

Yeter, Mustafa; Heinemann, Friedrich

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# The effects of fiscal rules on public finances and their identification

Friedrich Heinemann<sup>1</sup>

(ZEW Mannheim *and* University of Heidelberg)

Mustafa Yeter<sup>2</sup>

(ZEW Mannheim)

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## Abstract

Many economic studies analyse the impact of fiscal rules and discuss their effectiveness in limiting excessive debt. A majority of these studies, however, neglects or only deals insufficiently with the potential issue of endogeneity. In this paper, we propose a novel identification approach which identifies the impact of fiscal rules free from effects driving simultaneously the fiscal performance and the existence or strength of rules at the country level. In its core, the approach relies on unexpected shocks in long-run growth in order to derive a setting free from unobserved fiscal preferences and to allow for causal interpretation.

**JEL classification:** E62; H50; H6; H63

**Keywords:** fiscal rules; identification; public deficits

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<sup>1</sup>Address: Centre for European Economic Research (ZEW), P.O. Box 103443, 68034 Mannheim, Germany. E-Mail: [heinemann@zew.de](mailto:heinemann@zew.de)

<sup>2</sup>Address: Centre for European Economic Research (ZEW), P.O. Box 103443, 68034 Mannheim, Germany. E-Mail: [yeter@zew.de](mailto:yeter@zew.de)

# 1 Introduction

In recent decades, industrialised countries exhibited a tremendous increase in public debt reaching levels which are considered as unsustainable. Among others, this development is also regarded as one of the reasons for the emergence of the financial crisis. The resulting loss in confidence, increase in sovereign bond yields and hence refinancing costs of respective countries even further deteriorated public finances. Though this recent events accelerated the accumulation of debt, the generally increasing long-term trend in public debt is not a new phenomenon and is considered to be due to a deficit or spending bias of politicians.

The economic literature has identified multiple reasons for the existence of such a bias. A limited time horizon and asymmetric information resulting in a fiscal illusion of voters that may favour debt over tax financing and may induce the non-existence of the Ricardian invariance theorem (Barro, 1974). Approaching the end of a term, political parties may have the incentive to increase debt financing of public spending in order to reduce the financial scope of the subsequent administration (Persson and Svensson, 1989; Alesina and Tabellini, 1990). Furthermore, the same set of incentives may generally foster the rise of political business cycles characterised by cyclical shifts in the amount spent and its composition in pre-election periods in order to increase re-election probabilities (Rogoff, 1990; Alesina and Roubini, 1992).

Already in the past decades, legislators in multiple industrialised countries proposed and introduced numerical fiscal rules in order to meet these adverse incentives as well as the long-run trend for increasing public debt. Fiscal rules aim at limiting this tendency by defining numerical restrictions for specific elements of the budget. Under the impression of the recent crisis, the introduction and strengthening of fiscal rules was again high on the political agenda. At the level of the European Union for instance, the fiscal compact obliged ratifying Member States to introduce

numerical fiscal rules or to adapt existing ones along the requirements of the compact in order to increase their effectiveness as well as to strengthen the fiscal governance of Member States. In general however, the effectiveness of fiscal rules has been a matter of discussion among economists.

One line of thought provides arguments against the stringency of fiscal rules as they may induce the administration to bypass imposed limits through creative accounting (Milesi-Ferretti, 2004). von Hagen and Wolff (2006) as well as Koen and van den Noord (2005) provide empirical evidence for European countries that creative accounting might indeed be used to hide deficits and to prevent restrictions of fiscal rules to become binding. A different line of thought argues against the effectiveness of fiscal rules as they might constrain means for counter-cyclical fiscal policy. By this, fiscal rules may not only fail to restrain the development of public debt but rather foster its increase by inducing higher output volatility and pro-cyclical fiscal policy (e.g. Galí and Perotti, 2003).

There exists a large body of empirical research investigating whether the effectiveness of fiscal rules can be shown statistically. However, a majority of these studies shares a common point of criticism as they neglect or only deal insufficiently with the potential issue of endogeneity. The latter might invalidate the empirical analysis, as the fact that a country has a fiscal rule in place might primarily reflect their preferences for fiscal discipline (Poterba, 1996; Debrun et al., 2008). Consequently, a common cause interdependence may exist in which preferences drive both the presence of fiscal rules as well as the fiscal performance of a country. The establishment of a fiscal rule or its strictness might therefore systematically coincide with countries already exhibiting a low level of public debt. Thus, in these kinds of settings fiscal rules cannot be considered as exhibiting a causal influence on the level of public debt.

In order to resolve the potential problem of endogeneity, this paper will propose

a new identification strategy which will allow for a causal interpretation of the estimated correlation. Our identification strategy will rely on unexpected shocks in long-term growth to identify the impact of fiscal rules on fiscal outcomes. In this context, we will assume that the establishment or adaption of a fiscal rule will be the result of an optimising decision in which the costs, mainly the loss of discretion, will be weighted against the benefits taking fiscal preferences into account. However, when quantifying the potential costs, *exceptional* or *unexpected* growth shocks, and therefore cases in which political costs of constraints are the highest, could have not been taken into consideration at the point in time of voting for or against a fiscal rule. Thus, if the rule is found to be effective in cases of exceptional growth declines, it can be seen as genuinely effective independent from an influence of preferences.

The remainder of the paper is organised as follows. Section 2 provides an overview of the existing literature on the impact of fiscal rules on fiscal outcomes. Section 3 describes in detail our identification strategy and the data used in our analysis is presented in section 4. Our empirical strategy is specified in section 5, whereas our result are provided in section 6. Section 7 concludes.

## **2 Literature review**

The question whether fiscal rules are effective in limiting public debt has been addressed by numerous empirical studies. But as already Poterba (1996) has pointed out (among others), a causal interpretation of estimated correlations might not be possible. This is the case, since the existence of a fiscal rule or its strictness might be driven by preferences for sound fiscal policy in the respective country. Consequently, a common cause interdependence may exist in which preferences drive both the presence of fiscal rules as well as the fiscal performance so that rules might be endogenous and estimated results biased due to omitted variables. Several studies

have therefore used different approaches to formally deal with the issue of endogeneity. These will be presented in this section. However, not all followed approaches by these studies are convincing to the full extent.

The study by Debrun et al. (2008) examines the impact of fiscal rules on fiscal outcomes for a sample of 25 European countries between 1990 and 2005. It relies on an index provided by the European Commission which is constructed using surveys of fiscal policy experts in respective countries. The index compounds information on the type of the fiscal rule, covered fiscal aggregate, legal status and level of government it applies to. In assessing the impact of fiscal rules, considered dependent variables are given by the cyclically adjusted primary balance, the overall balance and the change in the debt to GDP ratio. In order to deal formally with the issue of endogeneity, the authors follow an instrumental variable approach in which they apply lagged values of the fiscal rules index as well as a dummy variable for countries following a commitment approach in their fiscal governance as instruments. Using these instruments, their study finds a statistically significant and positive impact of the fiscal rule index on the cyclically adjusted primary balance. The same holds true for the overall balance, whereas no significant effect can be found on the change in the debt to GDP ratio.

The study by Krogstrup and Wälti (2008) follows a different approach in its analysis of fiscal rules' impact on fiscal outcomes. Differing from Debrun et al. (2008) their analysis is limited to Swiss cantons in the period from 1955 to 1999. Instead of relying on a dedicated fiscal rule index, the authors resort to a dummy variable which equals to one if a cantonal fiscal rule is in place in a given year. The considered dependent variable in their analysis is the cantonal per capita real budget balance. In dealing with endogeneity, Krogstrup and Wälti (2008) apply two different approaches. In the first, they include a direct measure for fiscal preferences in Switzerland taken from Funk and Gathmann (2006). In a second approach, they

follow Dafflon and Pujol (2001) and assume fiscal preferences of voters to be time-invariant. In addition, they account for a structural break in the preferences of the electorate through the enfranchisement of the female population in Switzerland. Using the direct measure for fiscal preferences and ordinary least squares estimations, their study finds a positive and statistically significant effect of fiscal rules on the per capita real budget balance. Following the second approach and using fixed effects regressions, the authors again obtain a positive and statistically significant effect. The authors therefore conclude, that fiscal rules might indeed exhibit a causal debt reducing impact. However, both approaches followed by Krogstrup and Wälti (2008) are not free from criticism. In the first approach, the analysis relies on the measure for fiscal preferences to be free from measurement error. The second approach comes at the expense of a very strong assumption of time-invariance of preferences during a period of time of 44 years.

### **3 Identification Strategy**

As the overview in section 2 has showed, the crucial question that has to be answered will be whether found correlations can indeed be interpreted as causal. In the context of the analysis of fiscal rules' impact on fiscal outcomes, the main concern is given by the potential issue of endogeneity which might be driven by an unobserved variable, namely fiscal preferences. This unobserved heterogeneity is likely to drive both fiscal discipline expressed in low levels of public debt as well as the existence or strictness of a fiscal rule. Consequently, a common cause interdependence may exist between rules and fiscal outcomes rendering the causal interpretation of estimated correlations invalid.

Causality, though, would require the adaption of fiscal rules to be independent from current deficits. In general, the experimental ideal to derive causal inference would

therefore ask for an exogenous and random imposition of fiscal rules to countries with excessive deficits (or any arbitrary level). However, anecdotal evidence in Schaechter et al. (2012) refers to countries such as Sweden and Finland in which the adoption of fiscal rules were driven by the intention to reduce excessive debt resulting from economic crises or to ensure the continuity of an improved fiscal position. Therefore, this paper will propose a new identification strategy which will allow for a causal interpretation by excluding a potential influence of fiscal preferences.

Our identification strategy will exploit *unexpected* shocks in *long-term* growth. It consists of two main components namely the unexpectedness of a growth shock as well as the necessity to alter long-run rather than short-run growth prospects. At the core of our strategy lies the political economic view that the voting behaviour of politicians against or in favour of a fiscal rule will be the result of an optimising decision in which the costs as well as the benefits of a fiscal rule will be weighted against each other. Consequently, the final decision against or in favour could also be interpreted as revelation of fiscal preferences of politicians.

In this context, potential benefits of fiscal rules could be characterised by considering them as a signaling device to the electorate for sound policy resulting in an increased probability for (re-)election (Debrun and Kumar, 2007). Furthermore, fiscal rules might also increase confidence of financial markets in the fiscal soundness of respective countries resulting in lower risk premia (e.g. Feld et al., 2013).<sup>1</sup> In contrast, costs from a politician's perspective will be primarily characterised by the loss of discretion in fiscal policy and reduced means for counter-cyclical policies.

The relative importance of the latter will be significantly driven by the expectation for the economic development of respective countries in the future. Consequently, for an assessment with respect to the fiscal rule, the politician has to build expectations.

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<sup>1</sup>Further evidence at the level of sub-national fiscal rules is provided by Poterba and Rueben (1999, 2001) as well as Johnson and Kriz (2005) in the case of U.S. states. Evidence in the case of national fiscal rules is provided by Iara and Wolff (2011) as well as Heinemann et al. (2013)



With positive prospects for the future, even with preferences not in favour of a fiscal rule, a politician might be more likely to vote in favour as the rule itself seems less likely to bind so that potential benefits might prevail. In contrast, in cases of poor prospects costs might outweigh the benefits resulting in a lower probability for politicians to vote in favour of a fiscal rule. More crucial, though, is the potential constellation in which prospects cause costs and benefits to balance each other and fiscal preferences drive the decision either side.

Because of these kinds of settings, *unexpected* growth shocks are key in our identification strategy. This is the case, as unexpected shocks could not have been part of considerations to establish a fiscal rule in the beginning and its linked assessment of costs and benefits. Consequently, in periods of unexpected growth shocks the impact of fiscal rules should be independent from fiscal preferences. We therefore assume, that if fiscal rules can found to be effective in periods of exceptional growth declines and hence instances in which political costs of constraints are the highest, they can be regarded as genuinely effective and estimated correlations could be interpreted as causal.<sup>2</sup>

As mentioned above, our identification strategy also ask for shocks to alter the long-run rather than the short-run growth prospects besides being unexpected. This is the case, since well designed fiscal rules should allow for counter-cyclical policies in cases of short-run fiscal fluctuations. Therefore, we look at shifts in long-run growth prospects as these ask for fundamental economic adjustments in contrast to short run fluctuations.

To support our identification approach formally, we adapt a model on budgetary decision making under a debt rule constraint from Heinemann et al. (2014). The intuition in this model is simple. Ex ante, fiscal decision makers may agree to the introduction of a fiscal rule if it offers them an expected net gain. In this initial

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<sup>2</sup>As apparent from our assumption, the occurrence of a shock does not necessarily have to coincide with a point in time in which fiscal rules have to be altered or newly established.

calculus, politicians trade-off the potential advantages from fiscal rules against their expected disadvantage (i.e. political costs associated with consolidation measures). Here, the calculus of the latter is based on a (known) distribution of shocks leading to an increase in deficits. While *ex ante* - based on the expected net gains - the introduction of a fiscal rule may be advantageous, it could be rational to divert *ex post*. In this regard, the size of the shock is crucial. In case of a small shock, it is in the interest of politicians to continue to follow the rule in order to reap its political net gains. However, in case of a large shock pushing up compliance costs above a critical level, incentive to break the rule will emerge. Hence, we would expect that large shocks offer the chance to distinguish between genuinely effective and ineffective rules. A genuinely effective rule is defined as constraining the deficit even if this would not be in the interest of the fiscal decision maker anymore.

The model consists of two time periods. In period 0, it will be decided whether a fiscal rule will be introduced. In period 1, a stochastic shock may hit the budget. The initial deficit is given by  $d_0 > 0$  and is exogenous as it is the outcome of past decisions. By assumption, the type of the fiscal rule under discussion is always a zero deficit cap for period 1. In order to comply with the rule, the extent of consolidation in period 1,  $r$ , has to be large enough to neutralise both initial deficit as well as the deficit shock. The shock  $s$  is uniformly distributed over the range  $[0, S]$ . Consequently, the consolidation necessary to comply with the fiscal rule in period 1 is given by equation 1.

$$r = d_0 + s \tag{1}$$

The model assume that, once a fiscal rule is established, the government can realize the political payoff  $u = u_c - u_{nc}$  which amounts to the difference between the payoffs from compliance ( $u_c$ ) and non-compliance ( $u_{nc}$ ). With no rule in place, neither costs nor benefits arise from a (non-)compliance with the rule. The payoff in the

setting without a rule is given by  $u_{nr}$  and we assume that it relates to the payoffs in alternative settings as  $u_c > u_{nr} > u_{nc}$ . If a fiscal rule is in place, compliance benefits are weighted against its costs which are a function of the extent of the consolidation:  $c(r)$  with  $c' \geq 0$ ,  $c'' > 0$ ,  $c(0) = 0$ , and  $c'(0) = 0$ .

By construction, an effective rule is the more binding constraint compared to a non-effective rule. At the same, this means that if it is beneficial to introduce an effective rule, the same will be true for the introduction of a non-effective rule. The expected utility from the introduction of the former is given by equation 2.

$$E[U] = u_c - \frac{1}{S} \int_0^s c(d_0 + s) ds \quad (2)$$

A politician will support the introduction of a fiscal rule if condition 3 holds.

$$u_c - \frac{1}{S} \int_0^s c(d_0 + s) ds \geq u_{nr} \quad (3)$$

The gain from the fiscal rule amounts to the net effect from compliance and the expected costs of compliance given the known distribution of shocks. This will then be weighted against the payoff from the setting without a rule in place.

Once a fiscal rule has been introduced, two cases can be distinguished. If the rule is genuinely effective, by definition, the rule will always be observed, independent from the size of the shock. In such a case, consolidation needs are given by 1. If, however, the rule is not a binding constraint, politicians will decide whether to comply based on the optimisation given the observed shock period 1. They will comply if: The rule will be observed if the condition 4 holds.

$$c(d_1) \leq u(u_c - u_{nc}) \quad (4)$$

With  $c(r)$  being a monotone function of  $r$ , it is possible to invert 4 and to derive a critical level for compliance of the deficit in period 1. It is given by  $d_1^* = c^{-1}(u)$ . Only a deficit up to this level makes compliance beneficial. Given 1, this critical deficit can be translated into a critical size for the fiscal shock. This is given by equation 5.

$$s^* = d_1^* - d_0 = c^{-1}(u) - d_0 \quad (5)$$

$s^*$  is a positive function of  $u$ , the gain from compliance over non-compliance and it is negatively affected by the starting level of the deficit  $d_0$ .

In this setting, it will not be possible to distinguish between effective and non-effective rules if shocks are small and range between  $[0, s^*]$ . In this range, fiscal decision makers have an inherent incentive to comply and, hence, will do so even with a fiscal rule which is not genuinely effective. In contrast, a large shock in the range of  $[s^*, S]$  will allow observing the setting in which governments will violate the rule.

Hence, the effectiveness of a fiscal rule should be identifiable from large shocks – an insight which is the base for our empirical identification strategy. It will be key to test whether a fiscal rule has a weaker (or less significant) impact if shocks are large. Such a finding would point to the existence of purely endogenous fiscal rules. If however, the rule’s statistical significance is not different for small and large shocks, this points to a truly binding rule which exerts an independent impact.

Before we proceed and provide further information on data (section 4) and our empirical strategy (section 5), a more thorough discussion of endogeneity in the context of fiscal rules and fiscal preferences is necessary. This is the case, as there might exist different sources of endogeneity which would ask for different approaches. This becomes evident when distinguishing between the sphere of voters as well as

politicians and their preferences. In the case of our identification strategy, we assume that the politician exhibits preferences which are primarily shaped by his individual beliefs with respect to fiscal policy. Beyond this, his fiscal preferences could also be shaped by voter preferences which he observes motivated by (re-)election prospects. However, in our case his individual beliefs are key.

The reason for this becomes evident when we consider two alternative settings. In the first let us assume that the politician does not exhibit individual fiscal beliefs but rather that his incentives are entirely driven by his (re-)election prospects and the intention to send a positive signal for fiscal responsibility to the electorate. Although time inconsistent, this would result in a case in which economic prospects for future periods do not play a role but instead only contemporary signals on voter preferences which the politician observes. Consequently, our identification strategy could not resolve the bias induced by unobserved voter preferences in such a setting. Rather a direct and credible measurement would be necessary or specific assumptions with respect to the variation in time of preferences.

In the alternative setting let us assume, that the motivation of politicians for the introduction of fiscal rules is entirely driven by the intention to reduce the financial scope of the subsequent administration and by this to raise own (re-)election prospects. Again, this results in time inconsistent behaviour and a setting in which economic prospect are not taken into consideration. Therefore, our identification strategy would again be unable to resolve issues under such a setting. However, since we believe that both described settings are less likely to occur due to time inconsistencies, we are confident that our identification strategy will allow for a causal interpretation of estimated correlations.

## 4 Data

Early studies analysing the effectiveness of fiscal rules for a cross-section of countries lacked dedicated indicators or indices measuring the strength of fiscal rules. These studies rather relied on simple specifications in which the impact of rules was captured by dummy variables indicating whether a particular rule was in place (e.g., Bohn and Inman, 1996). Indices that explicitly tried to quantify the strengths and design features of fiscal rules were first developed at the sub-national level. In case of US States this was done by the United States' Advisory Commission on Intergovernmental Relations and their ACIR-Index (ACIR, 1987). For Swiss cantons a dedicated index has been developed by Feld and Kirchgässner (2008) and in case of the German states by Ciaglia and Heinemann (2012).

In case of a cross-section of countries, the European Commission has provided an index quantifying the features of national fiscal rules for Member States (European Commission, 2006). In its most recent update, this index covers the time period between 1990 and 2011 and unites scores from five different criteria to an overall index. These criteria include the statutory base of a rule, its monitoring, the existence of enforcing mechanisms, automatic sanction mechanisms and the rules' media visibility. All scores are based on surveys of Member States using standardised questionnaires.

Since the survey methodology may not exclude the possibility of misreporting by Member States in case of subjective criteria and in order to increase the overall sample size, we rely on the index provided by the International Monetary Fund (IMF) which provides data on the implementation of fiscal rules and their specific features for a large panel of countries. In terms of regional coverage, the data set provides observations for 81 countries. In terms of time coverage, data on fiscal rules is provided for the period between 1985 and 2012 (Schächter et al., 2012).

In order to be considered in the IMF data set, a fiscal rule has to impose a numerical limit on a budgetary aggregate which has to be long-lasting or which can only be revised with a low frequency. Furthermore, fiscal rules at the national as well as supranational level are taken into account but exclusively those which target at the level of the central government.<sup>3</sup> A further distinctive feature of the index is that rules do not necessarily have to be fully implemented to be considered. Rules which not yet took effect but were legally adopted until 2012 and follow a specific transfer regime are taken into account as well.<sup>4</sup>

The IMF database quantifies key dimensions of fiscal rules by distinguishing between four different types of rules as well as six key characteristics. In terms of types, fiscal rules are classified as debt rules, budget balance rules, expenditure rules and revenue rules. With respect to key characteristics, the database quantifies the extent of legislative support, coverage of government, coverage of aggregates, the existence of escape clauses, automatic correction mechanisms as well as supporting arrangements. Along nearly all of these dimensions, the data set applies a binary coding in order to quantify the existence of a specific characteristic. The final index score is then composed by taking the sum of all key dimensions for all types. The final score is normalised to range between 0 and 5. In this context, a higher index score indicates a higher prevalence of features which are considered as supporting the effectiveness of rules. However, it is important to stress out that the data set is not able to quantify the actual compliance with existing fiscal rules but rather quantifies to formal (*de jure*) institutional framework.

Figure 1 provides a graphical overview of covered countries in our sample and sheds some light on the trend development of fiscal rules during the last decade. Apparently, the majority of countries exhibited an increase in their index score compared

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<sup>3</sup>Consequently, fiscal rules at the sub-national level or rules targeting sub-aggregates or a specific expenditure item are not included in the data set.

<sup>4</sup>The German debt brake can be considered as example for such a case. The debt brake was legally adopted in 2009 but will take effect in 2016.

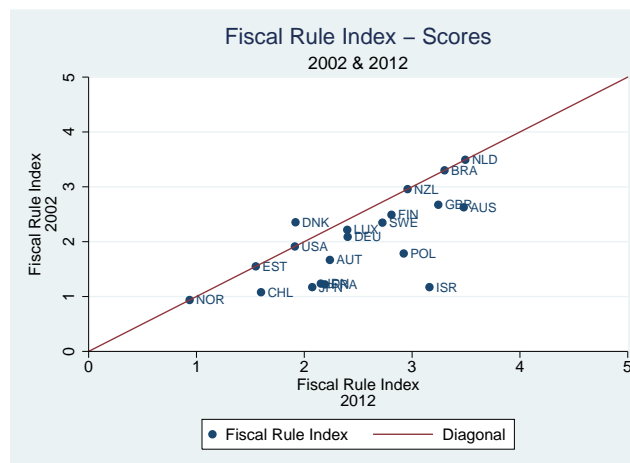


Figure 1: Evolvement of strength of fiscal rules over time  
*Source:* Own representation

to the values in 2002. Only in the case of Denmark a reduction of measured strictness can be found. Additionally, it becomes evident, that six countries exhibited no change at all in their index score during the last decade.

Country level data on a wide range of budgetary variables is obtained from the 93rd issue of the OECD Economic Outlook. Data is provided for all OECD Member States as well as six additional countries, namely Brazil, China, India, Indonesia, Russia and South Africa. The covered time period ranges from 1960 to 2012. Primary variables of interest from the database are the gross domestic product, the potential gross domestic product, the output gap, the cyclically-adjusted primary balance, cyclically-adjusted social security contributions as well as cyclically-adjusted revenues from direct taxes.

With respect to political control variables, we rely on the 2012 update of the Database of Political Institutions from the World Bank. This database provides wide ranging information on political parties and the institutional setting of political systems in respective countries. The database provides observations for 180 countries and covers the time period between 1975 and 2012. In its most recent update, the database contains an obvious mistake in the case of Germany. Here, the main opposition party and the second party in the government coalition have



been switched for the years between 2008 and 2012. We corrected for this mistake. Primary variables of interest from the data base are dummies indicating whether a legislative election took place in a respective year and a dummy indicating whether the government can be classified as left-wing or right-wing.

## 5 Empirical Analysis

Usually, the impact of fiscal rules on budgetary aggregates is assessed in the context of fiscal reaction functions. In our baseline specification, we will follow Debrun et al. (2008) and estimate the relationship according to equation 6.

$$f_{i,t} = \alpha + \beta_1 f_{i,t-1} + \beta_2 debt_{i,t-1} + \beta_3 gap_{i,t-1} + \gamma_1 FRI_{i,t} + \delta_1 x_{i,t} + \eta_i + \epsilon_{i,t} \quad (6)$$

In general,  $f_{i,t}$  refers to the respective fiscal aggregate of interest and will be the *cyclically adjusted primary balance* in our baseline case. In order to account for the possibility of sticky adjustment, we will also incorporate the lagged dependent variable in our specifications and analyse the impact of fiscal rules in a dynamic setting. While  $debt_{i,t-1}$  refers to the *debt to GDP ratio* in a particular country and captures a possible debt stabilisation motive,  $gap_{i,t-1}$  refers to the *output gap* and  $FRI_{i,t}$  respectively to the strength of the fiscal rule index. Political controls are comprised in  $x_{i,t}$ , whereas  $\eta_i$  accounts for potentially unobserved heterogeneity through country fixed effects.

In case of all fiscal variables in our specification, it is crucial to decompose them into their cyclical and discretionary component. The latter is of relevance as it captures the impact of fiscal policy directly under control of policy makers rather than the impact of automatic stabilisers through variation in output and interest. In case of the dependent variable, this is achieved by relying on the *cyclically adjusted primary*

*balance*. However, in case of the *output gap*, there could still be a non-discretionary component through coordinated fiscal policies within coalitions such as the European Union. We will, therefore, follow Galí and Perotti (2003) and rely on the output gap from countries where no common coordinated fiscal policy is in place. More precisely, we will rely on the output gap of EU-15 for the United States and will use the the US output gap for all remaining countries in the sample in turn.

In the context of equation 6 and an analysis using country fixed effects, a further issue has to be addressed. Evident from figure 1 and the descriptive statistics, time-variation in fiscal rules is very low. This not exclusively the case for fiscal rules at the national level, but also at the sub-national level (Krogstrup and Wälti, 2008). Ignoring this circumstance and relying on classical fixed effects regressions would render the analysis non-informative. Given the low time-variation and by the simple mechanics of within-estimations, standard errors may be very large due to technical reasons and would not allow to draw economically meaningful conclusions.

We will, therefore, also apply the *fixed effects vector decomposition approach* which allows to properly incorporate almost time-invariant variables in a setting with country fixed effects (Plümper and Tröger, 2007). In case of the dynamic specification, we will rely on the system-GMM estimator developed by Blundell and Bond (1998). However, as the latter are designed for panels with large N and small T, we will also follow the IV-approach proposed by Anderson and Hsiao (1982) which is also consistent in settings with small N and large T.

As described in section 3, two components are key to our identification approach. These are the unexpectedness of fiscal shocks as well as their impact on long-run growth prospects. In order to translate the latter into quantitative analysis, we will rely on the growth rate of the *real GDP trend* to capture long-run rather than short-run fluctuations. Shocks to the long-run growth prospects would ask for fundamental economic adjustments through discretionary fiscal policy and may therefore capture

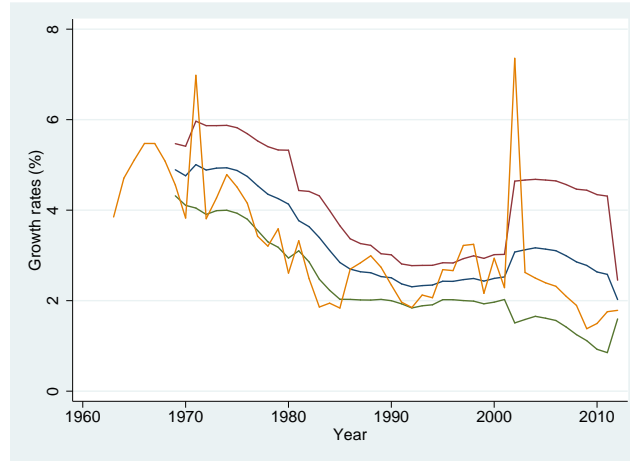


Figure 2: The identification of unexpected shocks to long-run growth  
*Source:* Own representation

the setting in which fiscal rules disclose their true impact. Relying on short-run fluctuations would ignore that well designed fiscal rules may allow for counter-cyclical policy and therefore again mix the impact from discretionary policy with the impact from automatic stabilisers.

The identification of unexpected shocks closely follows our description in section 3 where we assumed that expectations on the future condition of the economy are formed in order to assess the potential bindingness of fiscal rules and their related political costs. We will further assume that expectations are formed in a retrospective manner where the economic development in the past is used as information set to forecast future conditions. In the context of our empirical analysis, we therefore calculate rolling means of the past growth of the real GDP trend with varying window sizes and assume that these are used as forecasts. To distinguish between small sized shocks and unexpected fluctuation, we further calculate rolling standard deviations and use them to construct a bandwidth around the mean development. Figure 2 provides a graphical illustration of our approach where data for Canada is used as a showcase. Following our approach, growth shocks are considered as unexpected in cases where the actual growth rate of *real GDP trend* exceeds the boundaries defined by the standard deviation bandwidth. These occasions are captured by a

dummy and used to estimate an extended specification according to equation 7.

$$f_{i,t} = \alpha + \beta_1 f_{i,t-1} + \beta_2 debt_{i,t-1} + \beta_3 gap_{i,t-1} + \gamma_1 FRI_{i,t} + \theta_1 shock_{i,t} \quad (7)$$

$$+ \phi_1 shock_{i,t} * FRI_{i,t} + \delta_1 x_{i,t} + \eta_i + \epsilon_{i,t} \quad (8)$$

## 6 Results

Table 1 summarises the results in the case of our baseline specifications. In the first column, specification 6 is estimated using ordinary least squares without country fixed effects. While the *debt to GDP ratio* does not exhibit a statistically significant impact, favorable economic conditions captured by a positive *output gap* are on average positively correlated with the cyclically adjusted primary balance. In case of our main variable of interest, stronger fiscal rules indicated by a higher index scores happen to be positively associated with the cyclically adjusted primary balance indicating a potential disciplining effect from fiscal rules for public finances.

When introducing country fixed effects in the second column of table 1 and estimating the relationship using within-transformation, fiscal rules do not exhibit a statistically significant impact on the primary balanced. As previously mentioned, rather than economically, this effects is likely to be due to mechanical reasons of the estimation technique as the fiscal rule index exhibit a very low time variation. To take this circumstance into account, we estimated the relationship following the *Mundlack* approach as well as the *fixed effects vector decomposition approach* in columns 3 and 4. While the Mundlack approach yields a positive and statistically significant impact given a *F-statistic* of 5.93, the fixed effects vector decomposition approach does not confirm this result.

Columns 5 to 8 in table 1 re-estimate equation 6 in a dynamic setting. Throughout specifications 5 to 7, results indicate a positive and statistically significant degree

of sticky adjustment in the cyclically adjusted primary balance. A statistically significant impact is also pointed out for the debt to GDP ratio indicating a positive correlation between higher levels of debt and the primary balance. In case of the output gap, results point to a pro-cyclical relationship between the state of the economy and the primary balance which happens to be statistically significant in the estimation using the system GMM estimator by Blundell and Bond (1998). With respect to fiscal rules, more powerful rules seem to be positively correlated with the primary balance at the 5% level. Coefficients lie within a close range with the exception of column 8 where the effect is estimated in first differences following the Anderson-Hsiao estimator.

Table 2 summarises the results in the case of our identification approach. While the first three columns estimate equation 7 in a static setting, columns 4 to 7 provide results in a dynamic setting. As in the baseline specification, a debt stabilisation effect on the primary balance is not statistically identified. However, favorable economic conditions indicated by a positive output gap are positively associated with the debt to GDP ratio. With respect to the impact of fiscal rules though, the picture is mixed. While the overall impact of fiscal rules on the primary balance is statistically insignificant in case of classic fixed effects regressions ( $F$ -statistic of 0.26), the opposite is true in case of the fixed effects vector decomposition approach ( $F$ -statistic of 3.30). In case of the dynamic specifications, the picture is more precise. Results in case of the fixed effects vector decomposition, the system GMM as well as the Anderson-Hsiao estimator point to a positive and statistically significant overall impact of fiscal rules on the cyclically adjusted primary balance with values for the  $F$ -statistic ranging between 6.23 and 7.19.

Table 1: The effect of fiscal rules on the cyclically adjusted primary balance: Baseline results

	(1) OLS	(2) FE	(3) Mundlack	(4) FEVD	(5) OLS	(6) FEVD	(7) GMM	(8) IV
<i>dependent</i> <sub><i>i,t-1</i></sub>					0.787 [17.66]***	0.745 [16.69]***	0.795 [17.72]***	0.207 [0.61]
<i>debt</i> <sub><i>i,t-1</i></sub>	0.00872 [0.56]	-0.00538 [-0.23]	0.00101 [0.04]	-0.00538 [-0.48]	0.0115 [2.51]**	0.0243 [3.64]***	0.0146 [2.68]**	0.110 [3.76]***
<i>gap</i> <sub><i>i,t-1</i></sub>	0.217 [2.29]**	0.223 [2.13]**	0.220 [2.06]**	0.223 [2.87]***	-0.119 [-2.75]**	-0.0648 [-1.25]	-0.140 [-3.09]***	0.246 [0.98]
<i>fri</i> <sub><i>i,t</i></sub>	0.816 [2.54]**	0.168 [0.36]	0.274 [0.65]	0.786 [1.62]	0.321 [2.23]**	0.485 [2.14]**	0.470 [2.09]**	1.002 [2.25]**
<i>fractionalisation</i> <sub><i>i,t</i></sub>	6.269 [2.43]**	-0.211 [-0.03]	3.418 [0.90]	-0.211 [-0.02]	1.110 [1.51]	1.450 [0.27]	0.196 [0.18]	-4.558 [-1.49]
<i>left</i> <sub><i>i,t</i></sub>	1.137 [1.30]	-0.128 [-0.09]	2.142 [1.77]*	-0.128 [-0.11]	0.0988 [0.28]	-0.632 [-1.02]	0.0183 [0.04]	-0.664 [-0.98]
<i>right</i> <sub><i>i,t</i></sub>	0.998 [1.12]	-0.483 [-0.33]	1.925 [1.44]	-0.483 [-0.41]	-0.323 [-0.83]	-1.007 [-1.57]	-0.665 [-1.30]	-0.819 [-1.07]
<i>election</i> <sub><i>i,t</i></sub>	-0.266 [-1.51]	-0.296 [-2.22]***	-0.266 [-1.79]*	-0.296 [-0.89]	-0.221 [-1.07]	-0.245 [-1.01]	-0.0383 [-0.11]	-0.211 [-1.06]
<i>debt_mean</i>			0.0124 [0.41]					
<i>gap_mean</i>			2.992 [1.19]					
<i>fri_mean</i>			1.030 [1.69]					
<i>fractionalisation_mean</i>			3.197 [0.79]					
<i>left_mean</i>			-2.935 [-1.45]					
<i>right_mean</i>			-2.246 [-0.90]					
<i>election_mean</i>			2.664 [0.68]					
<i>constant</i>	-7.993 [-3.22]***	0.268 [0.05]	-8.771 [-3.09]***	-1.217 [-0.17]	-2.257 [-2.28]**	-3.147 [-0.83]	-2.132 [-2.06]**	-0.220 [-2.64]**
<i>N</i>	426	426	426	426	423	423	423	389
<i>R</i> <sup>2</sup>	0.111	0.044	0.153	0.321	0.596	0.619		0.042

cluster-robust *t* statistics in brackets  
\* *p* < 0.10, \*\* *p* < 0.05, \*\*\* *p* < 0.01

Table 2: The effect of fiscal rules on the cyclically adjusted primary balance: Identification results

	(1) OLS	(2) FE	(3) FEVD	(4) OLS	(5) FEVD	(6) GMM	(7) IV
<i>dependent</i> <sub><i>i,t-1</i></sub>				0.776 [17.18]***	0.728 [15.61]***	0.781 [16.94]***	0.218 [0.64]
<i>debt</i> <sub><i>i,t-1</i></sub>	0.0110 [0.74]	-0.0000213 [-0.00]	-0.0000213 [-0.00]	0.0123 [2.62]**	0.0263 [3.67]***	0.0157 [2.74]**	0.110 [3.67]***
<i>gap</i> <sub><i>i,t-1</i></sub>	0.226 [2.37]**	0.246 [2.44]**	0.246 [3.25]***	-0.110 [-2.69]**	-0.0436 [-0.82]	-0.135 [-3.06]***	0.241 [0.96]
<i>fri</i> <sub><i>i,t</i></sub>	0.676 [1.72]*	-0.155 [-0.36]	0.730 [1.25]	0.165 [0.94]	0.199 [0.62]	0.320 [1.13]	0.842 [1.91]*
<i>shock</i>	-1.767 [-1.51]	-2.096 [-2.17]**	-1.633 [-1.37]	-1.609 [-1.30]	-1.538 [-1.97]*	-1.027 [-1.48]	-0.745 [-0.83]
<i>fri</i> <sub><i>i,t</i></sub> * <i>shock</i>	0.234 [0.57]	0.355 [1.05]	0.107 [0.22]	0.273 [1.13]	0.468 [1.47]	0.264 [1.02]	0.238 [0.81]
<i>fractionalisation</i> <sub><i>i,t</i></sub>	6.034 [2.26]**	0.894 [0.15]	0.894 [0.08]	1.185 [1.51]	2.545 [0.44]	0.259 [0.23]	-4.547 [-1.47]
<i>left</i> <sub><i>i,t</i></sub>	0.739 [0.90]	-0.605 [-0.41]	-0.605 [-0.55]	-0.00456 [-0.01]	-0.744 [-1.17]	-0.148 [-0.29]	-0.745 [-0.94]
<i>right</i> <sub><i>i,t</i></sub>	0.618 [0.71]	-0.865 [-0.56]	-0.865 [-0.76]	-0.399 [-0.95]	-1.052 [-1.61]	-0.821 [-1.40]	-0.887 [-1.03]
<i>election</i> <sub><i>i,t</i></sub>	-0.287 [-1.41]	-0.328 [-1.94]*	-0.328 [-1.00]	-0.240 [-1.13]	-0.275 [-1.14]	-0.0773 [-0.23]	-0.217 [-1.10]
<i>constant</i>	-6.624 [-2.58]**	0.993 [0.19]	-1.080 [-0.14]	-1.758 [-1.52]	-3.040 [-0.75]	-1.516 [-1.26]	-0.214 [-2.72]**
<i>N</i>	422	422	422	422	422	422	389
<i>R</i> <sup>2</sup>	0.147	0.089	0.359	0.597	0.624		0.040

cluster-robust *t* statistics in brackets  
\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 7 Conclusions

There exists a vast economic literature that analyses the impact of fiscal rules and discusses their effectiveness in limiting excessive debt controversially. A majority of these studies, though, only dealt insufficiently with the potential issue of endogeneity. We proposed a novel approach in which we argue that the impact of fiscal rules can be identified free from fiscal preferences possibly driving simultaneously the fiscal performance and the existence or strength of fiscal rules at the country level. In its core, our approach relies on unexpected shocks in long-run growth in order to derive a setting free from unobserved fiscal preferences of political decision makers. Given our identification approach, we obtain results indicating a positive and statistically significant impact of fiscal rules on the cyclically adjusted primary balance. [To be completed...]

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