	2,199	2,193	2,199	2,199	2,199	2,199
	Dependent variable: Procyclicality of Investment Spending						
[2] ATT	**-0.727**	**-0.923****	**-1.070*****	**-1.092*****	**-1.066*****	**-1.018*****	**-1.070*****
	(0.507)	**(0.451)**	**(0.381)**	**(0.357)**	**(0.353)**	**(0.346)**	**(0.337)**
Number of Treated Obs.	111	111	110	111	111	111	111
Number of Control Obs.	1,876	1,876	1,876	1,876	1,876	1,876	1,876
Total Observations	1,987	1,987	1,986	1,987	1,987	1,987	1,987
Standardized biases (p-value)	0.848	0.821	0.850	0.750	0.779	0.848	0.775
Rosenbaum Bounds Sensitivity Tests	1.6	1.7	2	2	2.1	2.1	2.1

Note: Bootstrapped standard errors (with 500 replications) in brackets. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively.

Table 8. IRs and BBRs Jointly as Treatment Group

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
	Dependent variable: Procyclicality of Total Public Spending						
[1] ATT	**-0.275**	**-0.365****	**-0.216***	**-0.214***	**-0.213****	**-0.223****	**-0.214***
	(0.182)	**(0.154)**	**(0.113)**	**(0.112)**	**(0.105)**	**(0.107)**	**(0.112)**
Number of Treated Obs.	316	316	315	316	316	316	316
Number of Control Obs.	2,081	2,081	2,081	2,081	2,081	2,081	2,081
Total Observations	2,397	2,397	2,396	2,397	2,397	2,397	2,397
	Dependent variable: Procyclicality of Investment Spending						
[2] ATT	**-1.599*****	**-1.644*****	**-1.715*****	**-1.717*****	**-1.713*****	**-1.650*****	**-1.709*****
	(0.454)	**(0.417)**	**(0.397)**	**(0.339)**	**(0.345)**	**(0.382)**	**(0.356)**
Number of Treated Obs.	282	282	282	282	282	282	282
Number of Control Obs.	1,876	1,876	1,876	1,876	1,876	1,876	1,876
Total Observations	2,158	2,158	2,158	2,158	2,158	2,158	2,158
Standardized biases (p-value)	0.760	0.878	0.887	0.939	0.946	0.760	0.949
Rosenbaum Bounds Sensitivity Tests	1.5	1.4	1.5	1.4	1.4	1.4	1.4

Note: Bootstrapped standard errors (with 500 replications) in brackets. *, **, and *** indicate the significance level of 10%, 5% and 1%, respectively.

Table 9 and Table 10 look at the impact of other flexible rules. Cyclically-adjusted balance rules are associated with negative coefficients (indicating countercyclicality) but these are significant only for public spending as a whole, not for investment spending (Table 9). A possible interpretation is that to meet the target, policymakers tend to avoid procyclical adjustments in current outlays by cutting capital outlays, as the latter are not specifically shielded in the design of CAR. In contrast, the results in Table 10 suggest that rules with escape clauses do not protect from a procyclical fiscal stance: the coefficients are negative for overall spending, positive for investment spending, but in neither case are they significant.

Table 9. Matching Results: Cyclically-adjusted Balance Rules (CARs)

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
Dependent variable: Procyclicality of *Total Public Spending*							
[1] ATT	**-0.676*** (0.241)**	**-0.559*** (0.190)**	**-0.498*** (0.119)**	**-0.502*** (0.107)**	**-0.509*** (0.093)**	**-0.491*** (0.094)**	**-0.505*** (0.098)**
Number of Treated observations	143	143	143	143	143	143	143
Number of Control observations	2,314	2,314	2,314	2,314	2,314	2,314	2,314
Total number of observations	2,457	2,457	2,457	2,457	2,457	2,457	2,457
Dependent variable: Procyclicality of *Public Investment Spending*							
[2] ATT	**-0.408 (0.605)**	**-0.432 (0.497)**	**-0.388 (0.405)**	**-0.593 (0.363)**	**-0.564 (0.344)**	**-0.674** (0.339)**	**-0.584 (0.362)**
Number of *Treated* observations	130	130	128	130	130	130	130
Number of *Control* observations	2,084	2,084	2,084	2,084	2,084	2,084	2,084
Total number of observations	2,214	2,214	2,212	2,214	2,214	2,214	2,214
Standardized biases (p-value)	0.405	0.700	0.979	0.955	0.878	0.405	0.891
Rosenbaum Bounds Sensitivity Tests	1.2	1.1	1	1.2	1.4	1.5	1.3

Note: Bootstrapped standard errors (with 500 replications) in brackets. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively.

Table 10. Matching Results: Rules with Escape Clause (CRs)

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
Dependent variable: Procyclicality of *Total Public Spending*							
[1] ATT	**-0.193**	**-0.196**	**-0.119**	**-0.152**	**-0.139**	**-0.167***	**-0.143**
	(0.148)	**(0.124)**	**(0.101)**	**(0.097)**	**(0.097)**	**(0.101)**	**(0.098)**
Number of *Treated* observations	376	376	375	376	376	376	376
Number of *Control* observations	2,086	2,086	2,086	2,086	2,086	2,086	2,086
Total number of observations	2,462	2,462	2,461	2,462	2,462	2,462	2,462
Dependent variable: Procyclicality of *Public Investment Spending*							
[2] ATT	**0.441**	**0.457**	**0.519**	**0.451**	**0.508**	**0.482**	**0.497**
	(0.467)	**(0.370)**	**(0.347)**	**(0.337)**	**(0.326)**	**(0.313)**	**(0.320)**
Number of *Treated* observations	276	276	271	276	276	276	276
Number of *Control* observations	1,940	1,940	1,940	1,940	1,940	1,940	1,940
Total number of observations	2,216	2,216	2,211	2,216	2,216	2,216	2,216
Standardized biases (p-value)	0.088	0.749	0.972	0.958	0.985	0.088	0.984
Rosenbaum Bounds Sensitivity Tests	1.1	1.3	1.5	1.5	1.6	1.6	1.5

Note: Bootstrapped standard errors (with 500 replications) in brackets. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively.

The inclusion of a cyclical adjustment feature in ERs and BBRs has mixed effects on their countercyclical impact. The combination of ER and CAR gives statistically significant negative coefficients for both overall and investment spending (Table 11); these coefficients are larger than seen for ERs alone, and largely similar to those seen for the combination of ER with IR. The combination of a BBR with CAR yields larger negative coefficients for overall spending, but lower (and barely significant) coefficients for investment spending (Table 12), which seems to confirm the intuition that unless specifically shielded in the rule, investment outlays will be policymakers' preferred adjustment variable, even when the rule target is defined in cyclically adjusted terms.

Table 11. Matching Results: CARs and ERs Jointly as Treatment Group

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
	Dependent variable: Procyclicality of Total Public Spending						
[1] ATT	**-0.813****	**-0.849*****	**-0.598*****	**-0.582*****	**-0.621*****	**-0.763*****	**-0.615*****
	(0.368)	**(0.307)**	**(0.209)**	**(0.174)**	**(0.158)**	**(0.171)**	**(0.167)**
Number of Treated Obs.	67	67	67	67	67	67	67
Number of Control Obs.	2,314	2,314	2,314	2,314	2,314	2,314	2,314
Total Observations	2,381	2,381	2,381	2,381	2,381	2,381	2,381
	Dependent variable: Procyclicality of Investment Spending						
[2] ATT	**0.110**	**-0.989**	**-1.304****	**-1.375*****	**-1.337*****	**-1.382*****	**-1.329*****
	(0.926)	**(0.727)**	**(0.556)**	**(0.475)**	**(0.408)**	**(0.404)**	**(0.442)**
Number of Treated Obs.	59	59	59	59	59	59	59
Number of Control Obs.	376	376	376	376	376	376	376
Total Observations	435	435	435	435	435	435	435
Standardized biases (p-value)	0.178	0.908	0.988	1.000	1.000	0.178	1.000
Rosenbaum Bounds Sensitivity Tests	1.1	1.3	3	3	3	1.5	3

Note: bootstrapped standard errors (with 500 replications) In brackets the. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively.

Table 12. Matching Results: CARs and BBRs Jointly as Treatment Group

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
	Dependent variable: Procyclicality of Total Public Spending						
[1] ATT	**-0.676*** (0.232)**	**-0.559*** (0.198)**	**-0.498*** (0.117)**	**-0.502*** (0.101)**	**-0.509*** (0.098)**	**-0.491*** (0.093)**	**-0.505*** (0.102)**
Number of Treated Obs.	143	143	143	143	143	143	143
Number of Control Obs.	2,314	2,314	2,314	2,314	2,314	2,314	2,314
Total Observations	2,457	2,457	2,457	2,457	2,457	2,457	2,457
	Dependent variable: Procyclicality of Investment Spending						
[2] ATT	**-0.408 (0.606)**	**-0.432 (0.479)**	**-0.388 (0.389)**	**-0.593 (0.374)**	**-0.564* (0.337)**	**-0.674* (0.362)**	**-0.584* (0.349)**
Number of Treated Obs.	130	130	128	130	130	130	130
Number of Control Obs.	2,084	2,084	2,084	2,084	2,084	2,084	2,084
Total Observations	2,214	2,214	2,212	2,214	2,214	2,214	2,214
Standardized biases (p-value)	0.405	0.700	0.979	0.955	0.878	0.405	0.891
Rosenbaum Bounds Sensitivity Tests	1.2	1.1	1.1	1.2	1.4	1.5	1.3

Note: bootstrapped standard errors (with 500 replications) In brackets the. *, **, and *** indicate the significance level of 10%, 5% and 1%, respectively.

In sum, we find that not all flexible fiscal rules accommodate a countercyclical fiscal stance. Investment-friendly rules, and more broadly rules that exclude some categories of spending from the rule target, are the ones more clearly associated with countercyclical changes in both total and investment public spending.[14] The inclusion of cyclical adjustment features in ERs yields similar results. The results are mixed for cyclically-adjusted BBRs: the introduction of the latter is associated with countercyclical movements in overall spending, but with procyclical changes in investment spending. The introduction of escape clauses in FRs does not seem to have any impact on the cyclical stance of public spending. Investment-friendly ERs and BBRs, and cyclically-adjusted ERs, therefore appear as the most effective in taming the procyclical bias in public spending.

B. Robustness Checks

Diagnostic tests, reported at the bottom of Tables 3–12, confirm the robustness of the above results. The p value associated with the standardized biases is above the critical threshold of 10 percent in the large majority of cases. The cutting points from Rosenbaum sensitivity tests hover between 1.2 and 3, large enough levels compared to the findings in the literature (Rosenbaum, 2002; and Aakvik, 2001).[15]

Appendix 9 shows the results obtained using a probit model augmented to account for possible covariates of investment-friendly rules.[16] The propensity scores (Table A9.1) remain quantitatively

[14] Further overlaps between different rules, in line with Figure 2, confirm that IRs and CARs are the main drivers of the counter-cyclical properties associated with the implementation of FR. These results are available upon request to the authors.

[15] The cutting points of the Rosenbaum sensitivity tests indicate the level beyond which the ATT is no longer significant at the 5% threshold—a cutting point of 1.5 indicates that the unobserved heterogeneity would have to raise the odds of adopting a fiscal rule by 50 percent for the ATT to lose significance. Tipping points typically range between 1.1 and 2.2.

[16] We report only the results when investment-friendly rule is the treatment variable for space purpose. Results for other treatment variables are available upon request to the authors.

and qualitatively similar across columns The matching results using these "augmented" probit estimates (Table A9.2) all have similar sign as, and are close in magnitude to, those obtained from the non-augmented model in Table 5.

V. THE ROLE OF STRUCURAL FACTORS

Structural factors can magnify or mitigate the impact of a fiscal rule on the cyclical stance of fiscal policy. To explore their potential role, we look at possible non-linearity in the ATTs, through a control function regression approach. Building on Lin and Ye (2009) and Tapsoba (2012), we use the following OLS regression:

$$Cycl_{it} = \alpha + \beta_{it} IR_{it} + \gamma_{it} Pscore_{it} + \varphi X_{it} + \psi(IR_{it} \times X_{it}) + u_i + \nu_t + \varepsilon_{it} \quad (5)$$

where $Cycl._{it}$ refers to the procyclicality of *total* spending (or alternatively *investment* spending); IR_{it} to the investment-friendly rule dummy variable;[17] $pscore_{it}$ stands for the estimated *PS* from the baseline probit model and is included as a control function; X_{it} is a vector of macroeconomic, political and institutional factors that could give rise to heterogeneity in the ATT; u_i and ν_t refer to country and time fixed effects, respectively, while ε_{it} refer to the stochastic disturbance term. ψ, the coefficient of the interactive term between IR and X_{it}, catches the heterogeneity features of the treatment effect of IRs.

Table 13 and 14 report the results for total spending and investment spending, respectively. In each table, Column 1 shows the results of a simple OLS linking IRs adoption to the procyclicality of total spending (investment spending) while accounting for the estimated $pscore_{it}$. The β coefficient catches the mean difference in procyclicality between countries having enacted IRs and those that have not. In both cases, it is negative and significantly different from zero, and the magnitudes are close to the coefficients from the matching exercise in Table 5 above (-0.263 for total spending and -1.182 for investment spending). The following columns show the ψ coefficients of the interactive term between an investment-friendly rule and a given structural factor.[18]

On the macroeconomic side, potential sources of heterogeneity include past debt-to-GDP ratio, the level of development (proxied by per capita real GDP), the volatility of terms of trade, and the position over the business cycle (captured by a dummy for bad times, equaling one if the output gap is negative, zero otherwise).[19] The results indicate that investment-friendly rules are more effective in curbing fiscal procyclicality in countries with high past debt-to-GDP ratio, suggesting that these rules are more helpful in avoiding the procyclical bias when the financing constraints are tighter. The countercyclical-enhancing effect of investment-friendly rules appears more pronounced in bad times: in other words, it is easier, politically, to use capital outlays to stimulate the economy when faced with a contractionary shock, than to shield capital outlays from demand-cooling spending cuts in a boom. In addition, highly volatile terms of trade, which makes it harder to save during good times, seem to limit the procyclicality-reducing effect of IRs,

[17] Results for other fiscal rules are not reported here for space purposes. They are available upon request.

[18] In the equation underlying Tables 13 and 14, the X variables are entered in isolation (without being interacted with IR) on top of the interactive terms. For space purposes, these coefficients are not reported (only those for the interactive terms are).

[19] Results based on an alternative proxy for *bad times*, namely a dummy equaling one if the output growth rate is below the sample median output growth rate, and zero otherwise, remain qualitatively unchanged and are available upon request to the authors.

especially on overall spending (the coefficient of the interactive term is not significant for investment spending). The significantly negative coefficient of the interaction between investment-friendly rule and real per capital GDP for investment spending suggests that investment-friendly rules have more of an impact on investment spending in more advanced economies. Finally, the significantly positive coefficient of the interaction between investment-friendly rules and natural resource rents indicate that the voracity effect is stronger in resources-rich countries (Tornell and Lane, 1994; and Lane, 2003), hampering the ability of investment-friendly rules to rein in the procyclical bias in investment spending. This echoes the recent conclusion of the IMF Fiscal Monitor that commodity-exporting countries need to strengthen their ability to run countercyclical fiscal policies by further building fiscal buffers in good times, as the economic cycle moves together with the commodity cycle (IMF, 2015c).

Among political factors, government stability seems to mitigate the cycle-friendly property of IRs on public spending. This might stem from the fact that the ability of a government to stay in power makes it easier for it to resist spending pressures and to build fiscal buffers during booms, so as to spend more during bad times. In contrast, the coefficients of the interaction of either democracy or the election cycle (presence of elections in a given year) with an investment-friendly rule are not statistically significant, suggesting that these factors do not affect the effectiveness of IRs on the cyclicality of public spending.

Finally, we explore the influence of design and implementation features of fiscal rules on their countercyclical impact, and find that they all have significant impact. Formal monitoring and enforcement modalities, as well as strong legal basis for the rule, are associated with large negative coefficients, suggesting that these parameters magnify the countercyclical effect of IRs on overall spending (but less so for investment spending). In addition, a wider coverage of the rule increases its impact on the countercyclicality of public spending. The large negative sign of the interaction between an investment-friendly rule and the number of major changes in the design of the rule suggests that such rules have been frequently amended to increase their countercyclical impact. Finally, national investment-friendly rules have a stronger countercyclical effect than supranational ones, likely because the former are more binding on national fiscal authorities than the latter (Prakash and Cabezon, 2008; Tapsoba, 2012; Budina et al, 2012; and Dessus and others, 2013 for the West African Economic and Monetary Union).

Table 13. Heterogeneity of Treatment Effect of IRs on the Procyclicality of Total Public Spending

Variables	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**	**[7]**	**[8]**	**[9]**	**[10]**	**[11]**	**[12]**	**[13]**	**[14]**	**[15]**
Pscore	0.956***	1.651***	1.481***	1.220***	0.964***	1.174***	0.912***	1.483***	1.090***	0.995***	1.331***	1.288***	1.168***	0.976***	1.130***
	(0.197)	(0.250)	(0.256)	(0.286)	(0.225)	(0.270)	(0.222)	(0.257)	(0.223)	(0.278)	(0.280)	(0.270)	(0.257)	(0.221)	(0.247)
IR	-0.263***	3.050***	-0.716	-0.493***	-0.146	-0.262**	-1.583***	0.079	-0.273**	-0.250	0.074	-0.408***	-0.375***	-0.244**	-0.275
	(0.099)	(0.839)	(0.663)	(0.132)	(0.122)	(0.119)	(0.610)	(0.393)	(0.111)	(0.176)	(0.091)	(0.143)	(0.079)	(0.103)	(0.249)
Macroeconomic Factors															
IR* Lagged debt-to-GDP ratio		-0.830***													
		(0.206)													
IR* Log real per capita GDP			0.051												
			(0.069)												
IR* Volatility of terms of trade				0.026**											
				(0.013)											
IR* Bad times dummy					-0.381**										
					(0.151)										
IR*Log of natural rents						-0.010									
						(0.083)									
Political Factors															
IR* Government stability							1.913**								
							(0.794)								
IR* Democracy								-0.411							
								(0.421)							
IR* Election									-0.040						
									(0.234)						
Design															
IR* Monitoring										-0.279**					
										(0.114)					
IR* Enforcement											-0.512***				
											(0.144)				
IR* Coverage												-0.164**			
												(0.0814)			
IR* Legal basis													-0.295**		
													(0.127)		
IR*Year of major change														-0.599***	
														(0.117)	
National IR															-0.389***
															(0.098)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,472	2,472	2,472	1,879	2,472	2,467	2,472	2,472	2,358	2,472	2,472	2,472	2,472	2,472	2,472
Adjusted R-squared	0.008	0.018	0.006	0.004	0.006	0.004	0.006	0.010	0.006	0.003	0.007	0.007	0.006	0.006	0.006

Note: Bootstrapped standard errors (with 500 replications) in brackets. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively. Constant terms, as well as vector X variables in isolation (without interaction with IR) are included but not reported for space purpose.

Table 14. Heterogeneity of Treatment Effect of IRs on the Procyclicality of Investment Spending

Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
Pscore	1.960***	2.236***	1.789***	0.700	1.959***	1.748***	1.708***	2.372***	1.936***	0.687	0.528	1.837***	0.761	2.226***	1.909***
	(0.466)	(0.571)	(0.577)	(0.633)	(0.489)	(0.615)	(0.488)	(0.633)	(0.471)	(0.658)	(0.645)	(0.629)	(0.572)	(0.534)	(0.499)
IR	-1.182***	-2.848*	2.855*	-0.783**	-1.346***	-1.706***	-1.824	-1.371	-1.182***	-2.369***	-2.338***	-1.149***	-0.392	-1.190***	-1.083
	(0.311)	(1.551)	(1.673)	(0.374)	(0.434)	(0.361)	(1.509)	(1.303)	(0.388)	(0.531)	(0.499)	(0.375)	(0.265)	(0.316)	(0.756)
Macroeconomic Factors															
IR* Lagged debt-to-GDP ratio		0.414													
		(0.401)													
IR* Log real per capita GDP			-0.463***												
			(0.174)												
IR* Volatility of terms of trade				-0.014											
				(0.035)											
IR* Bad times dummy					-0.381**										
					(0.151)										
IR*Log of natural rents						0.374*									
						(0.199)									
Political Factors															
IR* Government stability							0.904								
							(2.003)								
IR* Democracy								0.235							
								(1.370)							
IR* Election									-0.138						
									(0.679)						
Design															
IR* Monitoring										-0.373					
										(0.403)					
IR* Enforcement											-0.234				
											(0.404)				
IR* Coverage												-1.163**			
												(0.569)			
IR* Legal basis													-1.062***		
													(0.404)		
IR*Year of major change														0.448	
														(0.466)	
National IR															-1.190***
															(0.312)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,225	2,225	2,225	1,751	2,225	2,220	2,225	2,225	2,216	2,225	2,225	2,225	2,225	2,225	2,225
Adjusted R-squared	0.010	0.012	0.013	0.006	0.008	0.010	0.013	0.011	0.009	0.017	0.018	0.008	0.012	0.008	0.008

Note: Bootstrapped standard errors (with 500 replications) in brackets. *, **, and *** indicate the significance level of 10%, 5% and 1%, respectively. Constant terms, as well as vector X variables in isolation (without interaction with IR) are included but not reported for space purpose.

VI. CONCLUSIONS

This paper uses propensity score matching methods on a broad panel of 167 advanced and developing economies over the period 1990–2012 to explore the relationship between fiscal rules and the cyclicality of the fiscal stance. It isolates the impact of different types of rules, and particularly that of flexible rules, which adapt the target in view of cyclical circumstances or policy priorities. The main findings, robust to a wide set of alternative specifications, are as follows.

- In line with the results of some recent studies, the paper finds that FRs in general are associated with a weak reduction in the procyclicality of fiscal policy. However, not all rules have the same impact: the design of the rule matters.

- Among standard rules, budget balance rules are associated with countercyclical changes in overall spending and in investment spending. The effects are mixed for expenditure rules: the introduction of the latter is associated with countercyclical changes in overall spending, but with procyclical changes in investment spending. Debt rules have no effect on the cyclical behavior of public spending.

- Flexibility in design seems however to have the strongest impact. Specifically, investment-friendly rules, or more broadly rules that exclude some categories of spending from the rule target, are associated with enhanced countercyclicality of both overall spending and investment spending. The countercyclical effect of investment-friendly rules seems stronger in bad times and when the rule is enacted at the national level. Inclusion of cyclical adjustment features in ERs yields broadly similar results. The enactment of cyclically-adjusted BBRs is associated with countercyclical movements in overall spending, but with procyclical changes in investment spending. The introduction of escape clauses in fiscal rules does not seem to affect the cyclical stance of fiscal policy.

- Country heterogeneity, such as past debt-to-GDP ratio, the level of development, the volatility of the terms of trade, natural resources endowment and government stability influences the procyclicality-reducing role of investment-friendly rules. So do the legal and enforcement arrangements surrounding the rule.

These results suggest that when it comes to enhancing the countercyclicality of fiscal policy, flexibility in the definition of the spending aggregate, and more particularly shielding public investment from the effect of the rule, is particularly effective. Flexibility through off cycle targets has more limited impact. However, improving fiscal discipline is the primary goal of fiscal rules. As such, the larger countercyclicality of fiscal policy associated with investment-friendly rules is not a synonymous of superiority of investment-friendly rules compared with other types of rules.

Indeed, countercyclicality does not guarantee fiscal soundness. Our analysis does not explore whether countercyclical movements were symmetric (expanding in bad times, falling in good times), or if investment-friendly rules provided sufficient incentives for governments to save during good times so as to be able to maintain or expand capital spending in bad times without putting the overall budget balance or public debt ratio at risk. There is evidence that governments tend to use fiscal policy as a stabilizing instrument more actively in bad times than in good times, with potentially adverse impact on public debt ratios (IMF, 2015a; and Celasun and others, 2015).

Investment-friendly fiscal rules may indeed give rise to creative accounting practices, as the lack of a clear-cut conceptual distinction between current expenditure and investment expenditure

may provide an incentive for opportunistic misclassification of unproductive expenditures as 'investment', with a view to circumventing the binding constraint of the fiscal rule (IMF, 2014; and Serven, 2007). Countercyclicality in public investment spending will deliver the desired impacts on growth, only if accompanied with an improvement in efficiency through a strengthening of public investment management framework (IMF, 2014; IMF, 2015b; and Warner, 2014). In countries with serious debt sustainability concerns, the growth-enhancing impact of public investment may fail to reduce budgetary pressures should the tax base be limited or tax administration be weak. Rebuilding fiscal buffers should be a priority in those countries, as mounting fiscal risks might lead to market pressure. More importantly, data is lacking to explore the link between countercyclicality and compliance with (or breach) of the rule targets. Furthermore, the coefficients of procyclicality used in this study are based on government spending, and do not account for changes in tax rates, owing to the lack of comprehensive and homogenous database on tax rates, especially in developing countries, which are predominant in our sample. These are promising avenues for further research.

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Appendix 1. Full Sample

Treatment Group						Control Group					
Antigua and Barbuda	Chad	Gabon	Kenya	Pakistan	St. Lucia	Albania	Comoros	Iran, Islamic Rep.	Moldova	Solomon Islands	Ukraine
Argentina	Chile	Germany	Latvia	Panama	St. Vincent & the Grenadines	Algeria	Congo, Dem. Rep.	Iraq	Mongolia	South Africa	United Arab Emirates
Armenia	Colombia	Greece	Lithuania	Peru	Sweden	Angola	Djibouti	Jordan	Morocco	Sudan	Uruguay
Australia	Congo, Rep.	Grenada	Luxembourg	Poland	Switzerland	Azerbaijan	Dominican Rep.	Kazakhstan	Nepal	Suriname	Uzbekistan
Austria	Costa Rica	Guinea-Bissau	Malaysia	Portugal	Togo	Bahamas, The	Egypt, Arab Rep.	Kiribati	Nicaragua	Swaziland	Vanuatu
Belgium	Cote d'Ivoire	Hong Kong	Mali	Romania	United Kingdom	Bahrain	El Salvador	Korea, Rep.	Oman	Syrian Arab Rep.	Venezuela, RB
Benin	Croatia	Hungary	Malta	Russia	United States	Bangladesh	Fiji	Kuwait	Papua New Guinea	Tajikistan	Vietnam
Botswana	Cyprus	Iceland	Mauritius	Senegal		Barbados	Gambia, The	Kyrgyz Rep.	Paraguay	Tanzania	Yemen, Rep.
Brazil	Czech Republic	India	Mexico	Serbia		Belarus	Georgia	Lao PDR	Philippines	Thailand	Zambia
Bulgaria	Denmark	Indonesia	Namibia	Singapore		Belize	Ghana	Lebanon	Qatar	Tonga	Zimbabwe
Burkina Faso	Ecuador	Ireland	Netherlands	Slovak Republic		Bhutan	Guatemala	Lesotho	Samoa	Trinidad and Tobago	
Cabo Verde	Equatorial Guinea	Israel	New Zealand	Slovenia		Bolivia	Guinea	Macedonia, FYR	Sao Tome and Prin.	Tunisia	
Cameroon	Estonia	Italy	Niger	Spain		Bosnia and Herzegovina	Guyana	Madagascar	Saudi Arabia	Turkey	
Canada	Finland	Jamaica	Nigeria	Sri Lanka		Cambodia	Haiti	Maldives	Seychelles	Turkmenistan	
Central African Rep.	France	Japan	Norway	St. Kitts and Nevis		China	Honduras	Mauritania	Sierra Leone	Uganda	

Appendix 2. Types of Fiscal Rules (only for FR countries in our sample)

Countries	BBR	DR	ER	RR	CAR	CR	IR	Sup.	Countries	BBR	DR	ER	RR	CAR	CR	IR	Sup.
Antigua and Barbuda	1998	1998						Yes	Israel	1992 (2010)		2005 (2010)				Yes	
Argentina	2000		2000				Yes		Italy	1992	1992				Yes		Yes
Armenia		2008							Jamaica	2010	2010				Yes		
Australia	1985 (1998)	1998	1985	1985	Yes				Japan	1947 (1998)		2006 (2010)				Yes	
Austria	1995 (1998)	1995				Yes		Yes	Kenya		1997		1997				
Belgium	1992	1992	1993 (1998)	1995 (1999)		Yes		Yes	Latvia	2004	2004				Yes		Yes
Benin	2000	2000				Yes	Yes	Yes	Lithuania	2004	1997 (2004)	2008	2008		Yes		Yes
Botswana			2003						Luxembourg		1990 (2004)	1990			Yes	Yes	Yes
Brazil		2000	2000			Yes	Yes		Malaysia	1959	1959 (2009)					Yes	
Bulgaria	2006	2003	2006 (2010)			Yes	Yes	Yes	Mali	2000	2000				Yes	Yes	Yes
Burkina Faso	2000	2000				Yes	Yes	Yes	Malta	2004	2004				Yes		Yes
Cameroon	2002 (2008)	2002					Yes	Yes	Mauritius		2008				Yes		
Canada	1998 (2006)	1998 (2006)	1998 (2006)						Mexico	2006 (2009)					Yes	Yes	
Cabo Verde	1998	1998							Namibia		2001	2010					
Central African Rep.	2002 (2008)	2002					Yes	Yes	Netherlands	1992	1992	1994	1994		Yes	Yes	Yes
Chad	2003 (2008)	2002					Yes	Yes	New Zealand	1994	1994					Yes	
Chile	2001 (2010)				Yes				Niger	2000	2000				Yes	Yes	Yes
Colombia	2011		2000		Yes				Nigeria	2007							
Congo. Rep.	2002	2002					Yes	Yes	Norway	2001				Yes			
Costa Rica	2001						Yes		Pakistan	2005	2005				Yes	Yes	
Côte d'Ivoire	2000	2000				Yes	Yes	Yes	Panama	2002 (2008)	2002 (2008)			Yes			
Croatia	2012	2009	2012		Yes		Yes	Yes	Peru	2000 (2003)		2000 (2003)			Yes		
Cyprus	2004	2004				Yes		Yes	Poland	2004 (2008)	1999 (2004)	2011			Yes		Yes
Czech Republic	2004	2004				Yes		Yes	Portugal	1992	1992				Yes		Yes
Denmark	1992 (2011)	1992	1994 (2009)	2001 (2012)	Yes		Yes	Yes	Romania	2007	2007	2010			Yes		Yes
Ecuador	2003 (2010)	2003 (2010)	2010				Yes		Russia	2007							
Equatorial Guinea	2002 (2008)	2002					Yes	Yes	Senegal	2000	2000				Yes	Yes	Yes
Estonia	1993	2004			Yes			Yes	Serbia	2011	2011			Yes			
Finland	1995 (2011)	1995 (2011)	2003 (2011)		Yes		Yes	Yes	Singapore	1965		1991 (2008)			Yes		
France	1992	1992	1998 (2011)	2006 (2011)		Yes		Yes	Slovak Republic	2004	2004				Yes		Yes
Gabon	2002 (2008)	2002					Yes	Yes	Slovenia	2004	2000 (2005)				Yes		Yes
Germany	1969 (2009)	1992	1982 (2008)		Yes		Yes	Yes	Spain	1992 (2006)	1992	2011		Yes		Yes	Yes
Greece	1992	1992				Yes		Yes	Sri Lanka	2003	2003						
Grenada	1998 (2006)	1998						Yes	St. Kitts and Nevis	1998	1998						Yes
Guinea-Bissau	2000	2000				Yes	Yes	Yes	St. Lucia	1998	1998						Yes
Hong Kong	1997						Yes		St. Vincent and the Grenadines	1998	1998						Yes
Hungary	2004 (2012)	2004 (2012)	2010			Yes		Yes	Sweden	1995 (2000)	1995	1997		Yes			Yes
Iceland			2004						Switzerland	2003				Yes			
India	2004						Yes		Togo	2000	2000				Yes	Yes	Yes
Indonesia	1967 (2004)	2004							United Kingdom	1992 (2010)	1992 (2010)			Yes		Yes	Yes
Ireland	1992	1992							United States	1986		1990 (2011)				Yes	

Note: BBR= Budget Balance Rule; DR= Debt Rule; ER= Expenditure Rule; RR= Revenue Rule; BBR= Budget Balance Rule; DR= Debt Rule; ER= Expenditure Rule; RR= Revenue Rule; CAR= cyclically-adjusted balance rule (defined in terms of cyclically-adjusted balance); CR= Rule with well-defined escape clauses; IR= Investment-friendly rule; Sup = Supranational rule; Major Change= Year of last major change for ECs in brackets. Dominica, Kosovo and Liberia, adopted FRs, but are excluded from our sample because of data limitation on key variables for the study.
Source: IMF Fiscal Affairs Department's Fiscal Rule Database (2013).

Appendix 3. Investment-friendly Rules Adoption Worldwide Through 2012 (Over a Minimum of One Year)

Country	Max. number of rules	National Rules		Supranational Rules	
		All rules are concerned	Some rules are concerned	All rules are concerned	Some rules are concerned
Argentina	2		2000-2008		
Benin	2				2000-
Brazil	2	2000-			
Bulgaria	5		2003-		
Burkina Faso	2				2000-
Cameroon	2			2002-	
Central African Republic	2			2002-	
Chad	2			2002-	
Congo, Rep.	2			2002-	
Costa Rica	1	2001-			
Cote d'Ivoire	2				2000-
Croatia	5	2012-			
Denmark	5	1994-			
Ecuador	2	2003-			
Equatorial Guinea	2			2002-	
Finland	5	1995-			
Gabon	2			2002-	
Germany	4	1985-2009			
Guinea-Bissau	2				2000-
Hong Kong SAR, China	1	2002-			
India	1	2004-2008			
Israel	2		1992-2008		
Japan	1	1947-			

Kosovo*	1	2008-2009			
Liberia*	1	2009-			
Luxembourg	4		1990-2004		
Malaysia	2	1959-			
Mali	2				2000-
Mexico	1	2009-			
Netherlands	4	2007-2010	1994-2006		
New Zealand	2	1994-			
Niger	2				2000-
Pakistan	2	2005-			
Senegal	2				2000-
Spain	4		2006-		
Togo	2				2000-
United Kingdom	4	1997-			
United States	1	1986-2002; 2011-			
Total		19	6	6	8

Note: *Countries that are not in the sample, owing to data limitation.
Source: IMF Fiscal Rule Dataset (2013)

Appendix 4. Sources and Definitions of Data

Variable	Definition	Sources
Government Total Spending	Total public spending, as GDP percentage.	World Economic Outlook (2014)
Cyclicality of Total Spending	Responsiveness of total public spending to GDP variation (>0: procyclical; =0: acyclical; <0: countercyclical)	Author's construction
Public Capital Spending	Total public investment, as GDP percentage.	World Economic Outlook (2014)
Cyclicality of Capital Spending	Responsiveness of public investment spending to GDP variation (>0: procyclical; =0: acyclical; <0: countercyclical)	Author's construction
FR Dummy	Dummy equaling 1 if a numerical constraint is imposed on any fiscal aggregates at time t, 0 otherwise.	Fiscal Rule Database, IMF's Fiscal Affairs Department (2012)
Investment-friendly Rule Dummy	Dummy equaling 1 if a numerical constraint is imposed on fiscal aggregates, excluding public investment or priority sector spending, at time t, 0 otherwise.	
Flexible Rule Dummy	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, 0 otherwise.	
Monitoring	Dummy equaling 1 if monitoring mechanism outside the government for the fiscal rule exists, 0 otherwise.	
Enforcement	Dummy equaling 1 if formal enforcement procedures for the fiscal rule exist, 0 otherwise.	
Coverage	Dummy equaling 1 if FR targets the general government or wider, 0 otherwise.	
Writing Legal Basis	Dummy equaling 1 if FR is statutory, written in international treaty, or added in Constitution; 0 otherwise.	
Degree of Democracy	Linear interpolation of freedom house political right index and polity2 index	Freedom House (2014); PolityIV (2013)
Quality of Bureaucracy	Index ranging from 0 to 4 (normalized 0-1) and measuring the institutional strength and expertise that a country's bureaucracy has to govern without drastic changes in policy or interruptions in government services.	International Country Risk Guide (ICRG, 2009)
Government Stability	Index ranging from 0 to 12 (normalized 0-1) and measuring the ability of government to stay in office and to carry out its declared program(s). The higher the index, the more stable the government is.	

Right-Wing Dummy	Binary variable equaling 1 if right-wing government is in place (in non-authoritarian regime), 0 otherwise.	Database of Political Institutions (2012) and own calculations
Federal Dummy	Binary variable equaling 1 if country has a federal state form, 0 otherwise.	Perspective Monde (2014); CIA WorldFactbook (2014)
Presidential Dummy	Binary variable equaling 1 if country has a presidential form of government, 0 otherwise.	Cheibub and others (2010); Perspective Monde (2014)
Majoritarian elections rule Dummy	Binary variable equaling 1 if country has a majoritarian electoral system in place, 0 otherwise.	Bormann and Golder (2005); Perspective Monde (2014)
Real GDP	GDP at constant prices.	Penn World Table (PWT 8.0)
Per Capita Real GDP	Per capita GDP at constant prices.	
Output Growth Rate	Annual change in real output	
Volatility of Output Growth	Standard deviation of real output growth.	Author's calculation
Inflation Rate	Annual change in CPI , normalized as (inflation/1+inflation), to mitigate the influence of hyperinflation episodes	World Development Indicators (2014) and Author's calculation
Financial Openness	Chinn and Ito index of financial liberalization.	Chinn and Ito (2006)
Trade Openness	Sum of imports and exports divided by GDP	Penn World Table (PWT 8.0)
Debt-to-GDP Ratio	Gross general government debt, as GDP percentage.	Ali Abbas et al. (2010)

Appendix 5. Descriptive Statistics

Variable	N	mean	min	max	sd
Government Total Spending (%GDP)	3541	31.326	0	204.17	12.952
Cyclicality of Total Spending	3472	-0.0707	-3.957	3.877	.5926383
Public Capital Spending (%GDP)	3143	6.077	0.033	40.027	4.775
Cyclicality of Capital Spending	3118	0.417	-9.132	9.890	1.707
Fiscal Rule Dummy	3841	0.285	0	1	0.451
Investment-friendly Rule Dummy	3841	0.120	0	1	0.325
Flexible Rule Dummy	3841	0.193	0	1	0.395
Monitoring	3841	0.199	0	1	0.399
Enforcement	3841	0.183	0	1	0.387
Coverage	3841	0.132	0	1	0.338
Writing Legal basis	3841	0.213	0	1	0.409
Degree of Democracy	3841	0.685	0	1	0.327
Quality of Bureaucracy	2906	0.564	0	1	0.279
Government Stability	2906	0.665	0.083	1	0.165
Right-Wing Ideology Dummy	3691	0.197	0	1	0.397
Federal State Dummy	3841	0.135	0	1	0.341
Presidential-type regime Dummy	3841	0.173	0	1	0.379
Majoritarian elections rule Dummy	3841	0.187	0	1	0.390
Real GDP	3831	3.04e+11	1.21e+08	1.33e+13	1.07e+12
Per capita real GDP	3831	9099.797	197.639	87716.73	13650.74
Output Growth Rate	3817	0.357	-0.994	0.993	0.636
Volatility of Output Growth	3788	4.085	0.027	142.071	9.392
Inflation rate	3817	0.695	-0.974	0.998	0.427
Financial openness	3435	0.309	-1.864	2.439	1.572
Trade Openness	3801	88.357	11.087	531.737	52.046
Debt–to-GDP ratio	3569	64.623	0.7781782	2092.92	64.830

Appendix 6. The Problem of Unobserved Heterogeneity

The underlying idea is straightforward. Let us consider that the decision to adopt FRs is determined not only by a vector of observable covariates (X), as this was the case hitherto, but also by unobservable covariates u, scaled such that $0 \leq u \leq 1$. Consequently, the probability of enacting FRs becomes

$$P = \Pr(FR_i = 1/X, u) = \beta X + \gamma u \quad \text{(A1)}$$

Recall that the odds for a country to introduce FR are defined by the ratio $P/1-P$.

Accordingly, for a matched pair of countries i and j, the odds ratio is $\frac{P_i/(1-P_i)}{P_j/(1-P_j)}$, which, if assuming a logistic distribution, can be rewritten as follows

$$\frac{P_i/(1-P_i)}{P_j/(1-P_j)} = \frac{exp(\beta X_i + \gamma u_i)}{exp(\beta Xj + \gamma u_j)} \quad \text{(A2)}$$

Given that countries i and j are matched on the basis of their observable covariates (X), it follows that $X_i = X_j$, which simplifies the odds ratio to $exp[\gamma(u_i - u_j)]$. Given the bounds imposed on u, it results that the odds ratio also turn bounded as follows

$$\frac{1}{e^{\gamma}} \leq exp[\gamma(u_i - u_j)] \leq e^{\gamma} \quad \text{(A3)}$$

A given value of γ will therefore set the extent to which a difference in the probability of FRs adoption between countries i and j, namely any deviation from the "free of hidden bias" case, may be attributable to the unobservable heterogeneity.

From the foregoing, two cases wherein the odds ratio is equal to 1, implying that the probability of FRs adoption is free of a hidden bias, emerge: (i) unobserved heterogeneity plays no role on the cyclicality of fiscal policy, that is $\gamma = 0$, or (ii) unobserved covariates are not different ($u_i = u_j$). The influence of unobserved characteristics is active when e^{γ} takes values different from 1. Thus, $e^{\gamma} = k$ indicates that two countries that are similar in terms of their observable characteristics could differ in their odds of introducing FRs by as much as a factor of k.

For each value of e^{γ}, the Rosenbaum bounds calculate the significance level of the null hypothesis that the ATT is equal to zero. Accordingly, it becomes possible to identify the tipping point from which the hidden bias should cause us to question the validity of our estimated ATT. The higher the level of cut-off point is, the more robust the linkage between FRs adoption and the procyclical stance of fiscal policy is.

Appendix 7. Control Variables

Control variables were selected on the basis of the key drivers behind the adoption of fiscal rules and the cyclical properties of fiscal policy identified in the literature. As a reminder, the aim is not to define the best statistical model explaining the probability of fiscal rule adoption or the emergence of a countercyclical fiscal stance. Rather, it is to control, to the extent possible, for variables that could influence both FR adoption and fiscal policy procyclicality. On that basis, the following variables were selected:

- Macroeconomic indicators include the past debt-to-GDP ratio, rate and volatility of economic growth, and rate of inflation—variables identified as key drivers of the cyclical properties of fiscal policy in the existing literature (Aghion and Marinescu, 2008; Alesina and others, 2008; Frankel and others, 2013; Mpatswe and others, 2011; Talvi and Végh, 2005; and Tornell and Lane, 1994). As the adoption of a fiscal rule is expected to be more likely in fiscally healthier countries, given the need for credibility about the enforceability of the rule (Calderón and Schmidt-Hebbel, 2008; IMF, 2009; and Tapsoba, 2012), we expect a negative correlation between the likelihood of fiscal rule adoption and the past debt-to-GDP ratio. Besides, the debt-to-GDP ratio might influence a government's leeway for engaging into countercyclical fiscal policy (Combes and others, 2014; Frankel and others, 2013; and Mpatswe and others, 2011). Likewise, good macroeconomic fundamentals are seen as key ingredients for a credible introduction of fiscal rules (Budina and others, 2012; and IMF, 2009), and we expect a positive association between the probability of fiscal rule adoption and the rate of economic growth, and a negative one with growth instability and the inflation rate.

- Political factors also play a pivotal role in the cyclicality of fiscal policy (Alesina and others, 2008; and Frankel and others, 2013), so indicators of political stability and the degree of democracy were included. The expected sign of government stability is ambiguous *a priori*: on the one hand, greater government stability may lower the deficit bias and improve fiscal discipline, setting the stage for adoption of a fiscal rule; on the other, government instability might foster fiscal rule adoption with a view to maintaining fiscal discipline despite frequent government changes (Tapsoba, 2012). In a similar vein, we expect a positive association between the degree of democracy and the probability of enacting rules-based fiscal frameworks, as democratic processes go hand-in-hand with political rights and inclusion of citizens in policymaking, which in turn should raise the appetite for constraining fiscal policy discretion (Acemoglu and others, 2003; and Gerring and others, 2005).[20]

- Institutional factors also matter for the cyclical stance of fiscal policy (Aghion and Marinescu, 2008; Alesina and others, 2008; Ayuso-i-Casals and others, 2007; Bergman and Hutchison, 2015; and Mpatswe and others, 2011). We include the type of presidential regime, the use of majority electoral rules, federal status and participation to a currency union. A presidential form of government and majority electoral rules are expected to be negatively correlated with the likelihood of adoption of a fiscal rule, because presidential-type regimes imply a greater rigidity between political branches in the decision-making process (Gerring and others, 2005, 2009), while majority electoral rules are less conducive to the formation of coalition governments (Austen-Smith and Banks, 1999): both features are not very amenable

[20] Such constraints are critical for tackling the root causes of fiscal profligacy, including notably issues related to polarized social preferences (Talvi and Végh, 2005; and Woo, 2009), conflicts of interest between political parties (Alesina and Tabellini, 1990), agency problem between voters and politicians (Alesina and others, 2008; and von Hagen, 2005), and the *common-pool* problem (Alesina and Perotti, 1994; and von Hagen, 2005).

to constraining policymaking through fiscal rule adoption. By contrast, federal status is expected to increase the probability of introducing fiscal rules, as it implies a stronger vertical separation of power (Gerring and others, 2005) and a stronger interest in controlling negative fiscal spillovers across government levels through binding constraints on their respective fiscal discretion (Huber and others, 1993; and Swank, 2002). Finally, we expect a positive correlation between currency union membership and fiscal rule adoption, as monetary unions are usually governed by supranational fiscal rules aiming at preventing free-riding behaviors between member states. The presence of these supranational rules may in turn catalyze the implementation of national rules (Debrun and others, 2008; and IMF, 2009).

Appendix 8. Matching Results Using a More Restrictive Definition of IRs as *Treatment* Variable

To better nail down the influence of *investment-friendly rules* on spending procyclicality, we re-estimate the ATT using a more restrictive definition of the *investment-friendly rule* dummy. Basically, we discard from the latter, observations on Finland, Israel, Netherlands (during 2007– 2010), and the United States, as the priority items excluded from the applicability perimeter of their rule are not really related to *investment*.[21] Spain (post–2011) and the United Kingdom (post–2011) are also excluded, because their investment exclusion is voided since 2011. We also rule out WAEMU countries, as the WAEMU-wide investment-friendly rule shields only externally-financed capital spending from the fiscal aggregates covered by the rule. The results, reported below are qualitatively similar to the baseline, bolstering the evidence on the IRs-induced countercyclicality on public spending.

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
Dependent variable: Procyclicality of *Total Public Spending*							
[1] ATT	**-0.273**	**-0.184**	**-0.169***	**-0.203****	**-0.230*****	**-0.280*****	**-0.222*****
	(0.189)	**(0.149)**	**(0.0991)**	**(0.0842)**	**(0.0826)**	**(0.0839)**	**(0.0799)**
Number of *Treated* observations	245	245	245	245	245	245	245
Number of *Control* observations	2,014	2,014	2,014	2,014	2,014	2,014	2,014
Total number of observations	2,259	2,259	2,259	2,259	2,259	2,259	2,259
Dependent variable: Procyclicality of *Public Investment Spending*							
[2] ATT	-1.868***	-1.858***	-1.814***	-1.811***	-1.807***	-1.768***	-1.805***
	(0.422)	(0.365)	(0.326)	(0.304)	(0.308)	(0.309)	(0.324)
Number of *Treated* observations	222	222	221	222	222	222	222
Number of *Control* observations	1,798	1,798	1,798	1,798	1,798	1,798	1,798
Total number of observations	2,020	2,020	2,019	2,020	2,020	2,020	2,020
Standardized biases (p-value)	0.764	0.969	0.995	0.995	0.989	0.764	0.992
Rosenbaum Bounds Sensitivity Tests	2.1	2.3	2.5	2.5	2.5	2.5	2.5

Note: Bootstrapped standard errors (with 500 replications) in brackets. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively.

[21] Finland excludes social security transfers, Israel, security spending, the Netherlands (during) 2007–10, interest payments, and the US, entitlement payments.

Appendix 9.1 Robustness

Appendix 9.1. Augmented Probit Model

Dependent variable	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
	Investment rule														
Log. debt-to-GDP ratio (lagged)	0.059	-3.601*	0.052	0.120***	0.048	0.078*	0.056	0.077*	0.026	-0.012	0.069	0.058	0.069*	0.074*	0.009
	-0.041	(2.103)	-0.041	-0.043	-0.043	-0.041	-0.041	-0.041	-0.043	-0.045	-0.043	-0.047	-0.041	-0.041	-0.042
Growth instability	-0.106*	-0.0983*	-0.0959*	-0.0995*	-0.110*	-0.141**	-0.114*	-0.121**	-0.053	-0.0992*	-0.123**	-0.141**	-0.118**	-0.085	-0.092
	-0.058	-0.058	-0.058	-0.059	-0.058	-0.058	-0.059	-0.058	-0.059	-0.059	-0.059	-0.067	-0.058	-0.057	-0.057
Economic growth	-0.036	-0.038	-0.033	-0.057	-0.038	-0.05	-0.037	-0.052	-0.057	-0.017	-0.049	-0.054	-0.046	-0.074	-0.111*
	-0.057	-0.057	-0.057	-0.059	-0.057	-0.058	-0.057	-0.057	-0.058	-0.057	-0.057	-0.062	-0.057	-0.058	-0.059
Inflation rate	-0.434***	-0.436***	-0.438***	-0.423***	-0.454***	-0.479***	-0.451***	-0.397***	-0.458***	-0.478***	-0.384***	-0.433***	-0.387***	-0.441***	-0.500***
	-0.064	-0.065	-0.065	-0.068	-0.066	-0.067	-0.066	(0.0662)	-0.065	-0.067	-0.066	-0.072	-0.066	-0.064	-0.068
Government stability	0.551***	0.560***	0.589***	0.569***	0.585***	0.675***	0.566***	0.472**	0.732***	0.675***	0.498**	0.447*	0.493**	0.466**	0.469**
	(0.213)	(0.214)	(0.217)	(0.220)	(0.215)	(0.222)	(0.214)	(0.213)	(0.219)	(0.220)	(0.216)	(0.231)	(0.214)	(0.217)	(0.217)
Degree of democracy	0.915***	0.895***	0.953***	1.009***	1.019***	1.544***	1.016***	0.949***	1.065***	1.321***	0.865***	0.627***	0.834***	0.947***	0.975***
	(0.118)	(0.120)	(0.120)	(0.119)	(0.124)	(0.141)	(0.118)	(0.122)	(0.124)	(0.151)	(0.116)	(0.138)	(0.119)	(0.119)	(0.121)
Presidential-typre regime	-0.173**	-0.181**	-0.191**	-0.197**	-0.193**	-0.222***	-0.198**	-0.134	-0.194**	-0.263***	-0.160*	-0.081	-0.139	-0.185**	-0.174**
	-0.085	-0.085	-0.085	-0.089	-0.087	-0.085	-0.086	-0.087	-0.086	-0.091	-0.087	-0.09	-0.086	-0.086	-0.087
Majoritarian electoral rule	-0.062	-0.069	-0.079	-0.089	-0.083	-0.175*	-0.071	-0.027	-0.195**	-0.156	-0.041	0.022	-0.032	-0.072	-0.039
	-0.094	-0.094	-0.094	-0.097	-0.097	-0.099	-0.094	-0.094	-0.093	-0.098	-0.094	(0.106)	-0.094	-0.095	-0.095
Federal State	0.399***	0.398***	0.387***	0.422***	0.422***	0.387***	0.425***	0.421***	0.136	0.493***	0.424***	0.331***	0.416***	0.413***	0.419***
	-0.086	-0.086	-0.088	-0.089	-0.091	-0.085	-0.089	-0.086	-0.092	-0.089	-0.089	-0.096	-0.087	-0.087	-0.086
Currency Union Member	0.716***	0.728***	0.709***	0.656***	0.715***	0.774***	0.707***	0.749***	0.814***	0.623***	0.743***	0.649***	0.753***	0.713***	0.724***
	-0.076	-0.076	-0.076	-0.078	-0.075	-0.078	-0.074	-0.077	-0.079	-0.077	-0.076	-0.084	-0.077	-0.076	-0.076
Squared debt-to-GDP ratio (lagged)		1.772*													
		(1.016)													
Trade openness			-0.762												
			(0.841)												
Financial openness				-0.0252											
				(0.0206)											
Log. per capita real GDP					-0.029										
					-0.024										
Log. natural rents						0.212***									
						-0.033									
Quality of bureaucracy							-0.162								
							(0.131)								
Right-wing ideology								-0.194**							
								-0.083							
Log. Population size									0.161***						
									-0.021						
Dependency ratio										3.896**					
										(1.654)					
IMF program											0.061				
											-0.071				
Government polarization												0.191***			
												-0.046			
Elections													0.0572		
													-0.077		
Crisis														-0.343***	
														(0.115)	
Overall fiscal balance															-0.00839***
															-0.002
Observations	2,618	2,618	2,600	2,448	2,618	2,613	2,618	2,595	2,618	2,618	2,574	2,261	2,595	2,596	2,594
Pseudo R^2	0.135	0.136	0.135	0.137	0.132	0.136	0.149	0.136	0.154	0.146	0.133	0.141	0.135	0.138	0.143

Note: robust standard errors in brackets. *,**, and *** indicate the significance level of 10%, 5%, and 1%, respectively. Constant terms are included but not reported.

Appendix 9.2. Robustness Matching Results (with IRs as *Treatment* Variable)

	Nearest-neighbor matching		Radius matching			Local linear regression matching	Kernel matching
	n= 1	n= 3	r= 0.01	r= 0.03	r= 0.05		
Robustness checks							
ATT on Procyclicality of *Total Public Spending*							
[1] Adding squared public debt (lagged)	-0.175	-0.206	-0.288**	-0.299**	-0.297**	-0.323***	-0.299**
	(0.185)	(0.157)	(0.129)	(0.118)	(0.118)	(0.102)	(0.116)
[2] Adding trade openness	-0.361**	-0.273*	-0.276**	-0.278***	-0.287***	-0.308***	-0.283***
	(0.166)	(0.152)	(0.117)	(0.106)	(0.100)	(0.100)	(0.106)
[3] Adding financial openness	-0.275*	-0.346**	-0.268**	-0.281***	-0.282***	-0.308***	-0.281***
	(0.164)	(0.152)	(0.116)	(0.108)	(0.106)	(0.106)	(0.105)
[4] Adding log. per capita real GDP	-0.442***	-0.269*	-0.283***	-0.285***	-0.281***	-0.304***	-0.281***
	(0.168)	(0.146)	(0.109)	(0.104)	(0.0997)	(0.108)	(0.106)
[5] Adding log. natural rents	-0.0916	-0.124	-0.169	-0.217**	-0.233**	-0.240**	-0.226**
	(0.172)	(0.137)	(0.107)	(0.103)	(0.102)	(0.0947)	(0.0996)
[6] Adding quality of bureaucracy	-0.229	-0.332**	-0.304***	-0.302***	-0.285***	-0.305***	-0.288***
	(0.180)	(0.146)	(0.109)	(0.0988)	(0.101)	(0.103)	(0.100)
[7] Adding right-wing ideology	-0.334*	-0.295**	-0.292**	-0.304***	-0.302***	-0.320***	-0.303***
	(0.183)	(0.149)	(0.118)	(0.115)	(0.112)	(0.106)	(0.112)
[8] Adding log. population size	-0.267	-0.258*	-0.242**	-0.236**	-0.240**	-0.245**	-0.238**
	(0.165)	(0.134)	(0.102)	(0.0975)	(0.105)	(0.103)	(0.107)
[9] Adding dependency ratio	-0.165	-0.201	-0.213*	-0.280**	-0.307***	-0.338***	-0.302***
	(0.172)	(0.150)	(0.111)	(0.116)	(0.109)	(0.100)	(0.105)
[10] Adding IMF program	-0.179	-0.235	-0.296***	-0.299***	-0.297***	-0.305***	-0.295***
	(0.185)	(0.157)	(0.113)	(0.113)	(0.106)	(0.103)	(0.105)
[11] Adding government polarization	-0.213	-0.283**	-0.263**	-0.254**	-0.252**	-0.234**	-0.252**
	(0.163)	(0.141)	(0.111)	(0.112)	(0.106)	(0.104)	(0.105)
[12] Adding elections	-0.180	-0.278*	-0.283**	-0.300***	-0.298***	-0.311***	-0.297***
	(0.172)	(0.154)	(0.114)	(0.113)	(0.108)	(0.103)	(0.108)
[13] Adding crisis	-0.289*	-0.316**	-0.272**	-0.289***	-0.292***	-0.303***	-0.290***
	(0.169)	(0.146)	(0.116)	(0.111)	(0.109)	(0.105)	(0.111)
[14] Adding overall balance	-0.540***	-0.397***	-0.304***	-0.295***	-0.298***	-0.311***	-0.298***
	(0.162)	(0.138)	(0.115)	(0.111)	(0.105)	(0.0982)	(0.104)
ATT on Procyclicality of *Public Investment Spending*							
[1] Adding squared public debt (lagged)	-1.055***	-1.221***	-1.113***	-1.112***	-1.094***	-1.072***	-1.098***
	(0.407)	(0.366)	(0.338)	(0.314)	(0.319)	(0.298)	(0.300)
[2] Adding trade openness	-1.127**	-1.158***	-1.207***	-1.219***	-1.194***	-1.142***	-1.198***
	(0.441)	(0.366)	(0.318)	(0.315)	(0.319)	(0.301)	(0.313)
[3] Adding financial openness	-0.919**	-1.098***	-1.207***	-1.204***	-1.173***	-1.138***	-1.179***
	(0.430)	(0.384)	(0.338)	(0.325)	(0.307)	(0.326)	(0.304)
[4] Adding log. per capita real GDP	-0.883**	-1.068***	-1.182***	-1.192***	-1.166***	-1.114***	-1.169***
	(0.426)	(0.369)	(0.323)	(0.323)	(0.292)	(0.293)	(0.315)
[5] Adding log. natural rents	-1.235***	-1.180***	-1.142***	-1.141***	-1.146***	-1.162***	-1.143***
	(0.403)	(0.349)	(0.309)	(0.287)	(0.325)	(0.321)	(0.292)
[6] Adding quality of bureaucracy	-1.007**	-1.205***	-1.191***	-1.179***	-1.155***	-1.103***	-1.159***
	(0.406)	(0.372)	(0.330)	(0.321)	(0.317)	(0.318)	(0.313)
[7] Adding right-wing ideology	-0.984**	-1.304***	-1.221***	-1.153***	-1.125***	-1.115***	-1.131***
	(0.435)	(0.382)	(0.325)	(0.327)	(0.326)	(0.315)	(0.332)
[8] Adding log. population size	-1.318***	-1.273***	-1.297***	-1.336***	-1.318***	-1.245***	-1.319***
	(0.405)	(0.396)	(0.334)	(0.315)	(0.312)	(0.329)	(0.319)
[9] Adding dependency ratio	-1.490***	-1.324***	-1.256***	-1.259***	-1.223***	-1.202***	-1.223***
	(0.410)	(0.374)	(0.310)	(0.343)	(0.332)	(0.323)	(0.312)
[10] Adding IMF program	-1.349***	-1.118***	-1.156***	-1.132***	-1.092***	-1.060***	-1.099***
	(0.473)	(0.389)	(0.351)	(0.329)	(0.331)	(0.330)	(0.324)
[11] Adding government polarization	-2.265***	-2.424***	-2.364***	-2.401***	-2.373***	-2.321***	-2.377***
	(0.450)	(0.432)	(0.387)	(0.384)	(0.404)	(0.408)	(0.377)
[12] Adding elections	-1.332***	-1.190***	-1.160***	-1.186***	-1.244***	-1.281***	-1.230***
	(0.490)	(0.411)	(0.393)	(0.363)	(0.359)	(0.344)	(0.364)
[13] Adding crisis	-1.232***	-1.256***	-1.187***	-1.150***	-1.120***	-1.089***	-1.127***
	(0.441)	(0.415)	(0.363)	(0.323)	(0.338)	(0.322)	(0.347)
[14] Adding overall balance	-1.116***	-0.976***	-1.162***	-1.157***	-1.124***	-1.068***	-1.128***
	(0.393)	(0.348)	(0.321)	(0.328)	(0.313)	(0.314)	(0.301)

Note: Bootstrapped standard errors (with 500 replications) in brackets. *, **, and *** indicate the significance level of 10%, 5%, and 1%, respectively.