Economic Stabilization in the Post-Crisis World: Are Fiscal Rules the Answer?

November 2014

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Abstract

We investigate whether fiscal rules help to reduce the extent of policy procyclicality—how government expenditure policy responds to GDP-- in a dynamic panel framework with 81 advanced, emerging and developing countries over 1985-2012. We construct two new fiscal rule indices and investigate whether rules help to dampen procyclical policies. We condition our empirical specifications on the degree to which governments appear able to manage and enforce fiscal rules. We find that fiscal rules are very effective in reducing procyclicality of policy once a minimum threshold of government efficiency/quality has been reached. Government efficiency alone is not enough to reduce procyclicality of fiscal policy. However, high government efficiency combined with strong fiscal rules is a potent combination facilitating counter-cyclical policy responses to GDP movements.

Key Words: fiscal rules, government efficiency, policy procyclicality

Highlights
- Procyclicality of fiscal policy exacerbates business cycle fluctuations
- Fiscal rules help to reduce the procyclicality of policy during business cycles
- Fiscal rules are effective if combined with a minimum threshold of government efficiency

JEL Codes: E32, E62, H5

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1. Introduction

The "Great Moderation" lulled many academics, policymakers and practitioners into thinking that the traditional focus of macroeconomic policy as a force to counteract business cycles was anachronistic. This changed overnight with the global financial crisis (GFC) as governments attempted to stimulate economies facing the largest economic downturns since the 1930s. A critical issue, however, was whether large-scale fiscal expansions would compromise longer-term sovereign debt solvency. Governments curtailed fiscal expansions in some cases because of the lack of market confidence in new sovereign debt issues. Many advanced economies, including several in the EU and the United States, had credit ratings on their sovereign debt reduced by credit rating agencies.

In this context the question arises over how countries can pursue activist fiscal stabilization policies during economic downturns while at the same time keeping policies on sustainable longer-term trajectories. Not surprisingly, an approximate mechanical solution to debt sustainability is that countries pursue counter-cyclical fiscal policy during both downturns and upturns in the business cycle. Indeed, activist countercyclical policies would seem desirable for debt management as well as output stabilization purposes. For example, the theoretical contributions of Christiano, Eichenbaum and Rebelo (2011) and Nakata (2011) suggest that optimal fiscal policy in a stochastic model with sticky prices is countercyclical. Both papers show that countercyclical fiscal policy is even more effective when the policy interest rate is zero.

Why then is fiscal policy procyclical in so many countries? A number of theoretical and empirical studies have addressed this problem. In the Tornell and Velasco (1999) model, for example, policy makers interacting strategically may create a "voracity effect" that causes procyclicality of fiscal policy. If fiscal policy is decided on a decentralized basis, with many interest groups vying for their share of the local spoils, standard smoothing behavior breaks down. In this case, too large a share of temporary positive income shocks is directed toward government expenditure and too little is saved. Of course, the political economy plausibly unfolds differently under different political and institutional arrangements.[1]

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[1] Cespedes and Velasco (2014) review this literature.

Although implementing a countercyclical fiscal policy seems a straight-forward solution to the problem, complicated political and institutional environments complicate the task. This has led to renewed emphasis on fiscal rules and institutions (European Commission, 2012; Bergman, et al., 2013). This discussion has encompassed advanced, emerging and developing economies (IMF, 2009), and focuses on how fiscal institutional frameworks may shape the evolution and effectiveness of fiscal policy and economic outcomes.

Despite the increasing popularity of fiscal rules, relatively little work on the functioning and effectiveness of rules has been undertaken. This is in stark contrast to the large volume of work on monetary rules, especially inflation targeting. Moreover, the work on fiscal rules in advanced economies has largely focused on European countries that are members of the EU. Bergman et al. (2013), for example, discuss the balance between market pressure and fiscal rules in facilitating sustainable public finances in Europe. They find that the quality of market signals is an insufficient indicator alone to accurately guide the conduct of fiscal policy, particularly during crisis periods. They suggest that market signals should be used to complement national fiscal rules in support of fiscal sustainability.

This paper evaluates fiscal rules and evaluates their effectiveness in reducing procyclical fiscal policies. By investigating the effectiveness of fiscal rules, our work is a natural complement to the large body of literature on monetary rules. Our work extends previous work on fiscal rules in two main dimensions. First, we investigate national fiscal rules using a rigorous dynamic panel econometric framework for a large number of countries (emerging, developing and advanced). Including emerging and developing economies in our investigation is important because business cycles are generally more volatile in these countries than in advanced economies. In addition, fiscal policies are generally more procyclical in emerging and developing economies.[2,3]

Second, we consider interactions among fiscal rules and the efficiency of government. The "efficiency" of government administration has been investigated by a number of researchers in various contexts. Calderón et al. (2012), in a recent paper, consider the role of government

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2 See, for example, Balassone and Kumar (2007), Ilzetzki and Vegh (2008), Kaminski et al. (2004), Hausmann and Stein (1996), Gavin and Perotti (1997), Talvi and Vegh (2005), Melitz (2000), and Gali and Perotti (2002). Cespedes and Velasco (2014) find evidence of reduced fiscal pro-cyclicality in a number of countries.

[3] Frankel et al. (2012) argue that a number of emerging markets have "graduated" to the fiscal procyclical group over the past decade. They point to Chile as a particularly successful case. Chile has followed a fiscal rule since 2001 that has a structural (i.e., cyclically-adjusted) fiscal balance as its target. By construction, such a rule ensures that temporarily high fiscal revenues are saved rather than spent.

administrative quality in shaping fiscal outcomes. Using a large sample of advanced, emerging and developing countries for 1984-2008, they find that the level of institutional quality plays a key role in countries' ability to implement counter-cyclical macroeconomic policies. Their results show that countries with strong (weak) institutions are more likely to adopt counter- (pro-) cyclical macroeconomic policies. We extend this work by determining whether the strength of fiscal rules is a significant determinant of countries' abilities to implement countercyclical fiscal policy, and whether the effectiveness of fiscal rules is enhanced in environments with high institutional quality.

More specially, we investigate fiscal policy rules and government expenditures for 81 countries over 1985-2012. We evaluate the effectiveness of national fiscal rules in generating counter-cyclical government expenditure responses within the context of a dynamic panel fixed-effects regression model. To this end, we develop a new fiscal rules index, varying across countries and over time. The national fiscal rules index (NFRI) is based on 28 specific characteristics of rules using the IMF FAD database.

Our emphasis is on the connection between the cyclicality of government expenditure policy, fiscal rules and the efficiency of government. We employ the World Bank "efficiency of government bureaucracy" index, part of the World Bank "Worldwide Governance Indicators, 2013 Update" (WGI) project research dataset. This indicator measures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, and the quality of policy formulation and implementation.

Previewing the results, we find that national fiscal rules are highly effective in reducing the procyclicality of government expenditure policy. We also find that measuring the interaction of fiscal rules and bureaucratic efficiency is complicated by their high correlation—countries with stronger rules also tend to have more efficient government bureaucracies. It is useful therefore to separate the sample into four categories of government efficiency—low, moderate, good and high. Using these groupings, we find that rules are not effective for countries with low government efficiency but are effective in reducing procyclicality once moderate (and higher) levels of efficiency are achieved. These results are robust to various model specifications, including controls for whether countries are targeting inflation, the extent to which economies are financially open, and the extent of government polarization. The results are also robust to an alternative measure of the fiscal rule and to different methods of measuring cyclicality.

Section 2 describes the data employed in the paper, focusing in particular on the construction of the fiscal rules index and government efficiency. Section 3 presents some descriptive material and statistics on fiscal institutions and rules. Section 4 presents the empirical results. Section 5 concludes.

2. Data

This section describes the definition and sources of the data used in our empirical analysis. Further details on data sources, description and construction of variables are provided in the Data Appendix. We employ annual data for a large sample of advanced, emerging and developing economies. (Quarterly data is generally not available for fiscal policy indictors for emerging and developing economies.) The availability of data on fiscal rules, also only available on an annual basis, restricts our country sample to 81 countries for the period 1985-2012.

Our fiscal rule composite measure is an index measuring the overall strength of fiscal rules in a given country in a given year. The underlying source of the various fiscal rule components is the "Fiscal Rules Dataset, 2012" (FAD) from the Fiscal Affairs Department of the International Monetary Fund. Schaechter, Kinda, Budina, and Weber (2012) discuss the construction and details of the dataset. The dataset includes information about national rules (applied on central government finances) for countries that are members of the IMF. Fiscal rules are defined broadly as constraints on fiscal policy. The dataset includes information on a wide variety of fiscal characteristics, e.g. number of rules, type of rule, monitoring and enforcement procedures. We follow Schaechter, Kinda, Budina and Weber (2012) and construct fiscal rule indices that incorporate five main characteristics (monitoring, enforcement, coverage, the legal basis and escape clauses) for each of the four types of fiscal rules (budget balance rules, debt rules, expenditure rules, and revenue rules).[4] This gives 20 fiscal characteristics. In addition to these characteristics we also add information about supporting procedures and institutions, whether there is an independent body setting budget assumptions, information about transparency and accountability, whether a balanced budget target is defined in structural terms or over the business cycle, and whether there are rules excluding public investments (or other priority items)

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[4] It is difficult to know whether monitoring is effective and to what extent escape clauses are used, as discussed in Schaechter et.al. (2012). Unlike Schaechter et al., we include these features when constructing the overall index of fiscal strength.

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from the ceiling. This adds eight characteristics to the 20 mentioned above, for a total of 28 characteristics.

To construct an overall index measuring the strength of national fiscal rules (NFRI) we first normalize all 28 sub-indices to lie between 0 and 1.[5] Then we sum over all characteristics to obtain a total index capturing the strength of national fiscal rules in each country using equal weights. Finally, we normalize the index to lie between 0 and 4, with larger numbers indicating stronger fiscal rules.

The "government efficiency" index is from the World Bank "Worldwide Governance Indicators, 2013 Update" (WGI) project dataset. This dataset is comprised of data on the quality of governance provided by a "…large number of enterprise, citizen and expert survey respondents in industrial and developing countries. These data are gathered from a number of survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms." The WGI consists of aggregate indicators of six broad dimensions of governance: (i) Voice and Accountability, (ii) Political Stability and Absence of Violence/Terrorism, (iii) Government Effectiveness, (iv) Regulatory Quality, (v) Rule of Law, and (vi) Control of Corruption. For our research, we employ the "Government Efficiency" indicator that reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to policies. The government efficiency indicator ranges from -2.5 to 2.5, with higher values indicating greater government efficiency.

Our focus in this paper is to what extent national fiscal rules and government efficiency affect the cyclicality of fiscal policy. A countercyclical fiscal policy involves lower (higher) government spending and higher (lower) tax rates in good (bad) times. This is termed a countercyclical policy because policy stimulus runs counter to the business cycle (i.e. fiscal policy is contractionary during expansions and expansionary during contractions). A procyclical policy is the opposite, with expansions in good times and contractions in bad times. An acyclical

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[5] All indicators are 0-1 dummies in the database except for coverage that can take on three values: 2: General government or wider; 1: central government; 0 if there is no coverage and adjusted upward by 0.5 to account for similar rules applying to different levels and legal basis that can take on numbers between 0 and 5; 5: Constitutional; 4: International Treaty, 3: Statutory; 2: Coalition agreement; 1: Political commitment. In case multiple statutory bases apply the higher statutory basis is used. These two indices are normalized to numbers between 0 and 1.

fiscal policy involves government policy that does not vary systematically with the business cycle.

In principle one could look at both real government expenditures and tax rates to measure the cyclicality of policy. Given the difficulty of observing tax rate indicators for a broad group of countries over time, however, we focus on real government expenditures. This follows the norm in the literature (e.g. Kaminsky et al., 2005; Frankel et al., 2011; Calderón et al., 2012; Céspedes and Velasco, 2014)[6]. Kaminsky et al. (2005) discuss various measures of fiscal policy and argue that real government expenditures and tax rates are preferable, as an indicator for the cyclicality of policy, to other indicators such as tax revenues, primary balance, expenditures to GDP ratio, and the revenue to GDP ratio.[7] The advantage of government expenditures is that co-movements with GDP are able to clearly distinguish between countercyclical, procyclical or acyclical fiscal policy.

3. Methodology

The basic dynamic panel model is estimated as equation (1):

$$(1)\ GEXP_{it} = \beta_0\ GEXP_{it-1} + \beta_1\ GDP_{it} + \beta_2(GDP_{it} * NFRI_{it}) + \mu_i + \varepsilon_{it}$$

where *GEXP* is cyclically adjusted real government expenditure, *GDP* is cyclically adjusted real GDP, *NFRI* is the fiscal rule index, μ_i measures country fixed effects and ε_{it} is the error term. β_2 measures the marginal effect of effect of national fiscal rules on cyclical government expenditure, and $\beta_1 + \beta_2 * (NFRI_{it})$ is the net procyclicality of fiscal rules (for any given level of rules, $NFRI_{it}$). The model is a dynamic panel, estimated using Arellano-Bond one-step GMM estimation with country fixed effects. We report coefficient estimates and clustered (around countries) and robust standard errors in the tables. We also report tests of first and second order autocorrelation, the Hansen J test statistic for over-identifying restrictions (the joint validity of all instruments) and the Hansen C test statistic (difference-in-Hansen test statistic) of the validity of the IV-style instruments (a subset of all instruments). If the model is well-specified we expect to reject the null of first-order autocorrelation, not reject second-order autocorrelation, and not reject the Hansen J and C tests.

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[6] Several papers employ additional fiscal policy indictors.
[7] In their own work they point out that there is no systematic data on tax rates, leaving government spending as the best indicator in practice. They show that government spending is able to discriminate among pro-cyclical, counter-cyclical and acyclical policy.

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A potential problem when implementing the GMM methods is that the number of instruments is quadratic in T. Roodman (2009b) discusses many of the potential pitfalls of instrument proliferation and its consequences, including over-fitting of endogenous variables, bias in estimates and the weakening of Sargan tests.

These issues have not been fully analyzed in the literature and there exists very little guidance on how to handle this problem in GMM estimation of dynamic panel data models (see the discussions in Hall and Peixe, 2003; Roodman, 2009b; and Bontempi and Mammi, 2012). Roodman (2009b) suggests that the number of instruments be limited to certain lags or collapsing the instruments by having separate moments for each lag (instead of a moment for each lag and time period). We will use the latter approach in our empirical application.[8]

An additional statistical issue in estimation of the panel is potential endogeneity. The Arellano-Bond GMM estimator allows us to handle endogeneity using internal instruments. We will assume that GDP is endogenous and include this variable as a GMM-style instrument (in addition to government expenditures). All other explanatory variables are assumed to be exogenous and are therefore included as IV-style instruments.

A similar equation (equation 2) and interpretation of coefficients is estimated to measure the impact of government efficiency (*GE*):

(2) $GEXP_{it} = \beta_0\, GEXP_{it-1} + \beta_1\, GDP_{it} + \beta_2(GDP_{it} * GE_{it}) + \mu_i + \varepsilon_{it}$

Finally, to address whether the effectiveness of fiscal rules in reducing procyclicality depends on the level of government bureaucratic efficiency, we estimate (3):

(3) $GEXP_{it} = \beta_0\, GEXP_{it-1} + \beta_1\, GDP_{it} + \beta_2(GDP_{it} * NFRI_{it}) + \beta_3(GDP_{it} * GE_{it}) +$
$\qquad \beta_4(GDP_{it} * NFRI_{it} * GE_{it}) + \mu_i + \varepsilon_{it}$

where the $(GDP_{it} * NFRI_{it} * GE_{it})$ term allows us to measure the interaction of both national rules and government efficiency together in reducing procyclicality. To measure the net effect of fiscal rules on procyclicality we need to control both for the level of rules and level of government efficiency. This net effect is given by: $\beta_1 + \beta_2 * (NFRI_{it}) + \beta_3(GE_{it}) + \beta_4(NFRI_{it} * GE_{it})$.

4. Statistical Contours

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[8] The Stata command xtbond2 written by Roodman (2009a) implements both these methods

This section reports some basic statistics on fiscal rules, fiscal outcomes, institutional quality, and features of business cycles for averages of the 81 countries in our sample.

Table 1 presents our sample of countries. The sample is roughly divided between advanced, emerging and developing economies. Table 2 reports summary statistics and the number of missing observations from each series. The real GDP (GDP) and real government expenditure (GEXP) series are the cyclical components from the HP-filter trend estimates of the log series (with λ equal to 100). Most missing values are from the government expenditure series at the beginning of the sample period.

[insert Table 1 here]

[insert Table 2 here]

By construction the mean values of GDP and GEXP are zero, but it is noteworthy that the standard deviation of the cyclical component of the GEXP series is almost twice that of the cyclical component of the GDP series. The mean value of the government efficiency index (GE) is 0.44 (median 0.35) with a standard deviation of 1.44. (Maximum value is 2.36; minimum -2.56). The average over the sample period (across time and countries) of the national fiscal rule index is 0.23 (with a minimum of zero and a maximum value of 1.89). The average number of rules (the average across countries) for the entire sample period is 0.46 (standard deviation equal to 0.81), with a minimum of zero and maximum of 4 national rules.

Figure 1 shows the evolution of the average number of national fiscal rules over time. National fiscal rules has grown substantially over the sample period, from an average of about 0.2 in 1985 to almost 1.0 in 2012, reflecting the increasing popularity of fiscal rules in providing guidelines and constraints on policy actions. Moreover, after a short lull, the popularity of fiscal rules—judging both by the number and strength of fiscal rules-- grew following the GFC.

[insert Figure 1 here]

Figure 2 presents our fiscal strength index for a diverse group of countries—the United Kingdom, Bulgaria, Chile and Kenya. This is illustrative as it points to quite different evolutions of rules over time and the circumstances that might change the rules index. For example, the national fiscal strength index for the UK dropped in 2009. Prior to this drop, during 1997-2008, the UK had a golden rule (a balanced budget rule), and general government borrowing was only allowed for investment (and not to fund current spending). This rule was evaluated using the average surplus on the current budget as a percentage of GDP over the economic cycle. The UK

also had an investment rule (classified as a debt rule) where public sector net debt as a proportion of GDP was directed to be stable over the economic cycle. Other things equal, net debt was to be maintained below 40 percent of GDP over the economic cycle. These two rules were abandoned in 2009 and replaced by new balanced budget and debt rules. During 2010 another balanced budget rule was adopted with the intent of achieving cyclically adjusted current balance by the end of a rolling, five-year forecast period. This rule was modified in 2011 when the government introduced the charter for Budget Responsibility. This rule is in effect until 2016. A new debt rule was also adopted, stipulating that public sector net debt must be falling as a percentage of GDP by 2015-16. Moreover, the framework for monitoring and enforcement was changed in 2011.

[insert Figure 2 here]

Table 3 reports basic correlations among the variables, cyclical values of GDP and GEXP, the National Fiscal Rules Index (NFRI), and the Efficiency of Government Index (GE). Significance levels using Sidak adjusted statistics are reported. Cyclical GDP is positively correlated with cyclical government expenditure, and negatively correlated with GE and NFRI, though the latter is not statistically significant. The strength of NFRI is positively and significantly correlated with the GE (correlation of 0.28). These correlations make the independent contribution of GE and fiscal rules difficult to ascertain. We address this issue in the empirical results section.

[insert Table 3 here]

The left-hand-side of Figure 3 shows a simple plot of fiscal cyclicality and the level of rules.[9] Country specific regressions over the full sample have been employed to calculate the degree of cyclicality (the estimated coefficient based GEXP regressed on GDP), and the parameters are plotted against the average level of the fiscal rule index. The plot shows a negative correlation between cyclicality of policy and fiscal rules. The plot on the right-hand-side of Figure 3 shows the same country-specific cyclical policy parameter plotted against the interaction of GE*NFRI. This measures the combination of good government and fiscal rules. There is a distinct negative correlation again indicating that the combination of good government and strong fiscal rules reduces the degree of policy cyclicality.

[insert Figure 3 here]

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[9] Note that we have re-scaled the fiscal rules index to be in the range of 1 and 5 in Figure 3.

5. Empirical Results

5.1 Baseline Results

Table 4 shows the basic model results using the cyclical component of GDP and GEXP.[10] All of the models pass diagnostic testing (reported in lower part of the table). We find evidence of strong procyclicality, significant at the 1 percent level of confidence. A one percent rise in the GDP "output gap" leads to a 0.59-0.86 cyclical rise in real government expenditure. Rules are associated with a significant reduction in procyclicality—a one unit rise in the national fiscal rules index reduces expenditure cyclicality by 0.697—significant at the 1 percent level of confidence. In order to illustrate the effects of national fiscal rules on the cyclicality of GDP in Table 4 we compute the marginal effects (with 95% confidence bands computed using the delta method) using the estimates in column (2). This allows us to measure how the strength of fiscal rules affects cyclicality in more detail. These calculations are shown in Figure 4. (The fiscal strength index is in the range of 0 and 4 but the maximum value is 1.80 in our sample.) The graph shows that stronger rules reduce cyclicality and that a NFRI index of about 1.25 is sufficient to reduce cyclicality to zero, i.e. no cyclical response of government expenditure to a rise in cyclical GDP.

[insert Table 4 here]

[insert Figure 4 here]

It is interesting to consider specific examples. A country with "average" national fiscal rules strength (0.23, e.g. Armenia in 2012) has estimated net expenditure procyclicality of 0.70, while the country with the strongest rules (United Kingdom at 1.885 in 2012) has estimated counter-cyclicality of -0.45, i.e. a one percent rise in (cyclical) GDP would lead to a decline of (cyclical) government expenditure of -0.45 percent. Australia with strong fiscal rules (1.485 in 2012) is estimated to have counter-cyclicality of -0.17 percent, while the U.S. with moderate fiscal rules (0.87) would have modest procyclicality of 0.25 percent. Greece, with no national fiscal rules, has an estimated fiscal procyclicality of 0.86 percent.

Table 5 investigates how fiscal rules interact with government efficiency. All of the estimated models again pass the diagnostic tests. We estimate four regressions evaluating

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[10] We also estimated the basic model with these variables in first-difference form and the results were almost identical. These results are omitted for brevity but are available from the authors upon request.

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whether fiscal rules are most effective when applied in tandem with higher government efficiency. We find that higher bureaucratic efficiency alone does little to reduce procyclicality, shown in column (1). However, when government efficiency is combined with fiscal rules (column 2) we find a highly significant and economically important effect, i.e. higher government efficiency in tandem with stronger rules significantly reduces procyclicality of fiscal policy (coefficient value of -0.74). This finding is consistent with the plots shown on the right side of Figure 3. This result is also robust to the inclusion of separate interaction terms (columns 3 and 4).

[insert Table 5 here]

We employ the estimates in Table 5 to measure how the cyclicality varies with the strength of national fiscal and government efficiency. Using the estimates in column (2) we illustrate how the cyclicality varies with NFRI for two levels of government efficiency, either the sample average (GE=0.44) or the average of the quintile with highest government efficiency (GE=1.80). These results are presented in the two panels of Figure 5. We show the marginal effect on GDP together with the 95% confidence bands computed using the delta method as above. The graphs again indicate that increasing the strength of fiscal rules tends to reduce cyclicality. However, for countries with average government efficiency, fiscal policy is still procyclical unless national fiscal rules are very strong. For countries with high government efficiency, by contrast, moderate levels of fiscal strength are sufficient to deliver countercyclical policy.

In terms of specific examples, a country with average government efficiency (0.44) and average national fiscal rules (0.23) has strong procyclicality (0.74), while at the high end a country such as the U.K. with high GE (1.53) combined with high NFRI (1.89) has strongly counter-cyclical policy (-1.33). Chile is also at the high end of the spectrum, with rather strong fiscal rules (0.73) and high government efficiency (1.25), so that the estimated policy response is almost acyclical (0.13).

[insert Figure 5 here]

5.2 Alternative Measure of Government Efficiency

The empirical evidence in Table 5 suggests a linkage between government efficiency, the strength of national fiscal rules and the cyclicality of fiscal policy. However, the measure that we are using for government efficiency-- the World Bank government efficiency measure-- is not especially nuanced and varies little over time. As argued by Charron, Lapuente and Rothstein

(2010), it is difficult to distinguish government efficiency differences between similar countries using the World Bank measure, e.g. between Sweden and Denmark, Chile and Italy, or Brazil and Bulgaria. They suggest that countries should be clustered with respect to their relative quality of government instead of using the World Bank index for each country.[11]

We follow their suggestion and decompose the 81 countries into quartiles based on the average of the World Bank index for each country. This provides us with four groups of countries, each with approximately the same number of countries. Table A1 in the Appendix show the four clusters of countries divided into high, good, moderate and low efficiency of government. Table A2 shows descriptive statistics for these four groups. From this table it is clear that cyclicality as well as the strength of national fiscal rules is positively associated with efficiency of government. Countries with high efficiency of government tend to have more countercyclical fiscal policy and also stronger national fiscal rules. Countries with low efficiency of government have highly procyclical fiscal policy and lax national fiscal rules.

In our empirical work, we code each cluster as a dummy variable, and add these as interactive dummy variables together with GDP*NFRI in the regression estimates reported in Table 6. The value of each term listed is GDP*NFRI if it falls in the designated cluster (e.g. moderate GE), and zero otherwise. Combined with the direct interaction term GDP*NFRI, we are able to calculate the cyclicality of policy given a level of fiscal rules and conditional upon its degree (cluster group) of government efficiency. (The excluded group, captured in the basic interaction term, is the low level of government efficiency).

[insert Table 6 here]

The results in Table 6 suggest strong effects from government efficiency, making rules much more effective when combined with moderate and higher levels of government efficiency. All the terms are statistically significant at the 1% level of confidence and economically meaningful. Diagnostic tests suggest that the model is well specified and that the instruments are exogenous. We illustrate these results in Figure 6. This figure uses estimates from the "high" and "moderate" quality cluster estimates from Table 6 (with 95% confidence bands computed using the delta method). Again, the procyclicality of policy is reduced as the fiscal rule strength rises. But the effect is much greater in the case with high GE. In particular, policy moves from pro- to counter-

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[11] This argument also holds for alternative measures of government efficiency commonly used in the literature and is not a specific issue when using the World Bank measure.

cyclical (i.e. acyclical) at a fiscal rules index threshold of 1.0 for the moderate GE cluster of countries but at a threshold of only 0.5 for the high GE cluster of countries.

The failure of rules for countries with low quality of government bureaucracy, indeed the odd positive correlation between rules and fiscal cyclicality for this group, suggests that this problem is concentrated in developing economies (constituting the group of countries with low government bureaucratic quality). The second column of Table 6 investigates the extent to which cyclicality of fiscal policy is concentrated on developing/emerging market economies. We investigate this point by simply adding an interaction term of GDP with a dummy equal to unity for developing and emerging economies, zero otherwise (advanced economies). The result confirms our priors and what has been found in the literature—procyclicality of fiscal policy is heavily concentrated in developing and emerging markets.

5.3 Robustness and Extensions

In this section we consider several empirical extensions. The first extension, shown in Table 7, broadens our set of control variables to include inflation targeting, a measure of capital account openness and the degree of government/political polarization. In this exercise, our objective is to determine whether factors other than fiscal rules may be responsible for reduced cyclicality of fiscal policy.

[insert Table 7 here]

A commitment to *inflation targeting* has been adopted by many countries over the past decades, and this institutional reform may have influenced the conduct of fiscal policy by limiting the scope of seigniorage revenues and placing other constraints on expenditure. To address this point, we add a dummy variable equal to 1 if the country has implemented inflation targeting at time t, and zero otherwise. The data is taken from Samarina and De Haan (2013) and Aizenman, Hutchison, and Noy (2011). Table A3 in the Appendix lists countries in our sample with inflation targeting. The inflation targeting dummy is entered directly in the equation and also interacted with the cyclical component of GDP. We expect inflation targeting countries to follow less procyclical fiscal policy.

In addition, we investigate whether institutions and fiscal rules interact with improved market access as measured by *international financial openness*. In particular, countries that are more financially open may be subject to more "market discipline" in terms of fiscal policy—

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policymakers may feel more constrained in their actions when their economies are highly integrated with world financial markets. To control for this possibility we use the Chinn-Ito index measuring a country's degree of capital account openness (Chinn and Ito, 2006). We again add this index and its interaction with the fiscal rule index. We expect greater financial openness to be associated with less cyclicality of fiscal policy.

Finally, the literature on the *fragmentation of government* suggests that greater fragmentation has a detrimental effect on public finances (e.g. Kontopoulos and Perotti, 1999; and Volkerink and De Haan, 2001). Fragmentation may also be associated with greater procyclicality of policy. In order to control for government fragmentation we use the inverse of the Herfindahl index of government (the inverse of the sum of squared seat shares of all parties in the government) from the World Bank Database of Political Institutions. We expect a positive relationship between this measure and government expenditures, i.e. an increase in fragmentation (a decrease in the Herfindahl index) is likely to increase government expenditure. We also expect a positive interaction effect—higher fragmentation is expected to increase procyclicality of government expenditure.

Table 7 reports the results. All of the regressions include the "baseline" specification of the model with our fiscal rules index and government efficiency indicator. The first three columns show results where each of the new control variables are entered separately in the regressions and the fourth column reports results where all three of the new control variables are included. Importantly, the baseline results are not qualitatively affected by the inclusion of these new control variables—the coefficient estimates are almost identical to those reported in Table 6. In addition, inflation targeting (IT*GDP) and the degree of government polarization (Gov. Polarization*GDP) appear to be related to the degree of fiscal cyclicality but not the extent of financial globalization (CI*GDP). In particular, countries with inflation targeting and higher government polarization appear to have lower cyclicality of government expenditure. The former result is consistent with our theoretical priors while the latter result is somewhat puzzling.

Our second extension, shown in columns (1) and (2) of Table 8, is to replace our aggregate fiscal rules measure NFRI with an index of only one characteristic—the strength of expenditure rules (ER). Using the IMF database we construct an index using information focused on government expenditure rules: monitoring, enforcement, coverage, legal basis, the existence of escape clauses and multi-year expenditure ceilings (aggregate or by ministry or by line item).

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Using these 8 key characteristics we compute an expenditure rule index using equal weights. We normalize this aggregate measure such that it is in the range of 0 to 4. Table A4 in the Appendix provides a list of countries in our sample with expenditure rules. As can be seen from this table, only 24 out of 81 countries have such a rule. Some countries (e.g. Germany) have had an expenditure rule during the full sample whereas other countries (e.g. Peru) implemented an expenditure rule sometime during the sample period.

[insert Table 8 here]

In a regression analogous to column (2) of Table 4, substituting ER for NFRI, we estimate coefficients (standard errors) of 0.25 (0.047), 0.80 (0.088) and -0.37 (0.126), respectively, for lagged government expenditure, GDP and the interaction term GDP*ER. These results also indicate the importance of expenditure rules (ER) in reducing cyclicality of fiscal policy (-0.37), but with weaker strength compared to a set of broader fiscal rules captured by NFRI (coefficient in table 4 of -0.69).[12] A set of broader regressions using the expenditure rule (ER) index together with the quality of government is shown in Table 8. Column (1a) employs the ER index and column (1b) transforms the ER index into a dummy variable equal to one if a country has implemented an expenditure rule, and zero otherwise. Our main findings are not affected when using this narrow definition of fiscal rules. The interaction of fiscal rules and government efficiency again suggest that countries with more efficient governments have less procyclical fiscal policies. Moreover, the results are very similar when we instead use a dummy to indicate the presence of an expenditure rule.

Our third extension, reported in the two columns (labelled 2a and 2b, reporting results from one combined regression) of Table 8, distinguish between business cycle phases by introducing a dummy variable which is equal to 1 if the cyclical component of GDP is negative (cyclical component of GDP is below trend) and 0 otherwise. This exercise is designed to evaluate whether fiscal rules may be more or less binding depending on the state of the business cycle. Using this dummy variable we then run our standard regression allowing us to test for asymmetries of the effects of fiscal rules for the four clusters of countries.

The point estimates reported in Table 8 indicate quite different patterns across business cycle downturns and upturns. The results for business cycle *downturns* (column 2a) are qualitatively similar to the previous results, with fiscal rules increasingly effective in countries with higher

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[12] Detailed results omitted for brevity but are available from the authors upon request.

quality bureaucracies, but suggest a weaker effect than our baseline model. Moreover, fiscal rules do not appear effective during business cycle *upturns* (column 2b), i.e. we find no discernable pattern between fiscal rule effectiveness and quality of bureaucracy during upturns in the business cycle. More formally, we perform F-tests of the null hypothesis that the cyclicality is symmetric across the two business cycle phases. The results indicate that the response of GDP is indeed different; an F-test of this hypothesis is rejected at the 1% level. For the interaction terms there is much less evidence suggesting asymmetry. We can only reject the null of symmetry for cluster 3, the p-value is below the 1% level. For other levels of government efficiency we find no significant difference across the two business cycle phases.

Our fourth extension considers the robustness of results to alternative values of the H-P filter. In our baseline empirical analysis we have assumed that the smoothing parameter in the HP-filter λ is constant across all countries. For annual data the convention is to use the value 100. However, Ravn and Uhlig (2002) suggest that the value 6.25 works well for annual US GDP data. In our empirical application we followed the convention and used the value 100 and, as an alternative, follow Marcet and Ravn (2004) and determine the value of λ endogenously. In particular, we use U.S. data (GDP and government expenditures) as the benchmark and assume that the variability of the trend component relative the variability of the cyclical component is constant across countries. Using this restriction, we estimate the implied value of λ for all countries (using Marcet and Ravn's adjustment rule 1), allowing the decomposition between cyclical and trend components.

The results are reported in columns (3a) and (3b) of Table 8. Column 3a shows the benchmark case with the cyclical component for GDP using $\lambda=100$ and column 3b uses the Ravn and Uhlig (2002) methodology giving a value of $\lambda=6.25$. (For government expenditures we benchmark against US government expenditures using $\lambda=100$.[13]) These variations in the cyclical adjustment methodology reveal only minor changes to the point estimates compared to our base equation. It is always the case that fiscal policy is less procyclical in countries with more efficient government and stronger fiscal rules. Our main conclusions are unaffected by changes in the smoothing parameter.

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[13] When using $\lambda = 6.25$ for both US GDP and US government expenditures we find that the cyclical component of government expenditures is not positively autocorrelated and therefore we refrain from using these estimated cyclical components.

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6. Conclusion

Procyclical fiscal policy has the potential to exacerbate swings in business cycles and lead to unstable debt dynamics. This paper investigates the efficacy of fiscal rules in reducing the procyclical nature of fiscal policy. Fiscal rules have been an increasing popular mechanism by which to frame fiscal policy, but relatively little cross-country empirical work has investigated their effectiveness. This contrasts markedly with the voluminous literature on monetary policy rules.

We investigate whether fiscal rules help to reduce the extent of fiscal policy procyclicality—how government expenditure policy responds to GDP-- in a panel framework with 81 advanced, emerging and developing countries over 1985-2012. We develop a new national fiscal rule index based on 28 distinct characteristics of actions, legislative or procedural, that constrain fiscal policy actions in each country at each point in time. The underlying source of the data is the IMF Fiscal Affairs Division database. We investigate the effects of national fiscal rules, controlling for the degree of government effectiveness—a proxy for how well governments are able to manage and enforce fiscal rules.

We find that national fiscal rules are very effective in reducing procyclicality of policy once a minimum threshold of government efficiency/quality has been reached. Government efficiency alone is not enough to reduce procyclicality of fiscal policy, but high government efficiency combined with fiscal rules is a potent combination that greatly reduces procyclicality. Strong rules combined with high levels of government administrative efficiency help create an institutional environment where governments are able to follow counter-cyclical fiscal policy. These results are robust to alternative measures of fiscal rules, how cyclicality is measured, and the inclusion of various controls such as whether countries are following inflation targeting, the extent of financial openness and the degree of political fragmentation.

Acknowledgements

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Table 1: Sample of countries.

Antigua and Barbuda*	Estonia	Namibia
Argentina	Finland	Netherlands
Armenia	France	New Zealand
Australia	Gabon*	Niger*
Austria	Germany	Nigeria
Belgium	Greece*	Norway
Benin*	Grenada*	Pakistan
Botswana	Guinea Bissau*	Panama
Brazil	Hong Kong SAR	Peru
Bulgaria	Hungary	Poland
Burkina Faso*	Iceland	Portugal*
Cameroon*	India	Romania
Canada	Indonesia	Russia
Cap Verde	Ireland*	Senegal*
Central African Republic*	Israel	Serbia
Chad*	Italy*	Slovak Republic
Chile	Jamaica	Slovenia
Colombia	Japan	Spain
Congo*	Kenya	Sri Lanka
Costa Rica	Kosovo	St. Kitts and Nevis*
Cote d'Ivoire*	Latvia*	St. Lucia*
Cyprus	Lithuania	St. Vincent and the Grenadines*
Czech Republic*	Luxembourg	Sweden
Denmark	Mali*	Switzerland
Dominica*	Malta*	Togo*
Ecuador	Mauritius	United Kingdom
Equatorial Guinea*	Mexico	United States

Note: * denotes countries without a national fiscal rule.

Table 2: Descriptive statistics.

Variable	Available observations	Missing Observations	Mean	Std. Dev.
GDP	2165	103	0.00	4.42
Government expenditure (GEXP)	1726	542	0.00	8.58
Government efficiency (GE)	2149	119	0.44	1.04
National fiscal rule index (NFRI)	2268	0	0.23	0.42
Number national rules	2268	0	0.46	0.81

Note: GDP and GE are the cyclical components of the H-P filter decomposition of the log value of the series.

Table 3: Correlations

	GDP	GEXP	GE	NFRI
GDP	1			
GEXP	0.1423*	1		
GE	-0.1349*	0.0008	1	
NFRI	-0.0294	-0.0111	0.2806*	

Note: Data for GDP and GEXP are the cyclical components of HP-filtered decomposition of the series between trend and cycle. * denotes significant at the 5% level. Sidak adjusted significance level.

Table 4: Cyclicality of Fiscal Policy and National Fiscal Rules

	(1)	(2)
GEXP(-1)	0.167*	0.253***
	(0.088)	(0.048)
GDP	0.594***	0.864***
	(0.215)	(0.114)
GDP*NFRI		-0.697***
		(0.214)
#obs	1564	1564
#instruments	52	54
AR(1)	0.000	0.001
AR(2)	0.110	0.207
Hansen J test	0.136	0.133
Hansen C test	n.a.	0.787

Note: Arellano-Bond one-step difference GMM estimation. Clustered and robust standard errors are shown within parentheses below each point estimate. *** denotes significance at the 0.01 level, ** at the 0.05 level and * at the 0.10 level. GDP is assumed to be endogenous while all other explanatory variables are assumed to be exogenous. When applicable we also include NFRI and/or GE as iv-style instruments. Hansen J test is a test for over identification and Hansen C test is a test of exogeneity of iv-style instruments.

Table 5 Cyclical of Fiscal Policy to GDP, National Fiscal Rules and Government Efficiency

	(1)	(2)	(3)	(4)
GEXP(-1)	0.243***	0.240***	0.241***	0.240***
	(0.050)	(0.048)	(0.049)	(0.049)
GDP	0.684***	0.815***	0.833***	0.872***
	(0.072)	(0.092)	(0.102)	(0.107)
GDP*GE	-0.001		0.001	0.001
	(0.002)		(0.002)	(0.002)
GDP*NFRI				-0.355
				(0.370)
GDP*NFRI*GE		-0.741***	-0.800**	-0.625*
		(0.166)	(0.324)	(0.372)
#obs	1549	1549	1549	1549
#instruments	54	55	56	57
AR(1)	0.001	0.001	0.001	0.001
AR(2)	0.205	0.192	0.180	0.186
Hansen J test	0.063	0.097	0.074	0.093
Hansen C test	0.583	0.154	0.130	0.230

Note: Arellano-Bond one-step difference GMM estimation. Clustered and robust standard errors are shown within parentheses below each point estimate. *** denotes significance at the 0.01 level, ** at the 0.05 level and * at the 0.10 level. GDP is assumed to be endogenous while all other explanatory variables are assumed to be exogenous. When applicable we also include NFRI and/or GE as iv-style instruments. Hansen J test is a test for over identification and Hansen C test is a test of exogeneity of iv-style instruments.

Table 6: Cyclicality of fiscal policy, National Fiscal Rules, and Government Efficiency

	(1)	(2)
GEXP(-1)	0.255***	0.253***
	(0.049)	(0.048)
GDP	0.854***	-0.030
	(0.112)	(0.111)
GDP*Developing		0.756***
		(0.163)
GDP*NFRI	1.473***	
	(0.623)	
GDP*NFRI Moderate GE	-2.250***	
	(0.641)	
GDP*NFRI Good GE	-1.847***	
	(0.623)	
GDP*NFRI High GE	-3.114***	
	(0.689)	
#obs	1564	1564
#instruments	57	54
AR(1)	0.001	0.001
AR(2)	0.207	0.202
Hansen J test	0.092	0.101
Hansen C test	0.074	0.971

Notes: Arellano-Bond one-step difference GMM estimation. Clustered and robust standard errors are shown within parentheses below each point estimate. *** denotes significance at the 0.01 level, ** at the 0.05 level and * at the 0.10 level. GDP is assumed to be endogenous while all other explanatory variables are assumed to be exogenous. NFRI is included as iv-style instruments. Hansen J test is a test for over identification and Hansen C test is a test of exogeneity of iv-style instruments.

Table 7: Robustness tests adding inflation targeting, Chinn-Ito index and government polarization.

	(1)	(2)	(3)	(4)
GEXP(-1)	0.254***	0.244***	0.260***	0.257***
	(0.049)	(0.055)	(0.055)	(0.060)
GDP	0.879***	0.707***	1.047***	1.124***
	(0.127)	(0.096)	(0.209)	(0.132)
GDP*NFR	1.461**	1.742***	1.296	0.958
	(0.629)	(0.588)	(0.794)	(0.860)
GDP*NFR Moderate GE	-2.142***	-2.457***	-2.024**	-1.709*
	(0.652)	(0.594)	(0.815)	(0.891)
GDP*NFR Good GE	-1.820***	-1.957***	-1.356*	-1.160
	(0.624)	(0.554)	(0.770)	(0.859)
GDP*NFR High GE	-3.000***	-3.023***	-2.375***	-2.074**
	(0.697)	(0.623)	(0.810)	(0.890)
GDP*IT	-0.443**			-0.389*
	(0.167)			(0.205)
CI*GDP		-0.016		0.166
		(0.098)		(0.131)
Gov. Polarization*GDP			-1.292***	-1.686***
			(0.306)	(0.464)
#obs	1564	1447	1393	1308
#instruments	59	59	59	63
AR(1)	0.001	0.002	0.006	0.006
AR(2)	0.212	0.192	0.301	0.293
Hansen J test	0.091	0.188	0.090	0.253
Hansen C test	0.071	0.256	0.745	0.207

Notes: See Table 6. IT is a dummy variable equal to 1 if country I has implemented inflation targeting at time t. CI is the Chinn-Ito index and government polarization is measured as the inverse of the Herfindahl index of government taken from World Bank Database of Political Institutions 2012.

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Table 8: Cyclicality of fiscal policy, expenditure rules and government efficiency.

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
	ER index	ER dummy	NFRI GDP < 0	NFRI GDP>0	NFRI λ(US GDP)=100 λ(US GEXP)=100	NFRI λ(US GDP)=6.25 λ(US GEXP)=100
GEXP(-1)	0.258***	0.257***	0.254***		0.266***	0.277***
	(0.048)	(0.048)	(0.042)		(0.052)	(0.054)
GDP	0.805***	0.807***	1.496***	-1.704***	0.662***	1.093***
	(0.092)	(0.093)	(0.166)	(0.318)	(0.125)	(0.159)
GDP*NFR	1.279*	1.483**	0.724	2.993	2.117***	2.905***
	(0.669)	(0.676)	(0.808)	(1.852)	(0.736)	(0.818)
GDP*FR Moderate GE	-1.604**	-2.021**	-0.803	0.810	-2.507***	-3.780***
	(0.732)	(0.865)	(0.596)	(0.787)	(0.774)	(0.906)
GDP*FR Good GE	-1.420**	-1.843***	-1.225***	1.905***	-2.261***	-3.544***
	(0.663)	(0.676)	(0.419)	(0.626)	(0.720)	(0.844)
GDP*FR High GE	-2.100***	-3.000***	-1.509***	0.679	-3.448***	-4.648***
	(0.688)	(0.720)	(0.319)	(0.456)	(0.781)	(0.865)
#obs	1564	1564		1564	1564	1564
#instruments	57	57		63	57	57
AR(1)	0.001	0.001		0	0.001	0.001
AR(2)	0.212	0.213		0.166	0.2	0.31
Hansen J test	0.099	0.133		0.196	0.064	0.084
Hansen C test	0.074	0.093		0.522	0.097	0.326

Notes: See Table 6. ER index = sum of monitoring, enforcement, coverage, legal basis, escape clauses and multi-year expenditure ceilings (aggregate or by ministry or by line item) normalized to be in the range of 0 to 4 (column 1). ER dummy = 1 if country I has implemented an expenditure rule at time t, 0 otherwise (column 2). In column (3) we distinguish between economic recessions (when GDP is below trend) and expansions (when GDP is above trend). Columns (4) and (5) report results when estimating λ in the HP-filter using the Marcet-Ravn procedure for two different benchmarks (λ = 100 for both US GDP and GEXP and using λ=6.25 for US GDP and λ=100 for US GEXP).

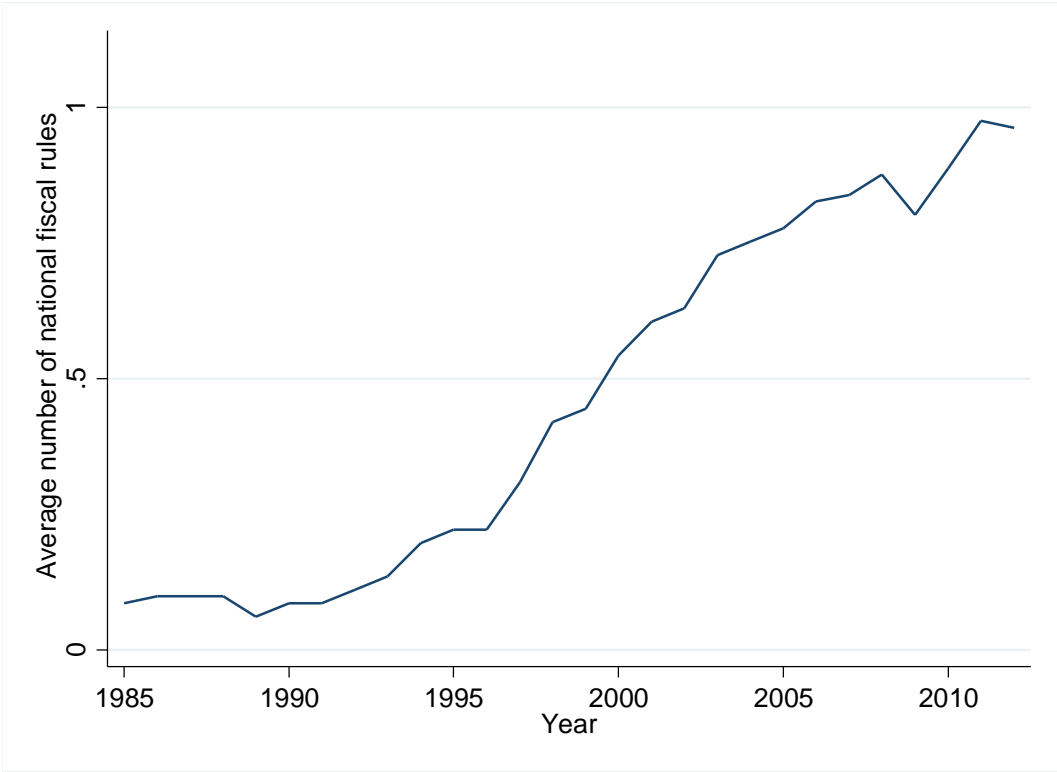Figure 1: Average number of national fiscal rules 1985-2012.

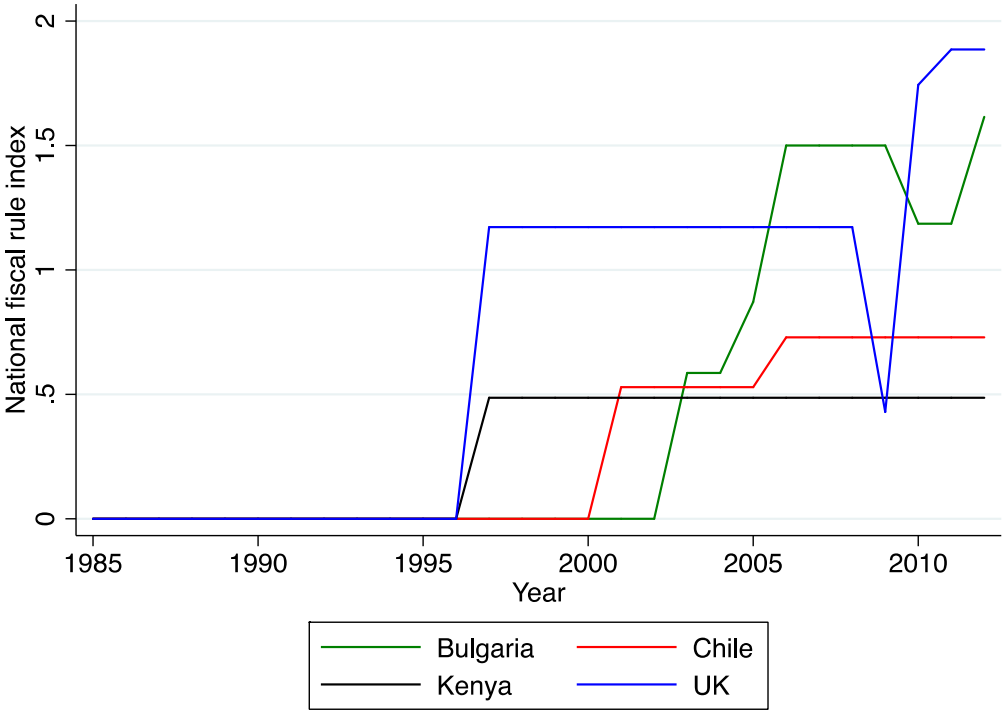Figure 2: National fiscal rule index for selected countries

Figure 3: Cross-correlations of cyclicality of fiscal policy, fiscal rule index and efficiency of government
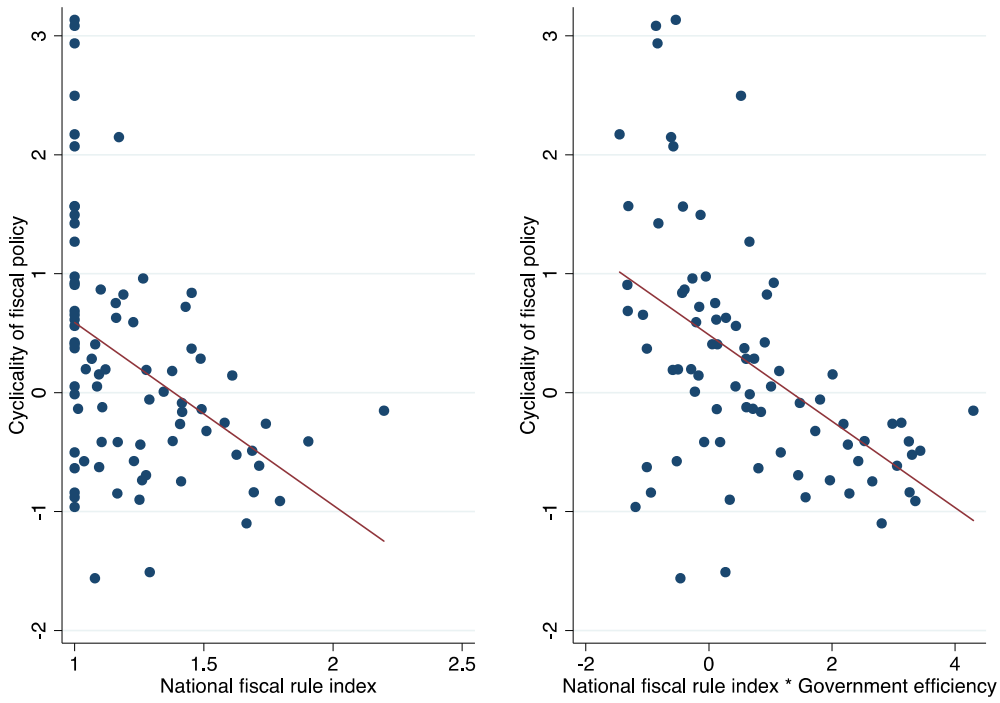

Figure 4: Marginal effect of GDP on government expenditures as a function of NFRI based on column (2) of table 4 together with the 95% confidence band computed using the delta method.
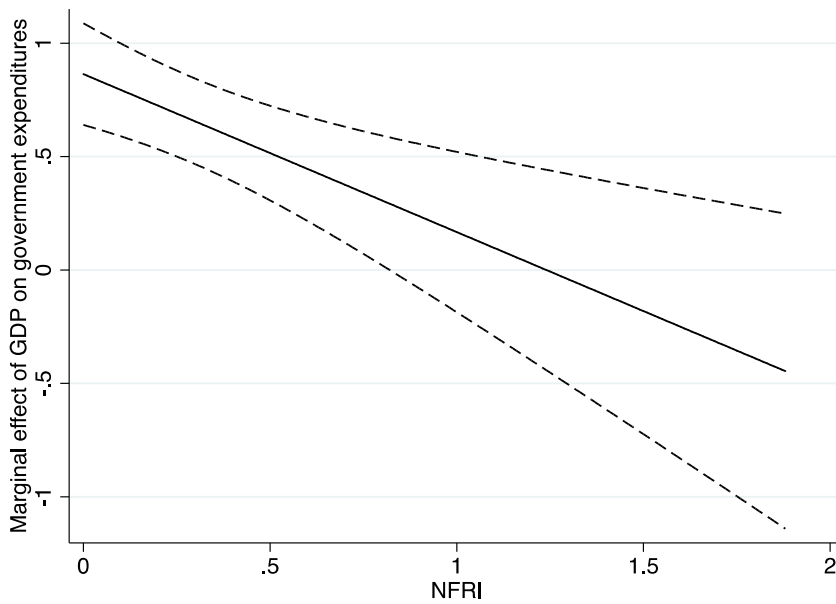
Figure 5: Marginal effect of GDP on government expenditures as a function of NFRI for average and high levels of government efficiency based on column (2) of table 5 together with the 95% confidence band computed using the delta method.
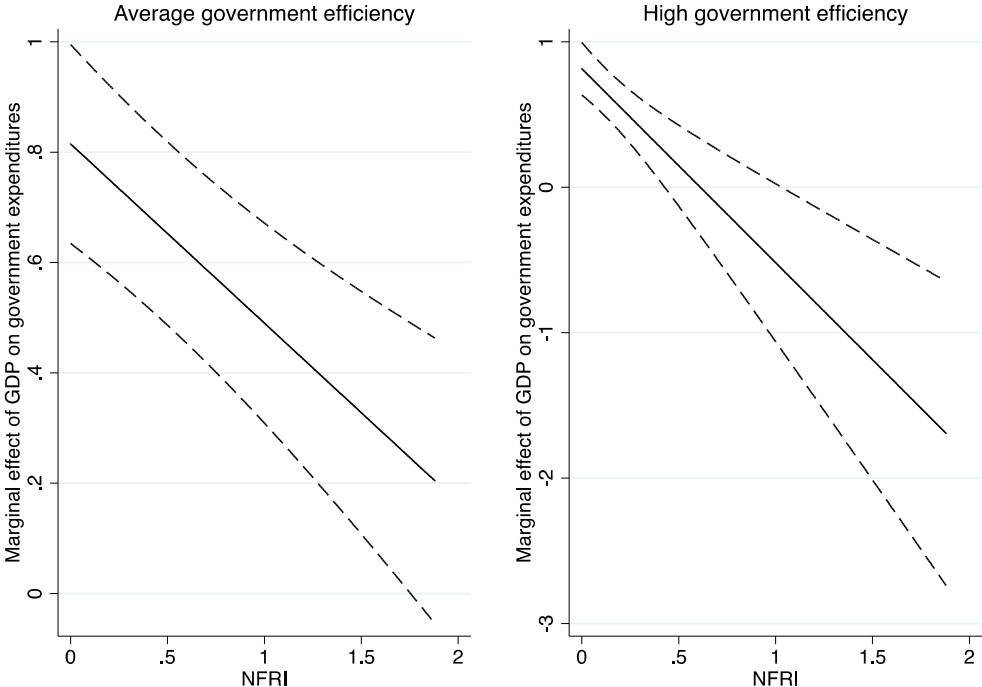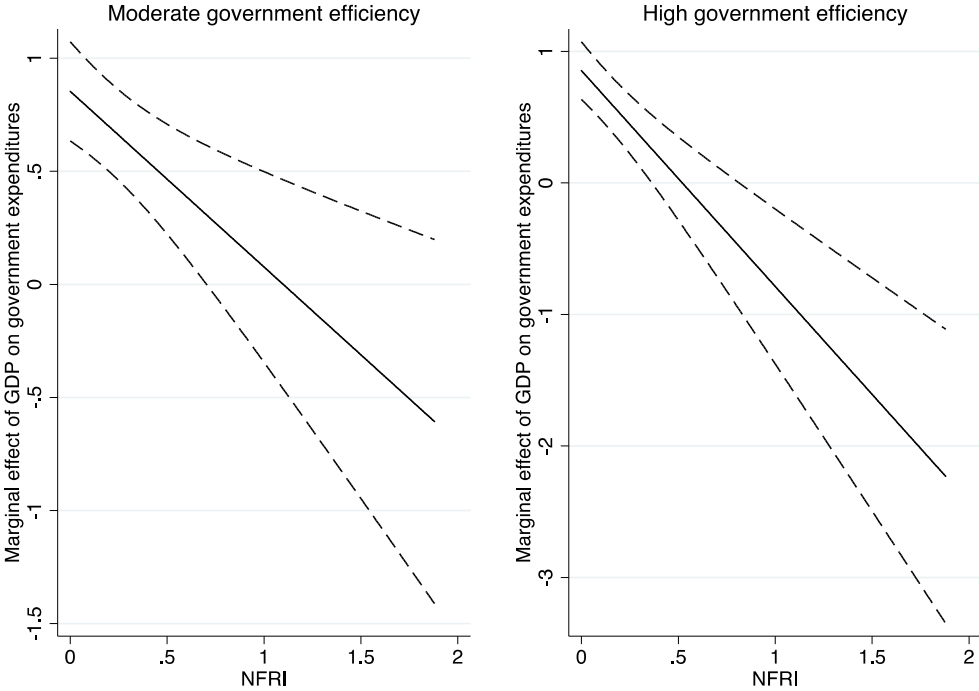
Figure 6: Marginal effect of GDP on government expenditures as a function of NFRI for moderate and high levels of government efficiency based on column (1) of Table 6 together with the 95% confidence band computed using the delta method.

A1. Data Appendix

Variable	Definition and Source
Fiscal rules	Information about 28 characteristics of national fiscal rules rules., "Fiscal Rules Dataset, 2012" (FAD) from the Fiscal Affair Department of the International Monetary Fund, Schaechter, Kinda, Budina, and Weber (2012).
GDP	Real GDP, WEO database
Government expenditures	Nominal government expenditures deflated using the GDP deflator, WEO database
Government efficiency	World Bank "Worldwide Governance Indicators, 2013 Update" (WGI) project research dataset

A2: Interpolation of World Bank Data on Government Efficiency

The World Bank data on government efficiency is biannual from 1996 until 2002 and then annual. We use linear interpolation to add observations in 1997, 1999 and 2001. In order to extend the data back to 1985 we make use of available data on our alternative measure of government efficiency, the International Country Risk Guide (ICRG). ICRG collects a wide range of political information and financial and economic data, using these underlying data to construct risk ratings for a large number of countries. The index we use is constructed using three different features (sub-indices) of the quality of government, corruption, law and order and bureaucracy quality. Summing these three sub-indices using equal weights we then rescale the resulting index to be in the range of 0 and 1. A higher value of the index implies higher quality of government.

We assume that the World Bank data behaves as the ICRG do for the years prior to 1996, that is, the two series have the same percentage change year-to-year. For all other countries we assume that the index of government efficiency has not changed during the period 1985-96. There are some countries in our data set that became independent or were established during the sample period we study.[14] For these countries we do not extend the data backwards. The argument as to why we are using information on ICRG to extend our sample is that the World Bank data and the ICRG measure are highly correlated (the correlation coefficient using only original data is 0.94).

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[14] Armenia (independent 1992), Czech Republic (1993), Estonia (1991), Hong Kong (1997), Kosovo (1999), Latvia (1991), Lithuania (1990), Mauritius (1992), Russia (1991), Serbia (2006), Slovak Republic (1993) and Slovenia (1991).

Table A1: Clusters of countries based on quartiles of government efficiency

High GE	Good GE	Moderate GE	Low GE
Australia	Antigua and Barbuda	Argentina	Benin
Austria	Botswana	Armenia	Burkina Faso
Belgium	Chile	Brazil	Cameroon
Canada	Cyprus	Bulgaria	Central African Republic
Denmark	Czech Republic	Cape Verde	Chad
Finland	Dominica	Colombia	Congo
France	Estonia	Costa Rica	Cote d'Ivoire
Germany	Greece	Grenada	Ecuador
Hong Kong SAR	Hungary	India	Equatorial Guinea
Iceland	Israel	Jamaica	Gabon
Ireland	Italy	Mexico	Guinea Bissau
Japan	Latvia	Namibia	Indonesia
Luxembourg	Lithuania	Panama	Kenya
Netherlands	Malta	Peru	Kosovo
New Zealand	Mauritius	Romania	Mali
Norway	Poland	Senegal	Niger
Sweden	Portugal	Sri Lanka	Nigeria
Switzerland	Slovak Republic	St. Kitts and Nevis	Pakistan
United Kingdom	Slovenia	St. Lucia	Russia
United States	Spain	St. Vincent and the Grenadines	Serbia
			Togo

Note: The grouping of countries is based on quintiles of sample average of the efficiency of government for each country.

Table A2: Descriptive statistics for groups of countries based on quartiles of efficiency of government.

	Mean	St. Dev.	Min	Max
High GE countries				
GDP	-0.32	0.27	-0.73	0.33
GEXP	-0.52	0.32	-1.10	0.15
GE	1.80	0.18	1.40	2.04
NFRI	0.50	0.30	0.00	1.20
Good GE countries				
GDP	0.44	0.53	-0.16	1.98
GEXP	0.25	0.74	-0.69	2.50
GE	0.78	0.24	0.44	1.17
NFRI	0.15	0.19	0.00	0.51
Moderate GE countries				
GDP	0.42	0.67	-1.09	2.02
GEXP	0.27	0.70	-1.51	1.49
GE	0.01	0.20	-0.30	0.43
NFRI	0.20	0.19	0.00	0.61
Low GE countries				
GDP	0.91	1.63	-2.76	3.69
GEXP	0.92	1.38	-1.56	3.13
GE	-0.81	0.35	-1.45	-0.36
NFRI	0.06	0.12	0.00	0.45

Table A3: List of countries with inflation targeting and year of adoption.

Country	Year of adoption
Armenia	2006
Australia	1993
Brazil	1999
Canada	1991
Chile	1991
Colombia	1999
Czech Republic	1998
Finland	1993
Hungary	2001
Indonesia	2005
Israel	1992
Mexico	1999
New Zealand	1990
Norway	2001
Peru	1994
Poland	1998
Romania	2005
Slovakia	2005
Spain	1995
Sweden	1993
Switzerland	2000
United Kingdom	1993

Note: Finland and Spain abandoned inflation targeting in 1999 and Slovakia in 2009 when these countries adopted the euro.
Source: Aizenman, Hutchison and Noy (2011) and Samarina and De Haan (2013).

Table A4: List of countries with expenditure rule.

Argentina	Iceland
Australia	Israel
Belgium	Japan
Botswana	Kosovo
Brazil	Lithuania
Bulgaria	Luxembourg
Canada	Namibia
Columbia	Netherlands
Denmark	Peru
Ecuador	Poland
Finland	Romania
France	Spain
Germany	Sweden
Hungary	US