Fiscal Rules and Business Cycles in Emerging and Developing Economies

May 2015

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Abstract

Emerging and developing economies generally have greater economic volatility than advanced economies, but have experienced a substantial dampening of the business cycle since the early 2000s. Fiscal pro-cyclicality has also declined markedly in emerging market economies. We investigate whether fiscal rules, working to increase stability in public sector finances, may have allowed governments to follow less pro-cyclical fiscal policies. Chile is a well-known success story in this regard, with its adoption of strict policy rules regulating government expenditures, taxation and debt. We investigate whether adopting rules-constrained fiscal policy similar to Chile has helped reduce the procyclicality of fiscal policy and thereby dampened business cycle fluctuations. To this end, we employ a dynamic panel framework with 101 countries over 1985-2013. We also investigate whether the effectiveness of fiscal rules is contingent upon the quality of government institutions, and which specific type of fiscal rule (expenditure, revenue, balanced budget or debt rules) appears most effective. In addition, we control for other factors that may impact fiscal cyclicality and the effectiveness of fiscal rules, i.e. inflation targeting, IMF programs, terms-of-trade changes and the level of government debt. We find that fiscal rules are effective in reducing pro-cyclicality if implemented in countries with relatively high quality government bureaucracies (advanced and emerging market economies). The converse also holds – higher government efficiency reduces procyclicality but the effect is much stronger when combined with fiscal rules. We also find that balanced budget rules appear the most effective in reducing fiscal pro-cyclicality for a broad group of countries, but only expenditure rules appear effective in the developing-country group. Rules are also most effective in countries with particularly high government debt burdens and in those experiencing large terms-of-trade volatility

1. Introduction

Economic fluctuations are generally much more pronounced in emerging and developing economies than advanced industrial economies. Possible reasons for this high volatility include large and frequent terms of trade changes (Aizenman et al., 2011, 2012), exposure to foreign financial shocks (e.g. interest rates) combined with financial frictions (Chang and Fernández, 2009), and more pronounced shocks to trend output growth (e.g. Aguiar and Gopinath, 2007). In their characterizations of business cycles, Calderon and Fuentes (2006) find that emerging markets have more cycles than advanced economies, and that the mean amplitude of contractions (expansions) is three times (1.4 times) larger.[1] Moreover, Kose, Otrok and Whiteman (2003) find that less developed economies are more likely to experience country specific business cycles. In terms of deepness of recessions and recoveries, Cerra and Saxena (2008) document in a large sample of countries that cycles associated with financial and political crisis generate large output losses, and it is apparent that emerging economies experience these problems with greater frequency. Sudden stops, currency crises, banking crises and "twin" banking and currency crises are also an important factor of large cycles in emerging market that, together with other financial frictions, amplify business cycles (e.g. Calvo, 1998; Calvo and Reinhart,; Glick and Hutchison, 2003; Hutchison and Noy, 2005, 2006 ; Mendoza, 2006).

Heightened economic volatility, in part, may also be attributable to greater procyclicality of monetary and fiscal policy in emerging and developing economies than advanced economies. Greater procyclicality of policy in emerging markets is noted, for example, by Gavin and Perotti (1997), Tornell and Lane (1999), Kaminsky et al. (2004), Talvi and Vegh (2005), Mendoza and Oviedo (2006), Alesina et al. (2008), and Ilzetzki and Vegh (2008). Ilezetzki and Vegh (2008), for example, take into account reverse causality (endogeneity), where exogenous shocks on the fiscal side could potentially generate business cycles rather than vice versa, and find very strong evidence of procyclicality: "We find overwhelming evidence to support the idea that procyclical fiscal policy in developing countries is in fact truth and not fiction. We also find evidence that

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[1] They use a sample of 23 emerging markets and 12 advanced (OECD) economies over the 1980-2006 (quarterly data). They use a business cycle methodology based on Harding and Pagan (2002), in turn closely related to the "classical" dating of business cycles used by the Burns and Mitchell (1946). This contrasts with the time series approach which attempts to decompose GDP into trend growth and cyclical components. They write: "One of the main features that distinguish cyclical fluctuations in emerging markets (vis-à-vis developed counties) is their higher volatility –partly manifested in the occurrence of more frequent and deeper recessions." (p. 16).

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fiscal policy is expansionary – a channel disregarded by the existing literature – lending empirical support to the notion that when "it rains, it pours."(p. 1).

Lane (2003) also finds greater output and income volatility in emerging markets, compared with advanced economies, and argues that greater business cycle volatility in emerging markets is exacerbated by pro-cyclical monetary and fiscal policies.[2] He argues that institutional reforms in the conduct of monetary and fiscal policies can improve the capacity to stabilize cyclical fluctuations; and while monetary institutional reforms, namely inflation targeting, is now widely accepted, relatively less progress has been made in designing and implementing new fiscal procedures. Rose (2007) argues that, on the monetary side, inflation targeting is a new norm for emerging economies and that its widespread introduction has provided a nominal anchor playing an important stabilizing role.

The "efficiency" of government theme in shaping fiscal outcomes has been investigated by a number of researchers in various contexts. Calderón et al. (2012), for example, consider the role of government administrative quality. They find that the level of institutional quality plays a key role in countries' ability to implement counter-cyclical macroeconomic policies.[3] Frankel (2011), considering the success story of Chile in reducing procyclicality of fiscal policy, concludes that institutional reforms were key to reducing fiscal procyclicality. Similarly, Frankel, Vegh and Vuletin (2013) find that the quality of institutions is a key determinant of an emerging market's ability to "graduate" to fiscal counter cyclicality and also show empirical evidence that as the quality of institutions increases over time, the level of procyclicality falls. They show that, in the 2000s, about a third of the developing world have become countercyclical and argue that stronger institutions have played a key role in this development, i.e. the causal link runs from stronger institutions to less procyclical or more countercyclical fiscal policy.[4] Frankel, Vegh and Vuletin (2013) measure institutional quality by an index of the investment profile (contract

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[2] Lane (2003) finds empirical that emerging markets have experienced much more volatile output and income fluctuations than developed economies, and that these fluctuations have been further exacerbated by pro-cyclical policies. He argues that institutional reforms in the conduct of monetary and fiscal policies can improve the capacity to stabilize cyclical fluctuations; and while monetary institutional reforms, namely inflation targeting, is now widely accepted, relatively less progress has been made in designing and implementing new fiscal procedures.

[3] Calderón et al. (2012) use a sample of 115 advanced, emerging and developing countries for 1984-2008. Their results show that countries with strong (weak) institutions adopt counter- (pro-) cyclical macroeconomic policies, reflected in extended monetary policy and fiscal policy rules. The threshold level of institutional quality at which monetary and fiscal policies are acyclical is found to be similar

[4] 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) also find evidence of reduced fiscal procyclicality in a number of countries.

liability/expropriation, profits repatriation, and payment delays), corruption, law and order and bureaucratic quality.

One institutional reform that has seen renewed emphasis in policy circles and that may be responsible for reduced pro-cyclicality of fiscal policy is the implementation of formal fiscal rules. The focus on fiscal rules has encompassed advanced and developing economies as well as emerging market economies (IMF, 2009), and emphasizes how fiscal institutional frameworks may shape the evolution and effectiveness of fiscal policy and economic outcomes. Although the popularity of rules guiding and constraining fiscal policy actions has increased markedly in recent years, focus has been on longer-term sustainability of government budget positions and debt (e.g. Bergman, Hutchison and Jensen, 2013), rather than their effect in reducing the procyclicality of policy.

The fiscal rules-procyclicality link is explored in Bergman and Hutchison (2014), but focuses on countries that have adopted rules with no special attention to developing and emerging countries. Frankel (2011) considers the structural budget rule as a part of institutional reforms in Chile. 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. Nonetheless, Frankel (2011) concludes that the key innovation allowing Chile to achieve countercyclical fiscal policy in general, and to run surpluses in booms in particular, is not just a structural budget rule in itself, but a regime that entrusts to an independent expert panel with responsibility for estimating long-run trends in copper prices and GDP.

The paucity of research on rules and fiscal cyclicality is in stark contrast to the large volume of work on the popularity and role of monetary rules, and inflation targeting in particular. To address this issue, we focus on fiscal rules and evaluate their effectiveness in helping to dampen the procyclical nature of fiscal policies in emerging and developing economies. We focus on the link between rules and procyclicality of policy, and the distinctions between advanced, emerging and developing economies, and how they compare with the level of government efficiency generally in reducing fiscal cyclicality. In particular we compare fiscal rules with broader institutional reforms (measured by quality of government and inflation targeting) and investigate whether rules and other reforms complement or substitute for each other in reducing fiscal procyclicality. Are budget rules enough or are complementary institutional reforms such as

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those implemented by Chile necessary to "graduate" countries to countercyclical fiscal policy? We also consider how the level of government debt may limit developing countries from following countercyclical policies during downturns (i.e. fiscal stimulus), as well the role played by terms-of-trade fluctuations and whether countries are in IMF-supported programs. We address these questions in a systematic way using a dynamic panel fixed-effects framework for a large number of emerging markets with and without rules, considering the role of national fiscal rules, institutions and examining the interactions among fiscal rules and the efficiency of government. To this end, we also develop several fiscal rules indices, varying across countries and over time. We all compare the efficacy of the basic forms of fiscal rules—expenditure rules, balanced budget rules, debt rules and revenue rules—in reducing fiscal cyclicality.

Section 2 describes the data employed in the paper, especially the construction of fiscal rules. Section 3 presents the methodology. Section 4 presents some descriptive material and statistics on business cycles, fiscal institutions and rules in emerging and developing economies. We demonstrate that a "great moderation" of business cycles and reduced pro-cyclicality of fiscal policy is clearly evident in emerging and developing economies in the past 15 years, even when including the Global Financial Crisis. We also show that fiscal rules have become increasingly popular over the past two decades. Section 5 presents the empirical results. Section 6 concludes.

2. Data

This section describes the definitions of variables and sources of the data used in our empirical analysis. Further details on data sources, description and construction are provided in the 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.) Our country sample is 101 countries over 1985-2013. We divide the sample into advanced, emerging and developing economies, shown in Table 1. We classify emerging markets as those listed by Monteil (2003). (This classification is consistent with Dow Jones "Country Classification System," MSCI Emerging Markets Index and the STOXX Limited regional classification systems.)

2.1 Fiscal Rules

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 from the "Fiscal Rules Dataset, 2012" (FAD) from the Fiscal Affair 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 fiscal rules (applied on central of general government) for 87 countries that are members of the IMF. (Fourteen other countries in our data set do not have national fiscal rules at any time during 1985-2013). Fiscal rules are defined as longer-lasting constraints on fiscal policy through numerical limits on budgetary aggregates. The data includes information on 28 characteristics of national rules in the following categories: (i) Type of rule, (ii) Year of implementation and year of major revisions, (iii) Number of rules, (iv) Legal basis, (v) Coverage – level of government, (vi) Monitoring procedures, (vii) Enforcement procedures, (viii) Institutional supporting features (Multi-year expenditure ceilings; Fiscal responsibility laws; independent council providing budget assumptions; independent council monitoring implementation), and (ix) Stabilization features (Budget balance rule accounting for the cycle; investment excluded).

We employ a procedure similar to Schaechter, Kinda, Budina and Weber (2012) and 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).[5] In addition to these characteristics we also add information about supporting procedures and institutions (multi-year expenditure ceilings implemented at the aggregate level, by ministry of by line item), whether there is an independent body setting budget assumptions, information about transparency and accountability, whether a balanced budget target is defined in cyclically/structural terms or over the business cycle and whether there are rules excluding public investments or other priority items from the ceiling. This adds eight characteristics to the 20 mentioned above, for a total of 28 characteristics.

To measure the strength of national fiscal rules (FRI) we first normalize all 28 sub-indices to lie between 0 and 1.[6] Then we sum over all characteristics to obtain a total index capturing the

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[5] 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.

[6] 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;

strength of national fiscal rules in each country using equal weights. Finally, we normalize such that this index lies between 0 and 4 the former implies that there are no national fiscal rules implemented in a country whereas the latter implies maximum strength.[7]

2.2 Fiscal Policy Measure

Our focus in this paper is to what extent national fiscal rules 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 it would tend to stabilize the business cycle (i.e., fiscal policy is contractionary during expansions and expansionary during contractions). A procyclical is the opposite, tending to exacerbate the business cycle with expansions in good times and contractions in bad times. An acyclical fiscal policy involves government spending and tax rates that do not vary systematically with the business cycle, neither reinforcing nor stabilizing 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, 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).[8] 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.[9] The advantage of government expenditures is that co-movements with GDP are able to clearly distinguish between counter-cyclical, procyclical and acyclical fiscal policy

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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.

[7] Appendix A3 shows plots of the fiscal rule index for different groups of countries.
[8] Several papers employ additional fiscal policy indictors.
[9] 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.

2.3 Other Variables

The "government efficiency" index is from the World Bank "Worldwide Governance Indicators, 2013 Update" (WGI) project research 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 such policies. The government efficiency indicator ranges from -2.5 to 2.5, with higher values indicating greater government efficiency.[10]

We are also interesting exploring other factors that may influence fiscal policy volatility as well as the cyclicality of fiscal policy, especially in emerging and developing economies. Candidate variables include: (1) whether they are participating in IMF programs, (2) have instituted inflation targeting, (3) experience high terms-of-trade volatility, and (4) have high government debt levels. We model participation in an IMF program as a binary dummy variable, with unity denoting current participation in the program. IMF program participation may reinforce the effectiveness of rules, but could also prove a substitute for the introduction of fiscal rules. We also look at inflation targeting regimes, again modeled with a binary dummy variable (value of unity denoting an IT regime). Inflation target would generally imply tightened monetary policy during upturns in the economy, and loosening of policy during downturns. This countercyclical policy regime may put less pressure on fiscal counter-cyclicality and lead to reduced significance of fiscal rules. On the other hand, to the extent that institutional reforms are often linked, e.g. IT and strong fiscal rules may be included in a package of institutional reforms, they may be reinforcing. Terms-of-trade volatility is an important factor destabilizing many

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[10] Note that the World Bank data is annual from 2002 but biannual from 1996 to 2002. We use an alternative measure of government efficiency (the International Country Risk Guide) to construct a series of efficiency covering the full sample, see Appendix A2 for details.

emerging and developing economies, and the effects may extend to limiting the effectiveness of fiscal rules. Finally, high debt levels—especially in countries with borrowing constraints—may greatly limit the ability of countries to follow counter-cyclical fiscal policy, especially debt-increasing simulative policies during recessions.

3. Methodology

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

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

where β_3 measures the marginal effect of effect of national fiscal rules (*NFRI*) on cyclical expenditure (*GEXP*), μ_i estimates country fixed effects, ε_{it} is the error term and $\beta_1 + \beta_2 * (FRI_{it})$ is the net procyclicality of fiscal rules (for any given level of rules, FRI_{it}). The model is a dynamic panel, estimated using Blundell-Bond (1998) system GMM, where we report coefficient estimates and Windmeijer's (2005) finite-sample corrected standard errors. We also report tests of autocorrelation of both first and second order and Hansen J test statistic for overidentifying restrictions (the joint validity 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 test.

A potential problem when implementing the GMM methods is that the number of instruments explodes with T, overall the number of instruments is quadratic in T. This is also a potential problem in our panel. 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 overidentifying 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 either that the number of instruments is limited to certain lags or a method of collapsing the instruments by having separate moments for each lag instead of for each lag and time period. We will use the latter approach in our empirical application.[11]

An additional issue is endogeneity. The Blundell-Bond GMM estimator allows us to handle endogeneity using internal instruments. We will assume that GDP is endogenous and include this

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

variable as a GMM-style instrument (in addition to government expenditures). We assume that government efficiency and the fiscal rule index we construct are predetermined and therefore included as standard iv-style instruments. When adding interaction terms to the regressions we assume that these are exogenous thus using them as IV-style instruments.[12]

A similar equation and interpretation of coefficients is estimated to measure the impact of other variables (X) that may influence fiscal cyclicality (e.g. government efficiency, IMF programs, inflation targeting, debt burdens and Terms-of-Trade volatility):

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

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

$$GEXP_{it} = \beta_0\, GEXP_{it-1} + \beta_1\, GDP_{it} + \beta_2(GDP_{it} * FRI_{it}) + \beta_3(GDP_{it} * X_{it}) +$$
$$\beta_4(GDP_{it} * FRI_{it} * X_{it}) + \mu_i + \varepsilon_{it} \tag{3}$$

where the $(GDP_{it} * FRI_{it} * X_{it})$ 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: $\beta_1 + \beta_2 * (FRI_{it}) + \beta_3(X_{it}) + \beta_4(FRI_{it} * X_{it})$.

4. Statistical Contours: Business Cycles, Fiscal Cyclicality and Fiscal Rules

4.1 Amplitude of Business Cycles and Government Expenditures

Our first exercise is to evaluate the evolution of business cycles across the groups of countries by development status and across time. Real GDP (GDP) evaluated in this business cycle analysis is the cyclical component 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. We report basic statistics of the standard deviation ("amplitude") of real GDP cycles in Table 2[13]. Figure 1 shows the distribution of business cycle volatility across countries, color coded to distinguish advanced (black), emerging (red) and developing economies (green). The upper (lower) panel in the figure shows business cycle volatility over

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[12] It could be argued that the interaction terms should be treated as potentially endogenous. Our main conclusions from the empirical analysis below are unaffected but the number of instruments increases considerably leading to over fitting of endogenous variables and weakening Hansen J-tests even when collapsing the instruments.
[13] The amplitude is the standard deviation of cyclical component of the HP-filtered GDP, i.e. square root of the variance and multiplied by 1/(number of obs-1).

1985-1999 (2000-2013). Figure 3 shows the change in business cycle amplitude between the two periods.

For the full sample, the mean (median) value for amplitude of the business cycle is 0.027 (0.022) for advanced economies, 0.035 (0.032) for emerging economies and 0.046 (0.043) for developing economies (Table 2)[14]. That is, the higher the development status, the lower is volatility. This pattern is also evident from Figure 1, where few of the advanced economies (black color coding) are on the right of the distribution which is dominated by developing economies (green coding). As noted in the introduction, this pattern has become a "stylized" fact in the literature—emerging markets and developing economies are more volatile than advanced economies.

However, dividing the sample into three sub-samples, 1985-1999, 2000-07 and 2008-13, provides a more nuanced view. First, volatility has decreased markedly for emerging (mean value declining successively from 0.039 to 0.031 to 0.024) and developing economies (0.048, 0.037 and 0.036), while increasing for the advanced economies in the most recent period (0.024, 0.023 to 0.030). A "Great Moderation" (dampening of the business cycle) is clearly evident for emerging and developing economies in the 2000s[15]. This observation is clearly evident by the change in the amplitude during the 1985-1999 and 2000-13 periods shown in Figure 2. Amplitude declined in most emerging and developing economies, while increasing in most advanced economies.

Second, it is apparent, comparing the 2000-07 and 2008-13 periods that volatility of the advanced economies increased markedly during the GFC and its aftermath, while declining in both emerging and developing economies. Third, emerging markets as a group "graduated" to greater business cycle stability since 2000. On average, business cycle amplitude in emerging economies is almost identical to that of advanced economies during 2000-13. Developing economies, by contrast, continue to exhibit much higher volatility, despite substantial reduction over time.

The amplitude of fiscal policy, represented by real government expenditures, shows a similar pattern to that of business cycles across advanced, emerging and developing economies. This is

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[14] The median standard deviation report is the median from country-wise standard deviations of the cyclical component of GDP fluctuations, based on a Hodrick-Prescott decomposition.

[15] The "Great Moderation" usually refers to the period starting in the mid-1980s in the United States.

shown in Table 3. Advanced economies have much less volatility in expenditures than emerging economies, and emerging economies exhibit much less expenditure volatility than developing economies.   This volatility ranking holds for the full sample and two sub-samples. However, government expenditure volatility declined for emerging and developing economies between 1985-99 and 2000-13, but increased in the advanced economy group.

4.2 Fiscal Cyclicality

Pro-cyclicality of fiscal policy—positive correlation of cyclical real GDP and cyclical real government expenditure—is mainly a characteristic of emerging and developing economies. This is shown in Table 4 and Figure 3. For the full 1985-13 sample period (1985-99 sample, 2000-13), the correlation is -0.088 (-0.149, -0.093) for advanced economies, 0.136 (0.175, 0.130) for emerging economies and 0.301 (0.269, 0.264) for developing economies. Less pro-cyclicality, highlighted by the color-coding scheme in Figure 3, is associated with higher economic development, and this holds for the full as well as the two sub-sample periods.

However, the mean value of pro-cyclicality across emerging markets has declined—from 0.175 to 0.130 between the two periods—in tandem with the dampening of business cycles and reduction in the cyclical volatility of real government expenditures. By contrast, counter-cyclicality of government expenditures is less (-0.093) in the 2000-13 period compared with 1985-1999 (-0.149) for the advanced economies, and no reduction in the pro-cyclical nature of fiscal policy is evident for the developing economies. This pattern is clearly evident in Figure 4.

The scatter plots illustrated in Figures 5 and 6 present individual country-data on changes in cyclicality in a different format. The horizontal axis measures the cyclicality in 1985-1999 and the vertical axis measures cyclicality in 2000-13. The northeast quadrant represent countries that have pro-cyclical policies in both periods—"still in school" as expressed by Frankel, Vegh and Vuletin (2013); the southeast quadrant represents those countries that have switched from pro-cyclical to counter-cyclical policy ("recent graduates"); the northwest quadrant represents those countries that have changed from counter-cyclical to pro-cyclical policies ("back to school"); and the southwest quadrant represents those countries following counter-cyclical polices in both periods ("established graduates"). Figure 5 shows all countries in the sample (with color coding distinguishing between advanced, emerging and developing economies), and Figure 6 shows emerging markets only (allowing individual country identification). Note that points lying on a

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45 degree line through the origin indicates no change in policy, while points below (above) indicate a reduction (increase) in pro-cyclicality.

For the full sample, a small majority of countries lie above a 45 degree line, leading to the increase in mean cyclicality reported for the full sample in Table 4. Of the emerging markets, China, India and Hong Kong (SAR) are "established graduates", while Singapore, Morocco, Philippines, Chile and Malaysia are "recent graduates". Five emerging markets (Hungary, Brazil, Poland, Thailand and Mexico) have changed from counter- to pro-cyclical polices and need to go "back to school" in terms of making an effort to follow policies to reduce fiscal pro-cyclicality.

The reduction in fiscal pro-cyclicality in emerging markets may be associated with the marked decline in business cycle amplitude noted above. Figure 7 is a scatter plot that indicates a trade-off between cyclicality of fiscal policy and amplitude of business cycle over 1985-2013 for the full sample of countries. The slope coefficient is equal to 5.1 with standard error equal to 1.460 (t-ratio = 3.52). The grey area is the 95% confidence interval. A reduction in the cyclicality of policy is associated with a reduction of business cycle amplitude.

4.3 Fiscal Rules

There are 51 countries in our sample that had a national fiscal rule in place in 2013 (18 advanced countries, 13 emerging markets and 20 developing countries), and 50 countries without a fiscal rule (total of 101 countries in the sample). Figure 8 shows how the number of countries implementing fiscal rules has changed over time. Clearly, the popularity of fiscal rules has increased over time in each group of countries. However, the upward trend towards adoption of rules is not monotonic, with episodes of surges and retrenchments. Figure 9 shows the change in our aggregate fiscal rules index between 1985 and 2013. There are a number of countries with no change in the strength of fiscal rules, but most have adopted stronger rules.

4.4 Country Experiences: Rules and Cyclicality

Figure 10 presents our measures of cyclical GDP, cyclical government expenditures and fiscal rule strength for four emerging and developing economies — Chile, India, Kenya and Venezuela. This is illustrative as it shows the evolution of rules over time and circumstances that might change the rules index. In the case of Chile and Kenya, strong fiscal rules were adopted and maintained. In India, strong fiscal rules were adopted and abandoned. Significant fiscal rules

were never adopted in Venezuela. The strong positive co-movement in GDP and expenditures appears to have weakened in Chile, Kenya and India around the time of the adoption of rules, while no change in the co-movements observed in Venezuela is evident over the sample period.

5 Empirical Results

5.1 Baseline Results

Table 5 more formally demonstrates the nature of fiscal cyclicality (regressing cyclical GDP on cyclical GE) over 1985-2013 for all countries as a group (column (1). Column (2) reports results where cyclical GDP is interacted with three separate dummy variables representing advanced, emerging and developing economies (column 2). The regressions report dynamic panel estimates (system GMM).[16] We use the Blundell-Bond system GMM estimator and provide Windmeijer's (2005) finite-sample corrected standard errors and as explained in the methodology section. As can be seen in the lower part of the table, the model passes the autocorrelation tests-- we reject first order autocorrelation but not second order autocorrelation. In Column (1) we reject endogeneity at the 5% level but not in the second regression where we add interaction terms (treating them as well as potentially endogenous).

We find evidence of strong procyclicality, shown in column (1), significant at the 1 percent level of confidence. Column (1) indicates that "average" cyclicality is 0.60 for the full sample (significant at the 1% level). Column (2) indicates that advanced economies are statistically "acyclical" (insignificant positive parameter estimate of 0.176), while emerging markets and developing economies show significant positive cyclicality with parameters of 0.306 and 0.773, respectively. These results are consistent with our summary statistics reported in the tables and figures.

Our baseline results for fiscal rules (FRI) and government efficiency (GE), following equations (1) and (2), are reported in Table 6. Columns (2)-(4) introduce government efficiency and fiscal rules into the model (column (1) allows a coefficient comparison). Column (2) includes the interaction term with GDP and degree of government efficiency (GE), column (3) includes the interaction term with GDP and the strength of fiscal rules (FRI), and column (4)

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[16] We also estimated fixed effects regressions with these variables and the results were almost identical. These results are omitted for brevity but are available from the authors upon request.

includes the interaction term combines GDP, GE and FRI.[17] Column (2) suggests that increasing government efficiency may somewhat reduce procyclicality but the coefficient is not statistically significant.

By contrast, column (3) suggests that fiscal rules have a significant effect in reducing procyclicality. The point estimate of -0.682 is statistically significant at the 1 percent level of confidence. Moreover, the combined interaction term, shown in column (4), is highly significant (1% level) and negative with a point estimate substantially greater than that shown for GE alone in column (2). This suggests that high government efficiency combined with strong fiscal rules is very effective in reducing procyclicality of policy.

5.2 Types of Rules

Tables 7 and 8 report the results from specific rules. Table 7 reports the effects of expenditure rules (ER) and balanced budget rules (BBR), and Table 8 reports the effects of revenue rules (RR) and debt rules (DR). The most effective rules, in terms of impact effect, statistical significance and consistency, appear to be balanced budget rules, followed by debt rules. Revenue rules and expenditure rules also appear to be effective to some degree.

Table 9 different sets of rules appear to be effective depending on development status. In particular, expenditure rules appear effective in advanced and developing economies; balanced budget rules appear effective in advanced and emerging economies; revenue rules appear effective in advanced economies; and debt rules appear effective advanced and emerging market economies. In sum, all rules appear effective in advanced economies, and most rules are effective emerging markets, but only expenditure rules appear effective in developing economies.

5.3 IMF Programs, Inflation Target, Debt Levels and the Terms-of-Trade

Table 10 reports some extensions of our baseline model by investigating the effects of participation in an IMF program (IMF) and an inflation targeting regime (IT) on cyclicality, and whether these programs/regimes affect the effectiveness of fiscal rules (through interaction terms). The results for the IMF programs, reported in columns (1) and (2), indicate that the presence of an IMF program does not affect fiscal cyclicality nor does it affect the

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[17] A model including all three interaction terms did not pass all the relevant diagnostic test.

effectiveness of fiscal rules. (Neither interaction term is statistically significant). The effect of an IT program, on the other hand, appears to be highly effective in reducing procyclicality of fiscal policy (column 3). This result holds even when including fiscal rules in the equation (column 4). However, the presence of both rules (FRI) and IT at the same time appears to increase procyclicality, giving an estimated small negative effect of a joint FRI and IT regime, and a total cyclicality near zero (an acyclical policy). To shed further light on this point, Table 11 shows the classification of inflation targeting countries into those without fiscal rules, those with fiscal rules for the entire sample period (bold), and those with fiscal rules in place in 2013 (denoted by an asterisk). The group of countries with IT regimes is primarily emerging and advanced economies, but no clear pattern by development status is evident.

Table 12 shows results from dividing our sample into gradients of debt levels. We consider three groups—high debt (highest 25 percentile of debt to gdp ratio), low debt (lowest 25 percentile of debt to gdp ratio), and medium debt (between lowest and highest ratios). We consider the direct effect on fiscal cyclicality (column 1) as well as the direct effect combined with fiscal rules (column 2). The results in column (1) indicate that pro-cyclical fiscal policy varies with the debt level, with medium and especially high debt level countries with much higher procyclicality. The results reported in column (2) indicate that the effect of fiscal rules also varies with the level of debt. Fiscal rules are very effective in reducing pro-cyclicality in countries with the highest debt levels, and little effect (statistically insignificant) when applied in countries with low and medium debt levels. This may imply that countries imposing fiscal rules when they have high debt levels are making a serious attempt to reduce pro-cyclicality of fiscal policy.

Finally, Table 13 divides countries into three groups by degree of terms-of-trade variability (ToT), again based on percentile levels (the high ToT group is the top 25 percentile group; low is the group with variability in the lowest 25 percentile). The results are qualitatively similar to the analysis based on debt levels. The high ToT variance group has the most pro-cyclical fiscal policies, and fiscal rules are most effective when applied in this group of countries. The explanation may be that high variance in the terms-of-trade induce a country to follow pro-cyclical fiscal policy—a "when it rains it pours" aspect of wealth gains or losses that fluctuate with the terms-of-trade—and fiscal rules appear to be an effective approach to limit this pressure on policy.

6 Conclusion

This paper investigates the efficacy of fiscal rules in reducing the procyclical nature of fiscal policy in emerging and developing economies. Fiscal rules have been an increasing popular mechanism by which to frame fiscal policy, but relatively little cross-country empirical work has investigated its effectiveness, especially in emerging and developing economies. Most of the work to date on reducing fiscal policy procyclicality in emerging markets focuses on broad institutional changes, not on implementation of rules. This contrasts markedly with the voluminous literature on monetary policy rules.

We investigate whether fiscal rules help to reduce the extent of policy procyclicality — how government expenditure policy responds to GDP — in a panel framework with 101 advanced, emerging and developing countries over 1985-2013. We include countries with and without fiscal rules in our sample. We develop a unique 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 find that the problem of procyclical fiscal policy is concentrated in developing countries and, to a lesser extent, emerging market economies. Advanced economies, on average, do not experience the problem of procyclical fiscal policy. Fiscal rules reduce procyclicality of policy but this effect appears mainly concentrated on advanced and emerging markets. This may be due to low levels of government efficiency and the enforcement of rules in developing economies. High government efficiency combined with strong fiscal rules is much more potent than government efficiency alone. We also find that balanced budget rules appear the most effective in reducing fiscal pro-cyclicality for a broad group of countries, but only expenditure rules appear effective in the developing-country group. Rules are also most effective in countries with particularly high government debt burdens and in those experiencing large terms-of-trade volatility.

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Table 1 Country Sample.

Advanced countries	Emerging markets	Developing countries	
Australia	Argentina	Antigua and Barbuda	Mongolia
Austria	Brazil	Armenia	Namibia
Belgium	Chile	Bangladesh	Niger
Canada	China	Benin	Nigeria
Cyprus	Colombia	Bolivia	Panama
Denmark	Czech Republic	Botswana	Romania
Estonia	Egypt	Bulgaria	Senegal
Finland	Hong Kong SAR	Burkina Faso	Serbia
France	Hungary	Capo Verde	Sri Lanka
Germany	India	Cameroon	St. Kitts and Nevis
Greece	Indonesia	Central African Republic	St. Lucia
Iceland	Israel	Chad	St. Vincent and the Grenadines
Ireland	Jordan	Republic of Congo	Togo
Italy	Korea	Costa Rica	Uruguay
Japan	Malaysia	Côte d'Ivoire	Vietnam
Latvia	Mexico	Croatia	
Luxembourg	Morocco	Dominica	
Malta	Pakistan	Ecuador	
Netherlands	Peru	Equatorial Guinea	
New Zealand	Philippines	Gabon	
Norway	Poland	Grenada	
Portugal	Russia	Guinea-Bissau	
Slovak Republic	Singapore	Jamaica	
Slovenia	South Africa	Kenya	
Spain	Taiwan Province of China	Liberia	
Sweden	Thailand	Lithuania	
Switzerland	Turkey	Maldives	
United Kingdom	Venezuela	Mali	
United States		Mauritius	

Note: The classification of emerging markets is based on the Monteil (2003).

Table 2 Business Cycle Amplitude in Advanced, Emerging and Developing Economies

		1985-2013	1985-99	2000-2007	2008-2013
Advanced countries	mean	0.027	0.024	0.023	0.030
	median	0.022	0.021	0.018	0.022
	sd	0.016	0.013	0.017	0.020
	min	0.013 [Australia]	0.006 [Slovenia]	0.005 [Australia]	0.007 [Estonia]
	max	0.081 [Latvia]	0.070 [Latvia]	0.083 [Latvia]	0.087 [Latvia]
Emerging markets	mean	0.035	0.039	0.031	0.024
	median	0.032	0.033	0.025	0.022
	sd	0.015	0.021	0.018	0.011
	min	0.020 [India]	0.013 [Pakistan]	0.009 [South Korea]	0.005 [Indonesia]
	max	0.070 [Russia]	0.101 [Russia]	0.092 [Venezuela]	0.050 [Russia]
Developing countries	mean	0.046	0.048	0.037	0.036
	median	0.043	0.037	0.028	0.025
	sd	0.033	0.041	0.029	0.030
	min	0.006 [Bangladesh]	0.007 [Bangladesh]	0.006 [Bangladesh]	0.002 [Bangladesh]
	max	0.209 [Equatorial Guinea]	0.260 [Equatorial Guinea]	0.133 [Liberia]	0.156 [Central African Republic]
All countries	mean	0.037	0.038	0.031	0.031
	median	0.030	0.029	0.023	0.022
	sd	0.025	0.031	0.024	0.023
	min	0.006 [Bangladesh]	0.006 [Slovenia]	0.005 [Bangladesh]	0.002 [Bangladesh]
	max	0.209 [Equatorial Guinea]	0.260 [Equatorial Guinea]	0.133 [Liberia]	0.156 [Central African Republic]

Note: Standard deviation of cyclical component of GDP shown in table. Cyclical component of GDP is from the H-P decomposition of trend and cycle GDP.

Table 3 Amplitude of Government Expenditure Cycles in Advanced, Emerging and Developing Economies

		1985-2013	1985-1999	2000-2013
Advanced countries	mean	0.037	0.030	0.039
	median	0.032	0.031	0.034
	sd	0.019	0.013	0.027
	min	0.010 [France]	0.007 [Cyprus]	0.006 [France]
	max	0.092 [Latvia]	0.061 [Portugal]	0.119 [Ireland]
Emerging markets	mean	0.058	0.069	0.055
	median	0.053	0.06	0.047
	sd	0.029	0.038	0.027
	min	0.017 [Israel]	0.017 [South Korea]	0.017 [Israel]
	max	0.153 [Singapore]	0.164 [Singapore]	0.142 [Singapore]
Developing countries	mean	0.100	0.119	0.091
	median	0.085	0.091	0.077
	sd	0.061	0.076	0.054
	min	0.031 [Maldives]	0.016 [Equador]	0.031 [Croatia]
	max	0.323 [Liberia]	0.355 [Equatorial Guinea]	0.323 [Liberia]
All countries	mean	0.070	0.074	0.066
	median	0.055	0.051	0.055
	sd	0.052	0.063	0.047
	min	0.010 [France]	0.007 [Cyprus]	0.006 [France]
	max	0.323 [Liberia]	0.355 [Equatorial Guinea]	0.323 [Liberia]

Table 4: Correlation between cyclical government expenditures and cyclical GDP

		1985-2013	1985-1999	2000-2013
Advanced countries	mean	-0.088	-0.149	-0.093
	median	-0.199	-0.123	-0.153
	sd	0.397	0.422	0.482
	min	-0.717 [Finland]	-0.865 [Finland]	-0.789 [Norway]
	max	0.802 [Greece]	0.539 [Iceland]	0.858 [Greece]
Emerging markets	mean	0.136	0.175	0.130
	median	0.203	0.227	0.162
	sd	0.326	0.324	0.387
	min	-0.639 [Turkey]	-0.481 [China]	-0.639 [Turkey]
	max	0.757 [Hungary]	0.671 [Philippines]	0.859 [Hungary]
Developing countries	mean	0.301	0.269	0.264
	median	0.306	0.346	0.325
	sd	0.311	0.407	0.364
	min	-0.750 [Costa Rica]	-0.793 [Dominica]	-0.750 [Costa Rica]
	max	0.828 [Croatia]	0.882 [Mongolia]	0.831 [Central African Republic]
All countries	mean	0.144	0.101	0.124
	median	0.216	0.221	0.216
	sd	0.379	0.429	0.429
	min	-0.750 [Costa Rica]	-0.865 [Finland]	-0.789 [Norway]
	max	0.828 [Croatia]	0.882 [Mongolia]	0.859 [Hungary]

Note: Correlation between cyclical component of real GDP and cyclical component of real government expenditures. Cyclical component of series calculated using Hodrick-Prescot filter decomposition.

Table 5 Cyclicality in full sample and divided into groups of countries.

	Model 1	Model 2
GEXP(-1)	0.308***	0.306***
	(0.034)	(0.037)
GDP	0.757***	
	(0.084)	
GDP Advanced countries		0.176
		(0.170)
GDP Emerging markets		0.306**
		(0.144)
GDP Developing countries		0.773***
		(0.147)
#countries	101	101
#instruments	57	60
Obs	2130	2130
AR(1)	0.000	0.000
AR(2)	0.532	0.606
Hansen	0.018	0.029

Note: System GMM estimates, government expenditures and GDP are assumed to be endogenous. Hansen J-test for over identification. 1985-2013 sample; unbalanced panel.
* p<0.10, ** p<0.05, *** p<0.01

Table 6 Testing whether cyclicality is determined by government efficiency and overall fiscal rule strength.

	Model 1	Model 2	Model 3	Model 4	Model 5
GEXP(-1)	0.308***	0.293***	0.303***	0.301***	0.295***
	(0.037)	(0.034)	(0.038)	(0.036)	(0.033)
GDP	0.757***	0.629***	0.853***	0.704***	0.713***
	(0.084)	(0.100)	(0.112)	(0.103)	(0.150)
GDP*GE		-0.161			-0.090
		(0.162)			(0.227)
GDP*FRI			-0.682***		-0.295
			(0.226)		(0.314)
GDP*FRI*GE				-0.348***	-0.116
				(0.102)	(0.287)
#countries	101	100	101	100	100
#instruments	57	57	59	58	60
Obs	2130	1922	2130	1922	1922
AR(1)	0.000	0.000	0.000	0.000	0.000
AR(2)	0.532	0.229	0.586	0.220	0.235
Hansen	0.018	0.050	0.021	0.093	0.048

Note: System GMM estimates, government expenditures and GDP are assumed to be endogenous. Hansen J-test for over identification. 1985-2013 sample; unbalanced panel.
* p<0.10, ** p<0.05, *** p<0.01

Table 7 Testing the effects of specific fiscal rule strength (expenditure and balanced budget rules) on cyclicality.

	Model 1: ER	Model 2: ER	Model 3: ER	Model 4: BBR	Model 5: BBR	Model 6: BBR
GEXP	0.309***	0.307***	0.307***	0.305***	0.302***	0.299***
	(0.038)	(0.036)	(0.036)	(0.038)	(0.036)	(0.037)
GDP	0.786***	0.666***	0.675***	0.843***	0.698***	0.736***
	(0.093)	(0.106)	(0.109)	(0.108)	(0.103)	(0.108)
GDP*ER	-0.277**		-0.142			
	(0.132)		(0.224)			
GDP*ER*GE		-0.078	0.004			
		(0.097)	(0.185)			
GDP*BBR				-0.320***		-0.191
				(0.077)		(0.120)
GDP*BBR*GE					-0.156***	-0.056
					(0.045)	(0.078)
#countries	101	100	100	101	100	100
#instruments	59	58	59	59	58	59
Obs	2130	1922	1922	2130	1922	1922
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.567	0.215	0.216	0.591	0.216	0.220
Hansen	0.018	0.079	0.081	0.028	0.095	0.088

Note: System GMM estimates, government expenditures and GDP are assumed to be endogenous. Hansen J-test for over identification. 1985-2013 sample; unbalanced panel.
* $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 8 Testing the effects of specific fiscal rule strength (revenue and debt rules) on cyclicality.

	Model 1: RR	Model 2: RR	Model 3: RR	Model 4: DR	Model 5: DR	Model 6: DR
GEXP(-1)	0.309***	0.305***	0.305***	0.304***	0.304***	0.304***
	(0.037)	(0.036)	(0.036)	(0.037)	(0.036)	(0.036)
GDP	0.761***	0.674***	0.673***	0.798***	0.700***	0.702***
	(0.085)	(0.103)	(0.103)	(0.096)	(0.100)	(0.108)
GDP*RR	-0.113***		0.082			
	(0.038)		(0.081)			
GDP*RR*GE		-0.134***	-0.206**			
		(0.047)	(0.101)			
GDP*DR				-0.260**		-0.046
				(0.116)		(0.113)
GDP*DR*GE					-0.296***	-0.264***
					(0.067)	(0.094)
#countries	101	100	100	101	100	100
#instruments	59	58	59	59	58	59
Obs	2130	1922	1922	2130	1922	1922
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.534	0.206	0.206	0.528	0.203	0.203
Hansen	0.021	0.087	0.087	0.020	0.089	0.085

Note: System GMM estimates, government expenditures and GDP are assumed to be endogenous. Hansen J-test for over identification. 1985-2013 sample; unbalanced panel.
* $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 9 Effectiveness of Alternative Rules (ER, BBR, RR, DR) by Development Status

	Model 1	Model 2	Model 3	Model 4
GEXP	0.308***	0.305***	0.308***	0.304***
	(0.038)	(0.038)	(0.037)	(0.038)
GDP	0.784***	0.842***	0.761***	0.801***
	(0.093)	(0.109)	(0.085)	(0.096)
GDP×ER Advanced countries	-0.449*			
	(0.229)			
GDP*ER Emerging markets	-0.319			
	(0.215)			
GDP*ER Developing countries	-0.204**			
	(0.101)			
GDP*BBR Advanced countries		-0.326***		
		(0.113)		
GDP*BBR Emerging markets		-0.312***		
		(0.084)		
GDP*BBR Developing countries		-0.306		
		(0.242)		
GDP*RR Advanced countries			-0.336***	
			(0.123)	
GDP*RR Developing countries			-0.048	
			(0.058)	
GDP*DR Advanced				-0.500***
				(0.150)
GDP*DR Emerging markets				-0.222***
				(0.084)
GDP*DR Developing countries				-0.210
				(0.141)
#countries	101	101	101	101
Obs	2130	2130	2130	2130

Table10 Interactions between cyclicality, IMF programs and IT

	Model 1	Model 2	Model 3	Model 4
GEXP	0.309***	0.306***	0.301***	0.295***
	(0.037)	(0.037)	(0.037)	(0.038)
GDP	0.582***	0.659***	0.815***	0.914***
	(0.102)	(0.132)	(0.101)	(0.135)
GDP*IMF	0.266	0.250		
	(0.179)	(0.197)		
GDP*FRI		-0.547**		
		(0.244)		
GDP*FRI*IMF		-0.138		
		(0.366)		
GDP*IT			-0.617***	-0.777***
			(0.178)	(0.216)
GDP*FRI				-0.756***
				(0.253)
GDP*FRI*IT				0.913***
				(0.352)
#countries	101	101	101	101
#instruments	59	63	59	63
Obs	2130	2130	2130	2130
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.530	0.569	0.528	0.570
Hansen	0.021	0.025	0.026	0.032

Note: System GMM estimates with clustered and robust standard errors. All regressions also include a constant and all constitutive terms but these are not reported for brevity. In addition to government expenditures, we assume that GDP is endogenous whereas all other variables are assumed to be exogenous including interaction terms with GDP. The marginal effect is shown for interaction terms.

Table 11 Inflation Targeting and Fiscal Rules

Armenia*	New Zealand*
Australia	Norway*
Brazil*	Peru*
Canada	Philippines
Chile*	Poland*
Colombia*	Romania*
Czech Republic	Slovak Republic*
Finland*	South Africa
Hungary	Spain*
Iceland	Sweden*
Indonesia	Switzerland*
Israel*	Thailand
Korea	Turkey
Mexico*	United Kingdom*

Note: The table lists inflation targeting countries. Bold indicates that the country had a national fiscal rule in place during the full sample 1985-2013, * denotes that the country had a national fiscal rule in place in 2013. Finland, Slovak Republic and Spain abandoned inflation targeting when these countries joined EMU.

Table 12 Debt and Fiscal Cyclicality

	Model 1	**Model 2**
GEXP	0.300***	0.300***
	(0.033)	(0.033)
GDP	0.192	0.181
	(0.125)	(0.150)
GDP (medium debt ratio)	0.249	0.254
	(0.171) [0.441***]	(0.192) [0.435**]
GDP (high debt ratio)	0.725***	0.820***
	(0.137) [0.917***]	(0.195) [1.001***]
GDP*FRI		0.033
		(0.198)
GDP*FRI (medium debt ratio)		-0.109
		(0.236) [-0.076]
GDP*FRI (high debt ratio)		-1.012***
		(0.260) [-0.980***]
#countries	101	101
#instruments	61	67
Obs	2130	2130
AR(1)	0.000	0.000
AR(2)	0.545	0.582
Hansen	0.027	0.021

Note: Low debt ratio (lowest 25 percentile, a debt ratio < 34%), high debt ratio (highest 25 percentile, a debt ratio >72%). System GMM estimates with clustered and robust standard errors. All regressions also include a constant and all constitutive terms but these are not reported for brevity. In addition to government expenditures, we assume that GDP is endogenous whereas all other variables are assumed to be exogenous including interaction terms with GDP. The marginal effect is shown for interaction terms and the total effect is shown within brackets below the standard error.

Table 13 Terms of Trade and Cyclicality

	Model 1	**Model 2**
GEXP	0.335***	0.333***
	(0.031)	(0.031)
GDP	0.380***	0.441***
	(0.117)	(0.145)
GDP medium ToT volatility	-0.158	-0.252
	(0.146) [0.221*]	(0.155) [0.189]
GDP high ToT volatility	0.340*	0.326
	(0.184) [0.720***]	(0.213) [0.767***]
GDP*FRI		-0.242
		(0.240)
GDP*FRI medium ToT volatility		0.458
		(0.284) [0.216]
GDP*FRI high ToT volatility		-0.347*
		(0.308) [-0.589*]
#countries	92	92
#instruments	61	67
Obs	1793	1793
AR(1)	0.002	0.003
AR(2)	0.077	0.085
Hansen	0.139	0.099

Note: System GMM estimates with clustered and robust standard errors. All regressions also include a constant and all constitutive terms but these are not reported for brevity. In addition to government expenditures, we assume that GDP is endogenous whereas all other variables are assumed to be exogenous including interaction terms with GDP. The marginal effect is shown for interaction terms and the total effect is shown within brackets below the standard error.

Figure 1: Amplitude of the business cycle, 1985-2013.
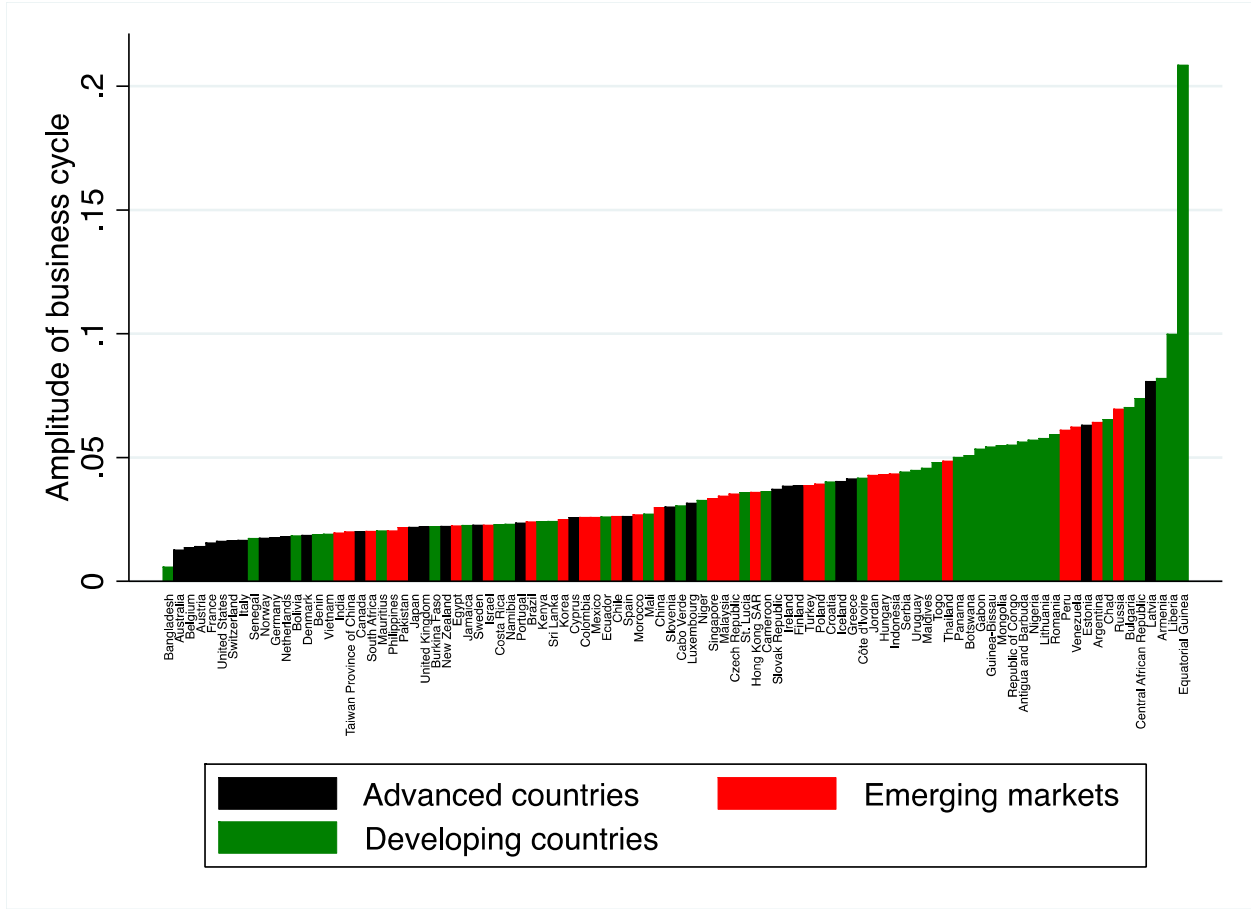
Note: Standard deviation of the cyclical component of GDP fluctuations (H-P filter decomposition). Countries are ordered from small to large amplitude in both graphs. Countries with amplitude exceeding 0.5 are excluded from the graph (Dominica, Grenada, Malta, St. Kitts and Nevis, St. Vincent and Grenadines).

Figure 2 Changes in Business Cycle Amplitude.
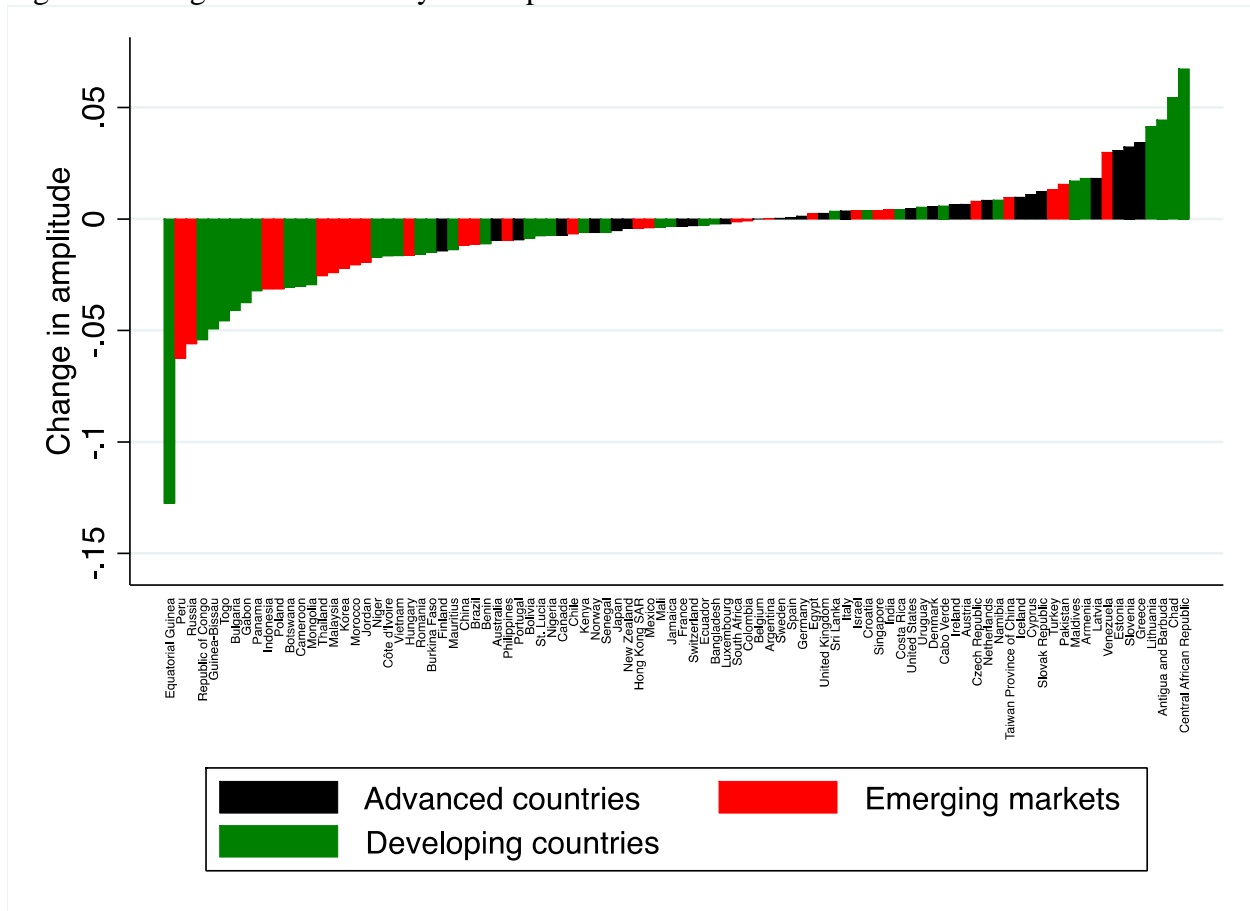
Note: Figure shows the change in the amplitude of the business cycle 2000-2013 vs. 1985-1999. Outliers (change in amplitude exceeding +/-0.5) have been excluded from the graph (Dominica, Grenada, St. Kitts and Nevis, St. Vincent and Grenadines).

Figure 3 Cyclicality of Fiscal Policy 1985-2013.
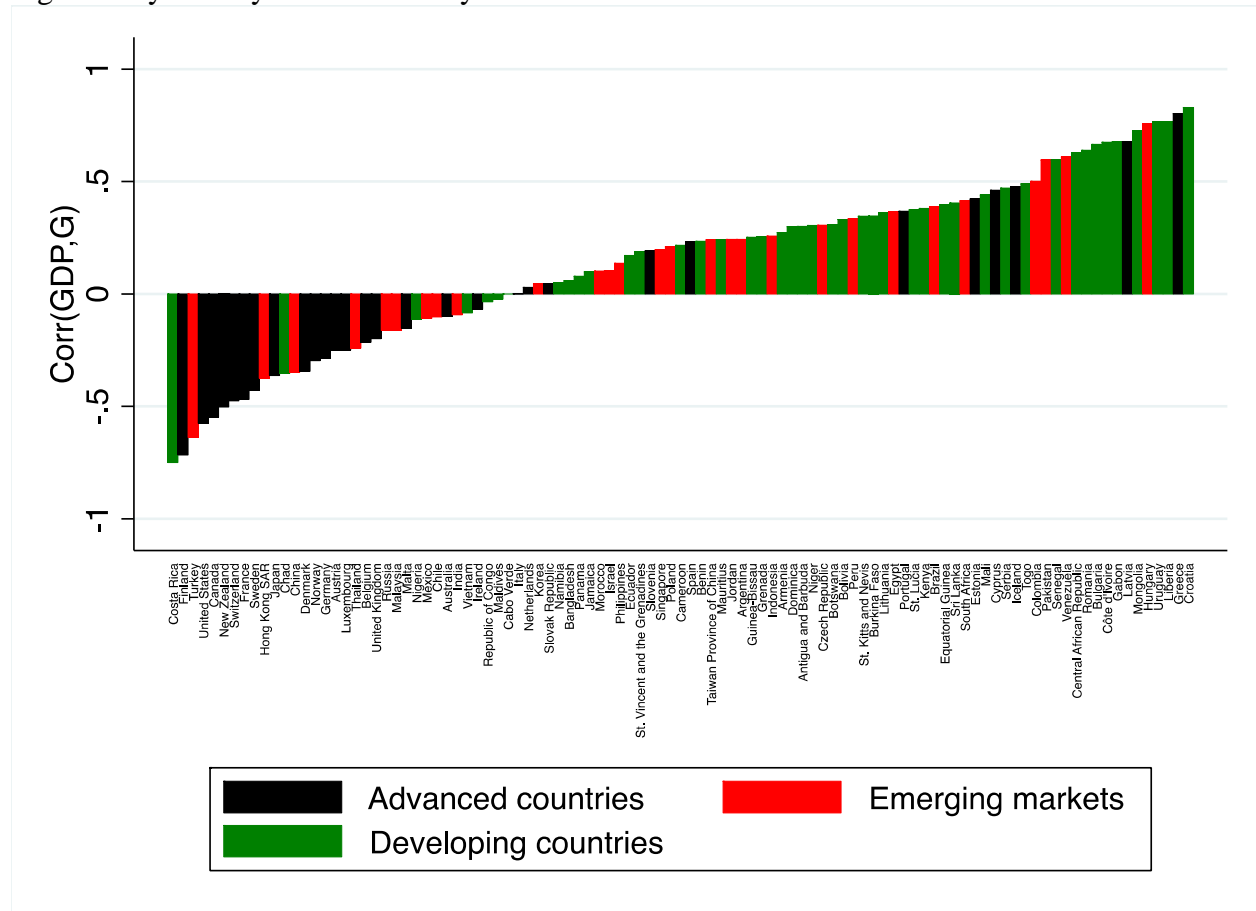
Note: Correlation between HP-filtered GDP and government expenditures 1985-2013.

Figure 4 Change in Cyclicality of Fiscal Policy: 2000-2013 vs. 1985-1999

Figure 5: Fiscal Cyclicality Comparison: 1985-99 and 2000-15
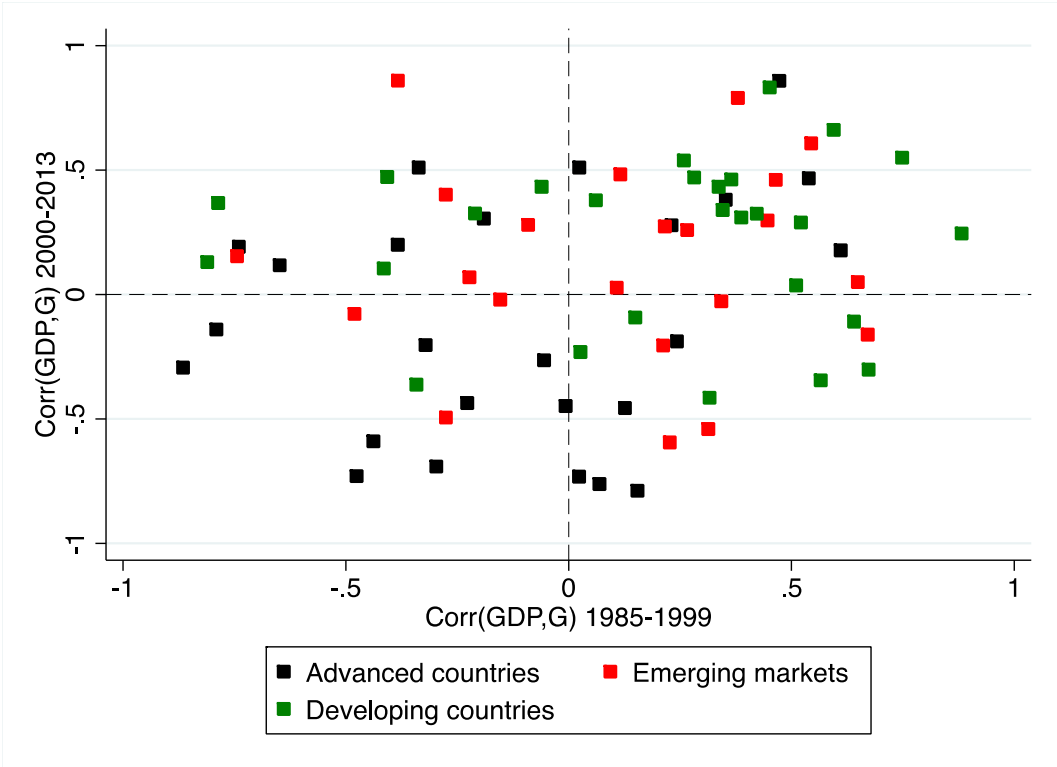
Figure 6: Emerging markets
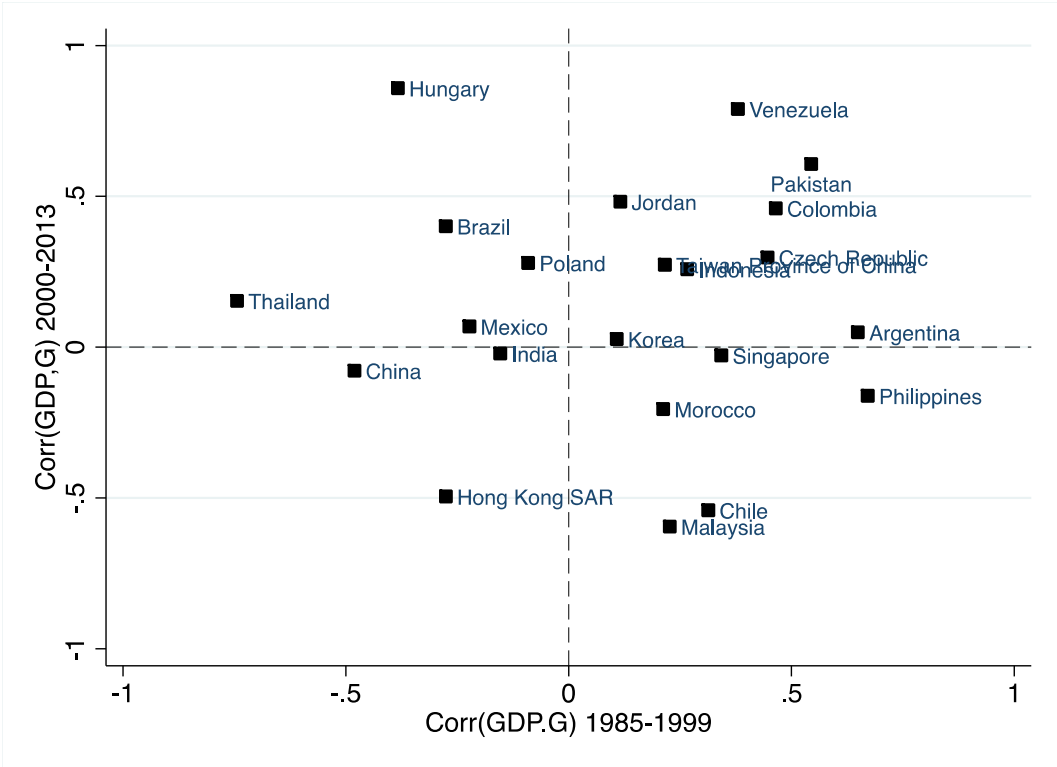
Figure 7: Trade-off between cyclicality of fiscal policy (corr(GDP,G)) and amplitude of business cycle 1985-2013.
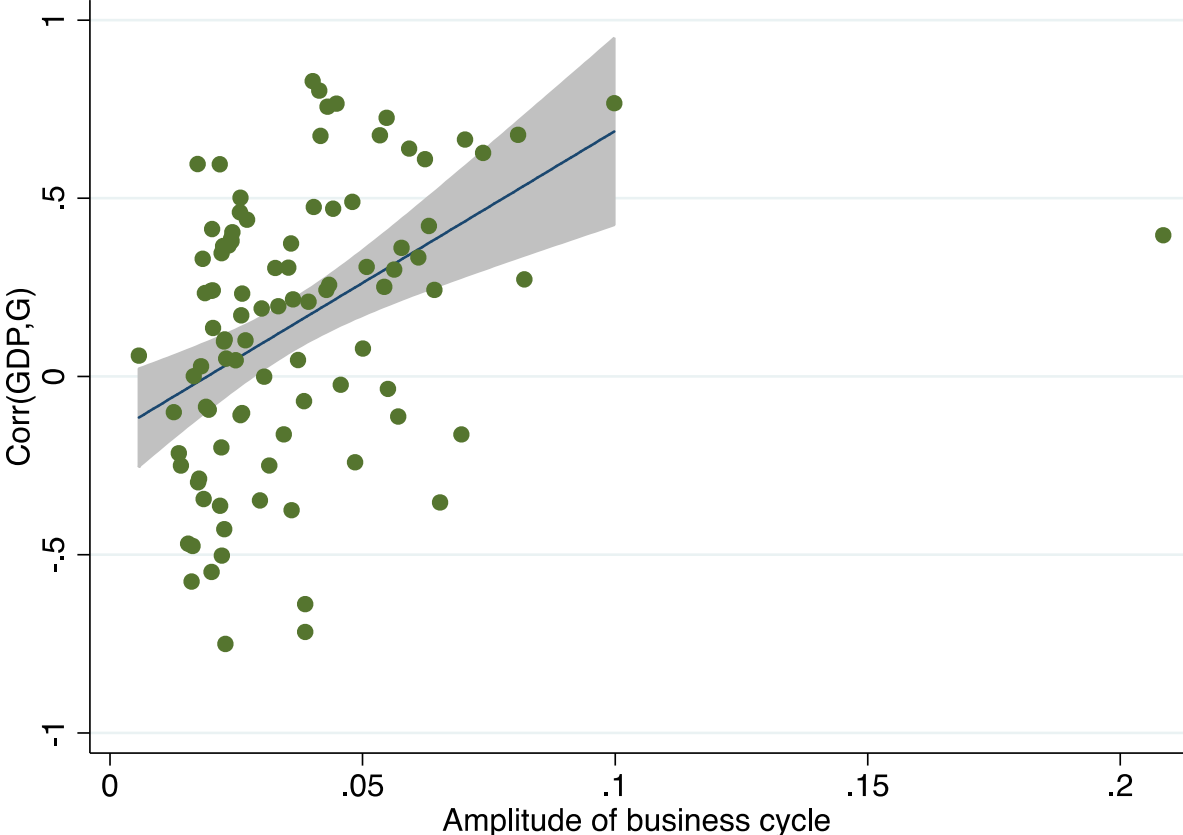
Note: Countries with amplitude exceeding 0.5 are excluded from the graph (Dominica, Grenada, Malta, St. Kitts and Nevis, St. Vincent and Grenadines). The regression line is computed using all observations in the graph but excluding Equatorial Guinea where the amplitude is above 0.2. Grey area is the 95% confidence interval. The slope coefficient is equal to 5.1 with standard error equal to 1.460 (t-ratio = 3.52).

Figure 8 Number of countries with national fiscal rules over the 1985-2013 period.
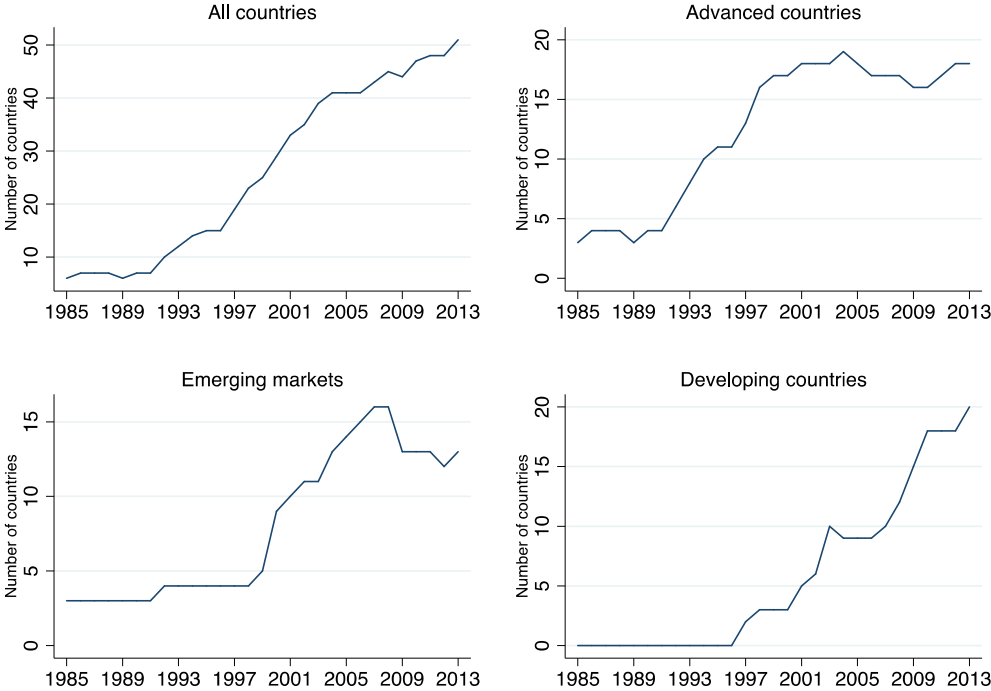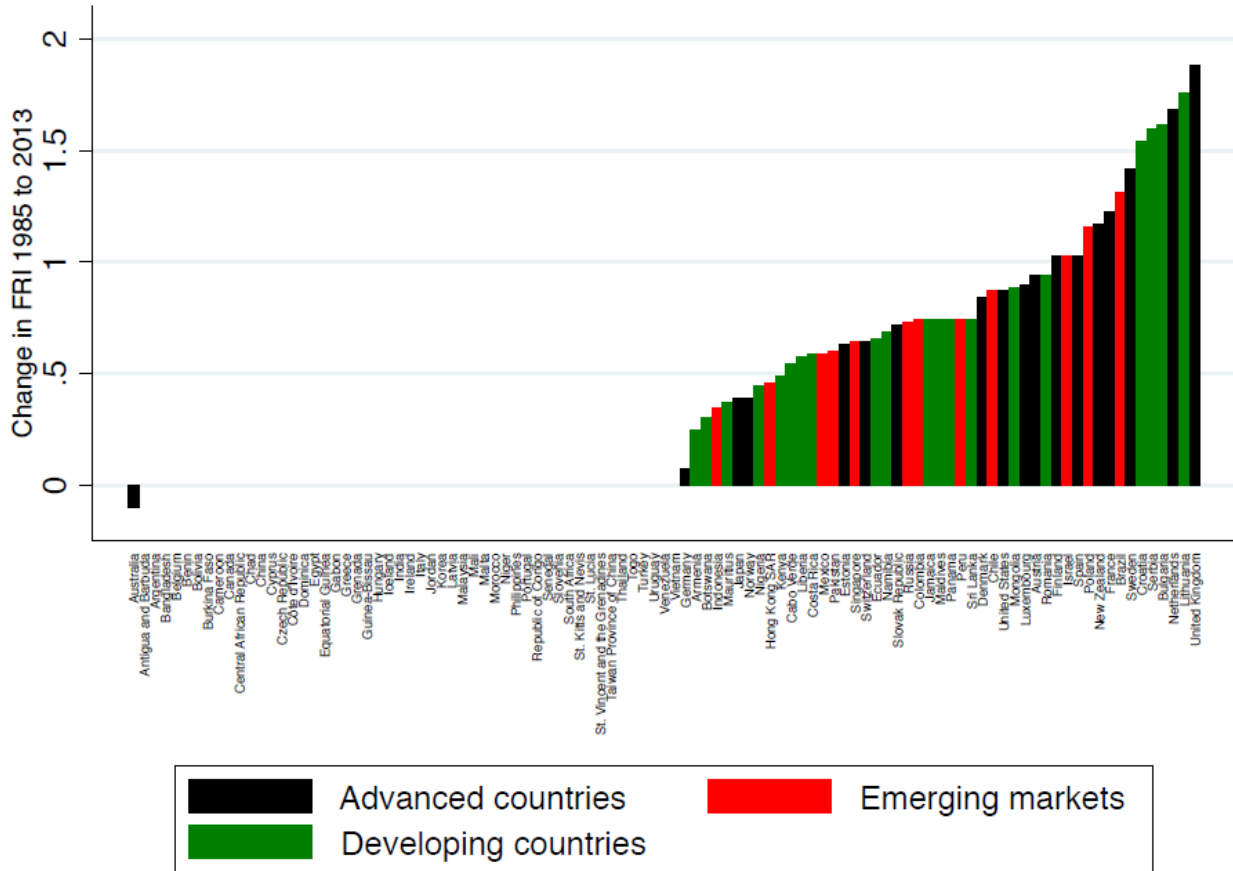
Figure 9: Change in fiscal rule strength 1985-2013

Note: The graph shows the change in national fiscal rule strength between 1985 and 2013. There is one country with constant national fiscal rules over the full sample (Malaysia) and six countries that had a fiscal rule during parts of the sample but had no rule in 1985 and 2013 (Belgium, Canada, Hungary, Iceland, India and Slovenia).

Figure 10 Fiscal Rules, Cyclical GDP and Cylical Government Expenditure in Selected Countries Emerging and Developing Economies
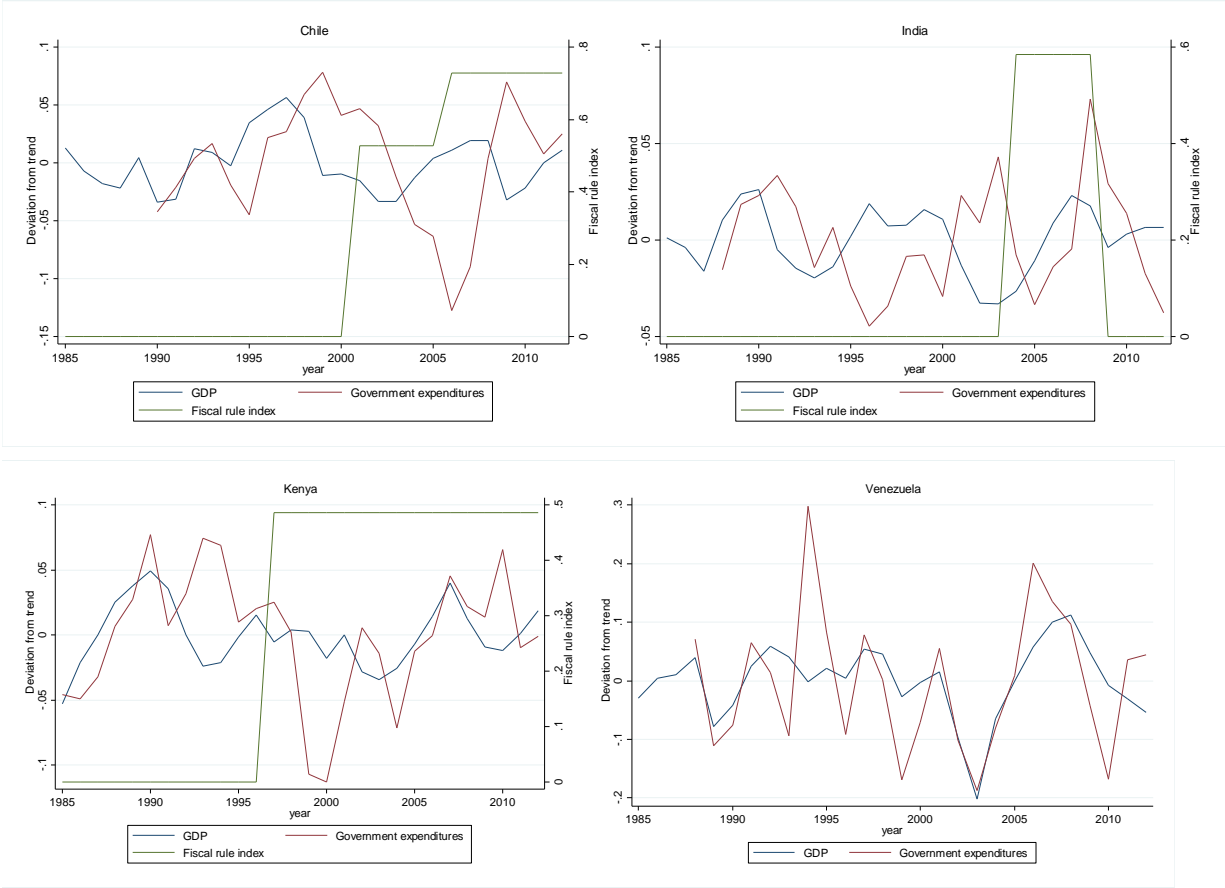
Figure 11 Average Fiscal Rules and Average Government Efficiency, 1985-2012.
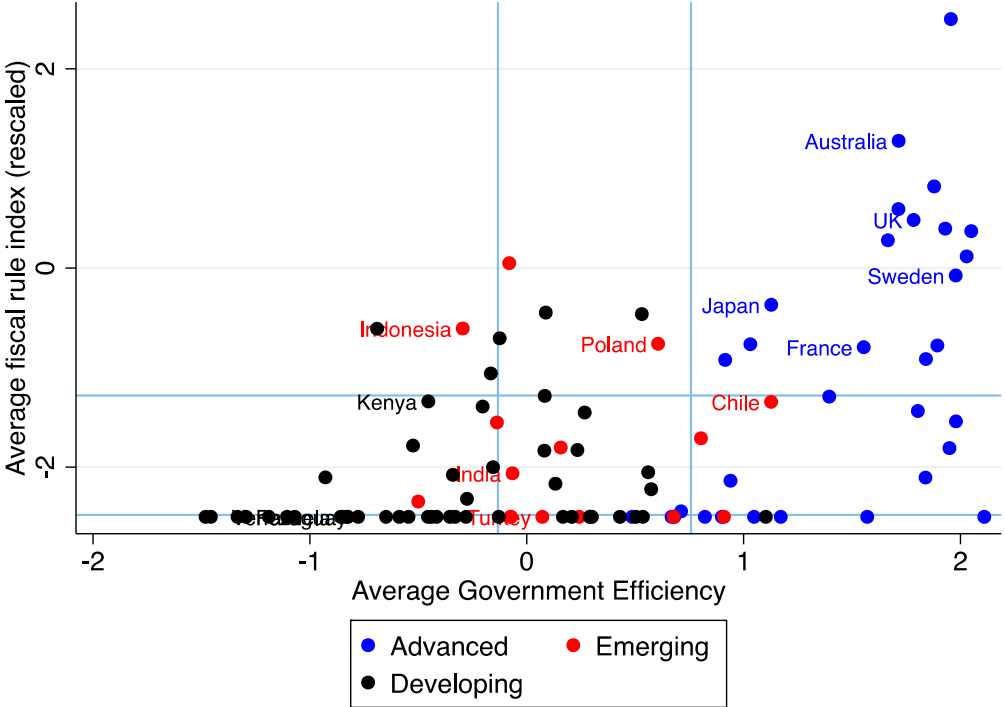
Note: Scatterplot with selected countries labeled. Vertical lines represent thresholds of low, medium and high government efficiency based on a decomposition of countries into three equally sized groups (quintiles) using average government efficiency over the period. Lower horizontal line represents zero, which is the minimum for fiscal rule index (no rules). The other horizontal line is at rule index level 0.29 and divides the number of countries into two equally sized groups (strong rules above line, and weak rules below line). (Average rule index for countries with strong rules is 0.56, and average rule index for countries with weak rules is 0.15.)

Appendix A1. Data Sources.

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

Appendix A2. Interpolation of World Bank Data on Government Efficiency.

The World Bank data on government efficiency is biannual from 1996 until 2002 and then the data is 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.[18] 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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[18] 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).

Appendix A3. The number of fiscal rules.

Figure A3.1 shows the number of fiscal rules (the upper part) and average strength of fiscal rules (the lower part) in our sample of countries. As is clear from these graphs, there is a clear tendency that the number of fiscal rules is increasing over time and that the strength of the rules also is increasing. Initially, only advanced countries implemented fiscal rules but from the mid 1990's both developing and emerging markets follow advanced countries and adopt new fiscal frameworks. These countries also improve their frameworks over time, which is clearly seen in the lower graphs.

Figure A3.1 Average number and strength of fiscal rules over the 1985-2012 period.