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WHY DO COUNTRIES HAVE FISCAL RULES? *

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Abstract

Reforms of fiscal institutions and fiscal rules are motivated by several objectives: strengthening fiscal solvency and sustainability, contributing to macroeconomic stabilization, and making fiscal policy more resilient to government corruption and private-sector lobby. These objectives are shared by most fiscal policy makers worldwide. So why do some countries adopt fiscal rules while others do not? This question boils down to identifying the conditions under which some countries decide to adopt fiscal rules and maintain them over time. In particular, which political and institutional conditions are behind the decision of policy makers to tie their own hands? Are fiscal rules more likely to be associated to particular monetary and exchange-rate regimes, or to deeper financial market development and more openness? Is it more likely for countries to keep fiscal rules in place when they exhibit stronger fiscal policy performance –or does the opposite hold true? Are richer countries more likely to adopt fiscal rules? These are the empirical questions addressed by this paper.

There are very few studies that identify institutional and economic variables explaining why countries adopt and maintain fiscal rules. This paper extends previous knowledge in two dimensions. First, the model used here is much broader in its specification, focusing on five categories of potential determinants for the choice of de jure fiscal rules, addressing the particular questions raised above. Second, the sample size is larger, comprising an annual-data panel sample of 94 countries (of which 35 have adopted fiscal rules) and spanning 34 years (1975-2008). The empirical estimation is performed using models selected after a detailed discussion of econometric issues relevant to this choice. The base-line results are subject to several robustness checks, presenting alternative results for different time samples, country samples, and categories of fiscal rules.

Keywords : fiscal rules, fiscal rule determinants, fiscal institutions, fiscal policy reform
JEL: E61, E62, E63

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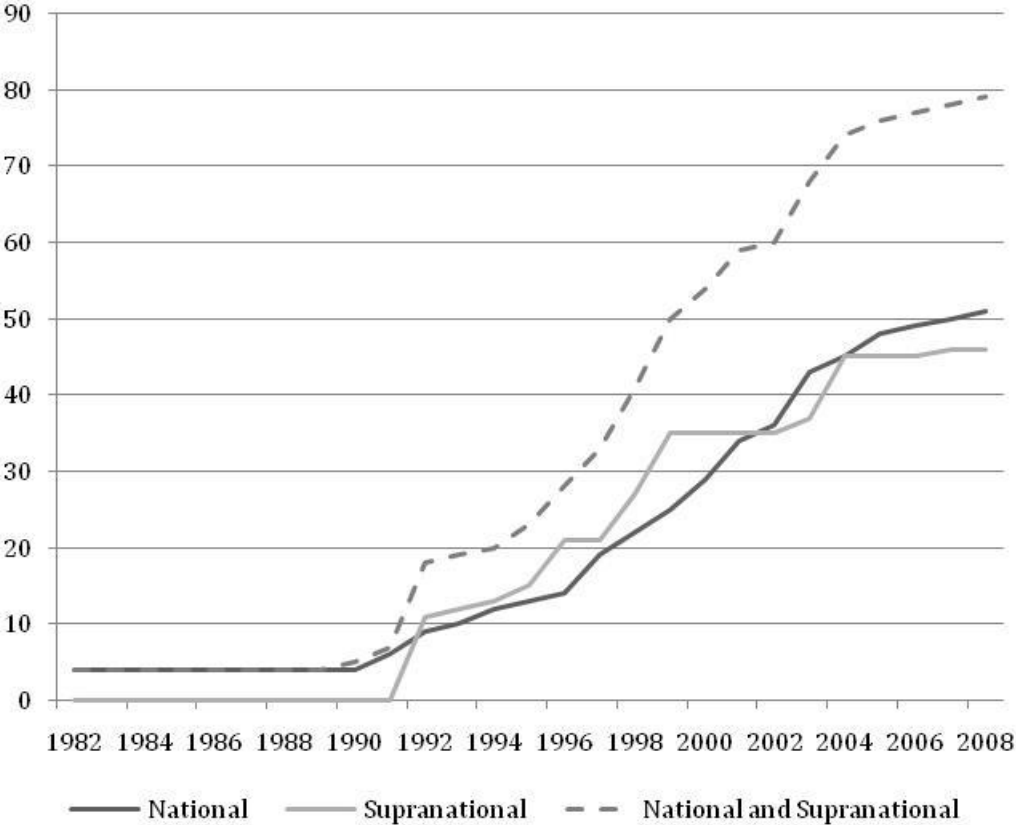
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While only four countries had national fiscal rules in place in 1982, many more have adopted rules since the 1990s, so that 51 nations had them in place in 2008 (figure 1). Another group of 46 countries had supranational rules in place in 2008 –most of them are European Union members.

Reforms of fiscal institutions and fiscal rules are motivated by objectives that are similar to those that inspired changes in monetary institutions and policies. In the case of fiscal rules, the explicit objectives that motivate their adoption comprise strengthening fiscal solvency and sustainability (i.e., attaining sustainable levels of government deficits and public debt), contributing to macroeconomic (or cyclical) stabilization (i.e., reducing fiscal policy pro-cyclicality or raising policy counter-cyclicality), and making fiscal policy design and execution more resilient to government corruption and private-sector lobbies (i.e., strengthening the political economy of fiscal policy decisions and budget management).

Figure 1: Number of Countries with Fiscal Rules, 1982-2008



Source: IMF (2009).

The latter objectives are shared by most fiscal policy makers worldwide. So why do some countries adopt fiscal rules while others do not? This question boils down to identifying the conditions under which some countries decide to adopt fiscal rules and maintain them over time. In

particular, which political and institutional conditions are behind the decision of policy makers to tie their own hands? Are fiscal rules more likely to be associated to particular monetary and exchange-rate regimes, or to deeper financial market development and more openness? Is it more likely for countries to keep fiscal rules in place when they exhibit stronger fiscal policy performance –or does the opposite hold true? Are richer countries more likely to adopt fiscal rules? These are the empirical questions addressed by this paper.

Fiscal rules are one major building block of frontier fiscal institutions and comprehensive fiscal reforms. Currently, many countries –industrial and emerging economies alike– are designing and implementing major reforms to their institutional framework for fiscal policy. The latter changes are motivated by different objectives. First, they reflect a growing global consensus among academics and policy makers about the economic benefits of procedures and rules that shape and limit planning and execution of fiscal policy. Second, they respond to the political benefits of more transparency and accountability in the exercise of fiscal policy in a democracy. Third, they respond to the failure of previous fiscal institutions and rules in many industrial countries, as was the case of systematic violation of European Stability and Growth Pact rules by many member countries of the euro zone.

A modern institutional framework for the conduct of fiscal policy and financial management should aim at addressing the principal-agent problems that arise between voters and political authorities due to government impatience, lack of representation of future generations, electoral competition, sensitivity to special-interest lobbies, corruption, and use of asymmetric and biased information (von Hagen, 2005; Wren-Lewis, 2010). To overcome these distortions and negative externalities, the academic literature and international experience suggest adopting an institutional framework for fiscal policy based on the following components: a fiscal responsibility law, modern financial management, a planning horizon that exceeds one year, rules for government asset and liability management, requirements on accountability and public information of the government's financial management, effective external control and auditing, establishment of a fiscal council and/or fiscal committees, and –last but certainly not least– a fiscal rule for the budget (Ter-Minassian, 2010; IMF, 2009; Schmidt-Hebbel, 2011).

With the adoption of independent and accountable central banks conducting rule-based monetary policy under conditions of increased transparency and accountability, reforms of fiscal institutions and adoption of fiscal rules came well after the revolution in monetary policy institutions that took place in the 1980s and 1990s. Reforms of central banks and their monetary policy frameworks were politically motivated by the 1970s Great Inflation and intellectually grounded in the rational expectations revolution in macroeconomics. This was reflected in theoretical work in support of independent central banking and the dominance of rules over discretion (Cukierman, 1992; Kydland and Prescott, 1977; Barro and Gordon, 1983). This radical change in central banking

was pursued to raise policy effectiveness, increase economic efficiency, and strengthen democratic accountability.

Subsequently, monetary policy decisions were modelled as monetary policy rules, starting with the seminal work by Taylor (1993) on the subsequently named Taylor rule. Subsequent analytical work has developed the theory for a forward-looking version of the Taylor rule, derived from optimizing central bank behavior (e.g., Svensson 1997, 2003). Recent empirical work has shown that the world's central bankers are both backward and forward-looking in setting monetary policy rates (Muñoz and Schmidt-Hebbel 2013).

Coming back to fiscal policy, fiscal rules differ widely across countries in how they are defined. Fiscal rules set targets, ceilings or floors for the government budget balance (on overall or primary balance, actual cyclically-adjusted balance, or multi-year balance “over the business cycle”); targets or ceilings for government debt levels; targets or ceilings for government expenditure levels (on aggregate, primary or current spending); and targets, ceilings or floors for government revenue. Target levels are set in absolute terms or as growth rates or ratios to GDP.

Different types of rules are related to different fiscal policy objectives. One category is deficit and debt ceilings that are mainly set to strengthen fiscal sustainability. A paramount example of these rules is the Stability and Growth Pact ceilings on government deficits (3% of GDP) and debt levels (60% of GDP) set in the 1990s for prospective euro zone member countries. Another category is comprised of fiscal rules that aim to strengthen both fiscal sustainability and counter-cyclical fiscal stabilization (or at least, avoid pro-cyclical policy bias). Including Chile, ten countries had such rules in place in 2008 (IMF, 2009), which sets a yearly cyclically-adjusted balance target. Among the 10 countries, Germany, the UK, and Sweden have a fiscal rule in place that defines a numerical target for the average budget balance over the economic cycle.

There is a rising body of descriptive and empirical country and cross-country studies on fiscal rules, their design and institutional issues, as well as the fiscal, macroeconomic, welfare, and growth effects of different fiscal rules (a few examples include Debrun and Kumar, 2007; IMF, 2009; Ter-Minassian, 2010; Anderson and Minarik, 2006; Deroose, Moulin and Wiertz, 2006; and Maliszewski 2009).

To the best of our knowledge, there are only two previous empirical studies identifying institutional and economic variables explaining why countries adopt and maintain fiscal rules. Calderón and Schmidt-Hebbel (2008a) estimate a model for the likelihood of having a fiscal rule in place, using an unbalanced panel dataset constructed by the authors (extending the database compiled by Kopits and Symanski, 1998 and others) on fiscal rules for 75 countries (of which 24 have fiscal rules) and spanning 1975-2005. Their results (based on pooled, fixed-effect, and random effect logit estimation, and pooled and fixed-effect probit estimation) show that a larger budget balance, lower population dependency ratio, lower expenditure pro-cyclicality, and more government stability

raise the likelihood of having a fiscal rule in place.

IMF (2009) presents panel data results for the likelihood of adopting a fiscal rule and for having a *de jure* fiscal regime in place based on a sample of 68 countries (of which two thirds have fiscal rules) and covering 1985-2008. Results obtained using an exponential hazard model that identifies the probability of switching to a rule in any given country and year indicate that the likelihood of adopting a rule is raised by a higher primary budget balance and a lower public debt ratio, and is also affected by various macroeconomic performance variables. Additional results, based on a conditional fixed-effects logit model that identifies the probability of having a fiscal rule in any given country and year, show that the likelihood of having a fiscal rule in place responds to the same variables that helped explain the adoption of the rule.

While its focus is on explaining the likelihood of having a fiscal rule in place, this chapter extends significantly the two previous studies. The model used here is much broader in its specification, focusing on five categories of potential determinants for the choice of *de jure* fiscal rules, addressing the particular questions raised by us above. Furthermore, our sample size is larger, comprising an annual-data panel sample of 94 countries (of which 35 have adopted fiscal rules) and spanning 34 years (1975-2008). Our empirical estimation is performed using a battery of models selected after a detailed discussion of econometric issues relevant to this choice. Finally, the base-line results are subject to several robustness checks, presenting alternative results for different time samples, country samples, and categories of fiscal rules (national and supra-national).

This chapter is structured in the following way. Section 2 presents a comprehensive set of potential determinants in the decision to adopt fiscal rules, providing broad theoretical arguments for the relevance of five categories of such correlates. Section 3 presents the data and descriptive statistics for the variables and empirical proxies of the potential determinants of fiscal rules. Section 4 reviews the state of non-linear panel data econometrics for discrete dependent variables in order to motivate the econometric models selected for this chapter's empirical work. Section 5 reports and discusses the estimation results. Section 6 concludes.

1. VARIABLE SELECTION AND MODEL SPECIFICATION

The data availability of fiscal rules is limited. The pioneering work of Kopits and Symansky (1998) has been updated and extended recently by the IMF (2009) to include 89 countries (21 advanced, 33 emerging, and 26 low-income economies) with national and/or supranational *de jure* fiscal rules in place in 2008, as depicted in figure 1. Using this information for this paper, we classify countries using a binary variable that takes a value of one if the country has any form of national fiscal rule in place, and zero otherwise.

This measure is arguably simple and certainly does not reflect the variety of fiscal rules or the degree of rule enforcement.¹ However, coding fiscal rules in this way is adequate to specify a behavioral model for a limited dependent variable defined as a binary random variable explained by a vector of potential determinants, making use of discrete-choice panel-data estimation methods.

There is no narrow theoretical framework that explains the choice of macroeconomic policy regimes. Hence, most empirical studies of the determinants of macroeconomic regime choice is based on a narrative about objectives pursued by policy makers, (pre-) conditions that facilitate adoption of a particular regime, consistency with regimes in other policy areas (e.g., inflation targeting and exchange rate floats), and/or structural features that require or facilitate adoption of a particular regime. This is the case of empirical studies of determinants of exchange-rate regimes (Levy-Yeyati and Sturzenegger, 2010; Calderón and Schmidt-Hebbel, 2008c), monetary policy regimes (Calderón and Schmidt-Hebbel, 2008c), and fiscal regimes based on fiscal rules (Calderón and Schmidt-Hebbel, 2008a; IMF, 2009).

This chapter follows the latter literature, extending the two previous studies on fiscal rules significantly. We identify five categories of potential determinants of choosing fiscal rules: political and institutional variables, fiscal policy conditions, monetary and exchange-rate regimes, financial market development measures, and the level of development. We select the most representative variables and measures available for the variables in each category. We match the sample of countries with fiscal rules to a larger control group of economies without fiscal rules.

1.1 Political and Institutional Variables

We identify four potential determinants of fiscal rules among political and institutional variables and then discuss their expected signs.

Fiscal rules are very likely to be the outcome of particular political regimes and institutions. By constraining fiscal policy makers in the design and execution of the budget, in a way that is relatively transparent and subject to open monitoring, fiscal rules reflect more transparency, stronger democratic accountability, less discretion, and less corruption. Therefore, our first political determinant is a standard measure of democracy.

At the constitutional level, the distinction between federal and unitary government is likely to make a difference in the adoption of fiscal rules. In federal countries, fiscal sovereignty of federal governments is weaker than that enjoyed by central governments in unitary countries. The vast

¹ Most fiscal rules do not specify escape clauses. Even those governments with *ex ante* defined escape clauses attached to their rules sometimes face situations where escape clauses do not apply but rules should be suspended –say, facing the deep 2008-2009 recession. However, with or without escape clauses, many governments have violated their fiscal rules and some of them –including several euro zone members– have incurred in recurrent, systematic violation of their national and supra-national fiscal rules. Hence, enforcement of *de jure* rules varies significantly across countries and over time. However, in the absence of data on enforcement of *de jure* rules (i.e., data on *de facto* rules), we limit our statistical analysis to *de jure* fiscal rules.

literature on fiscal federalism attests to the important differences in the conduct and outcome of fiscal policy between federal and unitary countries (e.g., Feld and Schnellenbach, 2010). We expect federal governments to be more likely to adopt fiscal rules than unitary governments because they strengthen their bargaining position with respect to the federated states or provinces.² For this reason, we include a binary dummy variable for federal governments.

There is evidence suggesting that rules reflect an implicit contract between governments and voters. In other words, they signal a government commitment to maintain mutually agreed standards of fiscal discipline (Debrun and Kumar, 2007). Therefore, we include a measure of political risk and checks and balances.

As political instability of governments makes it difficult to pre-commit to rules, fiscal rules are more likely to be adopted and continued over time under conditions of government stability.³ Hence we include a government stability measure as a potential regressor.

1. 2 Fiscal Policy Conditions

We identify three variables related to fiscal policy strength and conduct that may exert an influence on fiscal rule choice. First, we consider the population dependency ratio, i.e., the ratio of the population under 15 and over 64 years of age to those falling within 15 to 64 years of age. As the ratio rises, the demands for higher government spending on social programs in support of the young and the elderly (for child-care, education, pensions, and health) rise. This makes it more difficult for governments to commit to a fiscal rule, reducing the likelihood of putting one in place.

Next we include the government budget balance as a measure of overall fiscal policy strength. We expect that a higher budget balance raises the likelihood of adopting a rule-based fiscal regime as it is easier to adopt a disciplining device and stick to it when fiscal accounts are on a more sustainable footing (Debrun and Kumar, 2007). Intrinsically well-behaved governments adopt strict rules and institutions to reveal the nature of their unobservable preferences. However, in many papers on fiscal institutions and policy outcomes, the focus is on the reverse causality (from institutions to outcomes): because institutions are effective commitment devices, certain fiscal outcomes are observed. It thus remains an empirical issue to determine which causality prevails –an issue beyond the scope of this paper. In any case, we include the budget balance as a possible determinant of fiscal rule choice, noting its potential endogeneity.

The analytical and empirical literature provides several explanations for the existence of pro-cyclicality in government expenditures. First, restricted government access to credit markets,

² Federal states tend to complement adoption of fiscal rules at the federal (or national) level with adoption of sub-national rules at state or provincial levels (IMF, 2009).

³ This argument is analogous to the inclusion of government stability measures as determinants of counter-cyclical fiscal and monetary policies in international panel data studies (e.g., Calderón et al. 2012).

particularly during recessions, precludes borrowing to weather temporary shocks or recessions (Gavin and Perotti, 1997; Agénor and Aizenman, 2000; Kaminsky et al., 2004). Second, citizens in countries with corrupt governments demand less taxes and more government benefits in good times for fear that these rents will be appropriated by government officials (Alesina and Tabellini, 2005). Third, voracity effects arise from interest groups influencing government expenditure to raise their consumption more than output in response to favorable income shocks (Talvi and Vegh, 2004). Empirical evidence suggests that weaknesses in political institutions and financial underdevelopment are the main determinants of fiscal pro-cyclicality in the world (Calderón and Schmidt-Hebbel, 2008c; Iltzetzki and Végh, 2008). We expect governments prone to pro-cyclical government expenditure to be less willing to subject themselves to the discipline of a fiscal rule. Therefore, we include a measure of fiscal pro-cyclicality.

1.3 Monetary and Exchange-rate Regimes

Inflation targeting requires central banks to commit to a pre-announced, explicit target for inflation as well as developing a highly transparent set of rules for operating monetary instruments and providing information to the public. Moreover, there is significant theoretical and policy consensus that the absence of fiscal dominance is a pre-condition for the success of inflation targeting. In turn, fiscal dominance –the need to rely on central bank resources, ultimately seigniorage– is less likely when a government commits to a fiscal rule.

Minea and Villieu (2009) develop a theoretical model whereby inflation targeting provides an incentive for governments to improve institutional quality in order to enhance tax revenue performance.⁴ Testing of this model by Lucotte (2010), using propensity score matching, indicates that inflation targeting has a significant positive effect on public revenue collection in thirteen emerging economies.

Hence we include a discrete variable for countries where monetary policy is based on an inflation-targeting regime. We expect that an inflation-targeting regime raises the likelihood of having a fiscal rule in place.

While there is literature that links the choice of exchange rates to fiscal performance, it focuses on the impact of government deficits and public debt levels on the success of fixed, intermediate, and floating exchange rates. The conventional view (e.g., Giavazzi and Pagano, 1988; and Frenkel et al., 1991, among others) is that pegs provide more fiscal discipline than floats. If governments adopt a lax fiscal policy under a fixed exchange rate, it would lead to a speculative attack on reserves and, consequently, result in currency devaluation. Because the eventual collapse

⁴ The result requires monetary policy to be set in advance of fiscal effort to collect taxes. In our case, this requirement is empirically valid: no country in the sample initiated national fiscal rules prior to setting up inflation targeting.

of the peg would imply a large political cost for the policy maker, fixed regimes impose discipline on fiscal authorities.

However, political economy arguments provide the opposite rationale. Tornell and Velasco (2000) stress that, under reasonable conditions (linked to the uncertainty of government about its re-election and lack of access to capital markets), more fiscal discipline is attained under floats where fiscal mismanagement leads to devaluation and inflation in the short-term. Under pegs, unsustainable fiscal policy leads to higher debt and lower reserves in the short term, postponing the costs of devaluation and inflation into the future.

Hence, we include as a second policy regime measure, a binary variable for a fixed exchange-rate regime. Considering the arguments of the preceding literature, its effect on the likelihood of having a fiscal rule in place is ambiguous.

1.4 Financial Development

Financial development could have a positive influence on the likelihood of having fiscal rules in place through two channels. First, both domestic financial development and stronger integration into world capital markets raise government access to domestic and external debt financing and subject governments to closer scrutiny of fiscal sustainability by financial market analysts and rating agencies. This strengthens the case for adopting fiscal rules that commit governments to fiscal prudence and solvency. Second, if domestic financial markets are deeper, and integration into world capital markets is full and comprehensive, governments will be more likely to access domestic or external funding during cyclical downturns. This reinforces government adoption of fiscal rules that minimize fiscal pro-cyclicality or strengthen fiscal counter-cyclicality.

Therefore, we include one variable that reflects domestic financial development and another variable that measures international financial integration or openness as potential determinants of having fiscal rules in place.

1.5 Overall Development Level

Finally, we use per-capita real GDP for controlling the overall level of development. Some studies focus on the reverse causality, i.e., on the impact of fiscal rules on economic growth (e.g. Castro, 2011). Here we focus on the reverse causality from the level of development to the likelihood of having a fiscal rule in place. This hypothesis embodies the stylized fact that governments in richer economies have more human and financial resources available to undertake the complex task of adopting, complying with, monitoring, and evaluating the operation of a fiscal rule.

2. DATA AND DESCRIPTIVE STATISTICS

Next we describe the empirical measures chosen for our dependent variable and the ten variables selected as potential determinants. We also present summary information on the variables, their distributions, and correlations in graphical and tabular form. In the appendix, table A.1 provides more detail on data definitions and sources. Table A.2 contains our country list, reporting adoption of fiscal rules and inflation targeting, and identifying countries with federal systems.

Our dependent variable is the binary measure for a *de jure* fiscal rule that includes 89 countries and covers the period from 1975 to 2008, compiled by the IMF (2009). We code national and supranational rules separately. Most of our empirical analysis is conducted only for national rules; however, we use national and supranational rules for our sensitivity analysis.

Our first political and institutional variable is a measure of democracy: the Democracy and Polity2 indices of the Polity IV project. Then we include a binary dummy variable for federal governments (1 for federal governments, 0 otherwise). In this paper we use a *de jure* definition of a country as federal or unitary. In most cases *de jure* government classification of fiscal structure matches *de facto* classification. However, in a few cases, like Spain, the country is *de jure* unitary, but one could argue that its fiscal structure is so decentralized that it resembles a *de facto* federal structure.

As a measure of political checks and balances, we use the Political Constraint Index (POLCON-V), originally developed by Henisz (2000) and later refined and extended by Henisz and Zelner (2010). It is a quantitative measure of the institutional constraints faced by authorities, reflecting the extent to which a political actor or the replacement of any one actor (e.g., the executive or a chamber of the legislature) is constrained in his or her choice of future policies.⁵

As a measure of government stability we use the corresponding International Country Risk Guide (ICRG) Index.

Now let's turn to fiscal policy conditions. We use the complement of the young and old population dependency ratios, i.e., the share of the population between 15 and 64 years of age. For the budget balance we use the general government balance on a cash basis as a ratio to GDP. Our third fiscal variable is a measure of government pro-cyclicality. Here, most of the literature on cyclical behavior of fiscal policy has focused on cross-section models for which time correlations in preceding periods can be used for measuring the degree of government spending pro-cyclicality. For our panel-data model, we need a time-varying instrument. We compute a rolling-window correlation

⁵ An alternative index developed by the World Bank (CHECKS) counts the number of veto players in a political system, adjusting for whether these veto players are independent of each other as determined by the level of electoral competitiveness in a system, their respective party affiliations, and electoral rules (Beck et al., 2001). The pairwise correlation between CHECKS and the Political Constraint Index is 68%.

between detrended data on government consumption and GDP. Data were detrended using the Hodrick-Prescott filter with the optimal smoothing parameter suggested by Ravn and Uhlig (2002). The pro-cyclicality measure is subsequently computed as a rolling correlation of five-year periods.

For monetary and exchange-rate regimes, we use one binary variable for countries under an inflation-targeting regime and another for countries under a fixed exchange-rate regime. Regarding the classification of countries according to their adherence to inflation targeting, there is no difference between *de facto* and *de jure* regimes, and little disagreement among different sources on the starting date of inflation targeting. This is in contrast to classification of exchange-rate regimes, which are either *de facto* or *de jure*. Following the recent literature, we use the *de facto* classification (see Levy-Yeyati et al., 2010). Our binary variable is for super fixed exchange-rate regimes (encompassing monetary union, dollarization, and currency boards) with a value of one, and other regimes (conventional pegs, intermediate, and floating exchange rates) with a value of zero. Because our focus is on institutions, we only consider dollarization, currency boards, and monetary unions as (super) fixed exchange-rate systems. To account for (unlikely) mutual causation between these extreme hard pegs and fiscal rules, we use lagged values in the regressions.

Our first financial-market development variable is domestic financial development, for which we use a standard measure: the outstanding stock of domestic bank credit to the private sector as a ratio to GDP. The second dimension is international financial integration or openness, for which we use the measure developed by Chinn and Ito (2008). Choosing between ex-post measures of financial integration (such as foreign asset ratios to GDP) and Chinn and Ito's ex-ante policy measures, we prefer the latter for reasons of consistency with other policy measures included among regressors.

Finally, we follow the standard measure of overall development, which is real per-capita GDP at market prices.

Potential endogeneity of our independent variables to have a fiscal rule in place is not a significant concern because countries either adopt a rule at one point in time and keep it for the remaining sample period or do not adopt a fiscal rule at all. However, in order to address possible residual endogeneity in some way, we use lagged values for several variables that may be affected by the contemporaneous choice of a fiscal rule, namely, for dependency ratio, government balance as ratio to GDP, fixed exchange-rate regime, capital account openness, and GDP per capita.

Table 1 summarizes descriptive statistics for all dependent and independent variables, for unbalanced panels covering annual data for a maximum of 89 countries and 34 years over 1975-2008. While the number of available observations for all variables is around 3,000, there are missing data for some countries and years (in particular the 1970s) so that actual sample sizes used in the econometric analysis vary around 2,200 observations. The sample mean for fiscal rules reflects that 15.8% of the sample corresponds to country-year observations of fiscal rules. Likewise, inflation targeting and super fixed-exchange rate regimes correspond to 9% and 24.2% of the country-year

observations, respectively. The coefficient of variation of each variable indicates that heterogeneity is notorious among several control variables, including those representing political aspects (democracy and federalism) and fiscal policies (government budget balances and pro-cyclicality of government expenditures).

Table 1: Descriptive Statistics, varying panel sample, up to 89 countries, 1975-2008

	Observations	Mean	Standard Deviation	Coefficient of Variation	Range
Fiscal Rule	3,026	0.158	0.365	2.306	[0,1]
Democracy	2,871	2.690	7.382	2.744	[-10,10]
Federalism	3,026	0.169	0.374	2.221	[0,1]
Checks and Balances	2,855	0.451	0.328	0.727	[0,0.9]
Government Stability	2,798	7.344	2.125	0.289	[1,11]
Dependency Ratio	2,937	-0.413	0.277	-0.671	[0.34, 1.13]
Govern. Budget Balance	2,434	-0.058	0.412	-7.089	[-13.4,0.23]
Gov. Exp. Procyclicality	2,840	0.168	0.554	3.293	[-0.99,0.99]
Inflation Targeting	3,026	0.090	0.286	3.189	[0,1]
Fixed Exchange Rate	2,781	0.242	0.428	1.772	[0,1]
Financial Development	2,810	3.562	0.877	0.246	[-0.38, 5.55]
Capital Acc. Openness	2,823	0.272	1.586	5.836	[-1.84, 2.48]
Per capita GDP	2,807	7.897	1.543	0.195	[4.81, 10.65]

Table 2 presents a matrix with simple correlations between all variables. In general, variables tend to display very low correlation, in particular, when comparing political and economic fundamentals. Among political variables, we only see a relatively high correlation between democracy and political checks and balances –which to some extent is expected– but neither variable is highly associated with having federal or stable governments. Among economic variables, there is very little correlation among fiscal variables (dependency ratio, fiscal balances and the pro-cyclicality of government expenditures). Positive –yet unsurprising– correlations are observed between the degree of development (measured by per capita GDP) and the two variables representing financial development and integration to international capital markets. Per capita GDP is also positively correlated with checks and balances.

Table 2: Pairwise Correlations of Independent Variables, up to 89 countries, 1975-2008

	Checks and Balances	Democracy	Federalism	Government Stability	Dependency Ratio	Government Budget	Procyclicality Gov. Expend	Inflation Target	Fixed Exchange	Capital Acc. Openness	Financial Development	GDP per capita
Checks and Balances	1.000											
Democracy	0.613	1.000										
Federalism	0.230	0.176	1.000									
Government Stability	0.400	0.214	0.073	1.000								
Dependency Ratio	-0.632	-0.467	-0.148	-0.399	1.000							
Government Balance	-0.011	-0.031	0.022	0.052	0.041	1.000						
Procyclicality Gov. Expend.	-0.142	-0.059	-0.025	-0.126	0.174	0.001	1.000					
Inflation Target	0.257	0.185	0.064	0.133	-0.324	-0.129	-0.073	1.000				
Fixed-Exchange	-0.166	-0.156	-0.069	0.001	0.166	0.029	-0.008	-0.175	1.000			
Capital Acc. Openness	0.440	0.304	0.114	0.316	-0.518	-0.012	-0.170	0.216	0.064	1.000		
Financial Development	0.469	0.196	0.198	0.273	-0.647	0.016	-0.015	0.260	-0.015	0.480	1.000	
GDP per capita	0.621	0.440	0.218	0.336	-0.786	0.006	-0.121	0.273	-0.121	0.555	0.712	1.000

Note: numbers in bold indicate that correlations are significant at 5%.

3. ESTIMATORS AND ECONOMETRIC ISSUES

The econometric literature on panel data models has progressed substantially in the last half-century. The properties of parametric estimators in linear models are well understood, at least for the popular cases of the fixed-effects, random-effects, and mixed (or two-way) estimators. Their performance under different conditions (sample size, endogeneity, misspecification, error correlation, sampling, etc.) has been widely explored from both analytical and empirical viewpoints (Wooldridge, 1995).

The conventional practice indicates that in static linear models, fixed-effects estimators are preferred to random-effects estimators when the effects are correlated with other regressors. However, the random-effects estimator is more parsimonious, requiring only one additional parameter to be estimated (namely, the variance of the distribution of random effects) and is therefore preferred in the absence of correlation between effects and control variables.⁶

The properties of estimators in non-linear panel data models, in particular for discrete variables, are less developed and therefore substantial issues remain unsolved (Greene, 2009). The

⁶ Time dependency in disturbances can only be modeled using the random-effects estimator; fixed-effects estimators are biased (Nickell, 1981). Fully dynamic models taking into account complex dynamic patterns require estimation using instrumental variable procedures to account for the endogeneity of predetermined variables.

current consensus view about the choice of fixed versus random effects in linear models does not carry over to non-linear models. In the general case of the fixed-effects estimator for discrete data models, the incidental parameter problem (Neyman and Scott, 1948) leads to estimator bias when the time dimension T is fixed, even when the cross-section dimension tends to infinity ($N \rightarrow \infty$). In simple terms, the estimator for the included control variables depends on the estimator of the fixed effects, and the latter is only consistent when $T \rightarrow \infty$.⁷

Consider the log likelihood for a sample of size (N, T) of the general fixed-effects model:

$$(1) \quad \log L = \sum_{i=1}^N \sum_{t=1}^T \log g(y_{it}, \beta x_{it} + \alpha_i, \theta)$$

where y is the variable of interest, x is a set of exogenous control variables, α_i is the individual effect, β is the vector of slope coefficients, and θ is an ancillary parameter (e.g., scale parameter or dispersion of disturbances).

Maximization of equation (1) to obtain the maximum likelihood (ML) estimator is complicated by the first-order conditions conforming to a set of non-linear equations, so estimates are obtained by numerical approximation.

The incidental parameter problem arises from the fact that, in general, the estimator of the parameters of interest (say, $\hat{\beta}_{it}$) will depend on the estimator of the individual effects ($\hat{\alpha}_i$). Assume that β and θ are known. Then the estimator of α_i would use the T_i observations for each individual. Only when T converges to ∞ , does the estimator of $\hat{\alpha}_i$ converge to the population parameter and allow the estimators $\hat{\beta}_{it}$ to also converge. However, for fixed T , the latter will be generally biased. The size of the bias diminishes relatively rapidly in T . Heckman (1981) suggests that biases are negligible for $N=100$ and $T=8$.

However, for the particular case when y is a binary variable and the cumulative distribution function of $g(\cdot)$ in equation (1) is the logistic distribution, the incidental parameter can be avoided altogether if one focuses on the conditional logit estimator. As noted in Greene (2001), in any group where the sample of the dependent variable is comprised of either all 1's or all 0's, there is no ML estimator for α_i –the likelihood equation for $\log L_i$ has no solution if there is no within-group variation in y_{it} . However, conditional upon observing such variation, the ML estimator can be obtained by focusing on the distance between control variables before and after such variation, the fixed effects cancelling out as they do in the linear model. Note, however, that this procedure eliminates a potentially large number of observations. The conditional estimator is consistent, so it bypasses the incidental parameter problem. However, it does have a major shortcoming as it

⁷ Linear models avoid this problem by virtue of the Frisch-Waugh theorem (which separates estimation of the parameters of interest from estimation of the fixed effects) and recover the individual effects using the individual mean, which is a sufficient statistic for the effect.

precludes computation of the partial effects or estimates of the probabilities for the outcomes by avoiding the estimation of the fixed effects. After all, there is no way to tell if an individual has any value of α_i if he does not change his behavior. Therefore, this approach limits the analyst to infer only about β .⁸

The fixed-effects probit model, on the other hand, has not been widely used because ML estimators are biased and difficult to implement computationally. As noted by Maddala (1987), the conditional ML method does not produce computational simplifications as those arising in the logit model because the fixed effects do not cancel out. This implies that all N fixed effects must be estimated as part of the estimation procedure. This also implies that, since the estimates of the fixed effects are inconsistent for small T , the fixed-effects probit model yields inconsistent estimates for β as well. Greene (2001) disputes the computation intractability of the probit fixed-effect model, however he acknowledges the inconsistency of the estimator.⁹

Thus, in applying the fixed-effects estimator to panel-data models with discrete dependent variables, the conditional logit model seems to be the preferred choice. Nevertheless, one should bear in mind that the conditional logit estimator requires strict exogeneity of the regressors and stationarity over time (it cannot, at least in principle, accommodate heteroskedasticity over time in the latent model).¹⁰ As these conditions are frequently violated in economic data, the random-effects estimator is an attractive alternative. The probit model is computationally tractable for panel data, while the logit model is not.¹¹

For the random-effects estimator, equation (1) is modified to acknowledge the fact that individual effects (μ_i) come from realizations of a density function $f(\mu_i)$. The model is specified then as $f(y_{it}, \mu_i | x_{it}, \beta, \theta)$. One can safely assume that in static models, conditional on μ_i , the T_i observations in each group are independent. This allows us to write the joint distribution of the y_{it} observations and the μ_i individual effects as:

$$(2) \quad f(y_{it}, \mu_i | x_{it}, \beta, \theta) = f(y_{it} | x_{it}, \mu_i, \beta, \theta) f(\mu_i) = \prod_1^{T_i} g(y_{it}, \beta x_{it}, \mu_i, \theta) h(\mu_i | \theta)$$

In order to form the likelihood function for the observed data, μ_i must be integrated out. The assumption that the individual effects follow a normal distribution –the essence of the probit model– allows for the tractability that is missing in the logit case. The log likelihood function becomes:

⁸ There is an extensive literature on semi-parametric and GMM approaches for some panel data models with latent heterogeneity (Honoré, 2002). Among the practical limitations of these estimators is that, although they provide estimators of the primary slope parameters, they usually do not provide estimators for the full set of model parameters and, thus, preclude computation of marginal effects, probabilities or predictions for the dependent variable.

⁹ The estimator is biased upward, but the bias declines relatively fast. For a sample of 20 observations and, in the case of a single scalar regressor, the fixed-effects probit estimator is biased upward by around 4% ($\pi/80$).

¹⁰ The conditional ML estimator for the logit model is inconsistent if the conditional independence assumption fails (Kwak and Wooldridge, 2009).

¹¹ According to Wooldridge (2009), some headway has been made in obtaining bias-corrected versions of fixed-effects estimators for non-linear models, but these new methods have several practical shortcomings.

$$(3) \quad \log L = \sum_{i=1}^N \log \left[\int_{\mu} \Pi_1^{T_i} g(y_{it}, \beta x_{it}, \mu_i, \theta) h(\mu_i | \theta) d\mu_i \right]$$

Several methods are available to maximize the probit likelihood function (Hermite quadrature, exact integration, and simulated maximum likelihood). These methods are useful but they are also computationally cumbersome. Quadrature only operates effectively when the dimension of the integral is small, as in our case.

In general, the probit model imposes the restriction that the correlation between successive error terms for the same individual is a constant (defined in the literature as the “equicorrelation” model). The only limitation of probit models is that they require normal distributions for all unobserved components, a feature that may characterize most unobserved, random components but that is notoriously absent in cases where variables are truncated (e.g., incomes or prices must be positive).

In summary, the econometric literature on limited dependent variables in non-linear panel data models has not yet reached the point where researchers can confidently identify the strengths and weaknesses of the different estimators. In general, random-effects probit models and conditional fixed-effects logit models tend to be preferred to other estimators when, as in our case, both N and T are relatively large.

The analysis undertaken below is econometrically rigorous. However, it is subject to limitations. In particular, because economic theory cannot guide the econometric specification, there is a possibility that omitted variables may exert a joint influence on the decision to implement fiscal rules and build institutions, suggesting a spurious causal linkage. In such case, institutions would just be proxies for those omitted determinants of fiscal rules.

4. ECONOMETRIC RESULTS

Following the conceptual framework regarding the choice of a fiscal regime (the likelihood of having a fiscal regime in place) and the detailed discussion of the corresponding econometric issues, we now turn to our estimation results.

4.1 Base-line Results

Our econometric results are reported in tables 3 to 6. The results lend strong support to the conceptual framework discussed above. We focus first on full-sample regressions in table 3. Our unbalanced panel comprises the full 1975-2008 sample period and up to 89 countries, as long as data is available. Of course, sample size differs considerably across the two models (at most 941 country-year observations for fixed-effect estimations, compared to more than 2,250 for random-effect estimations). The treatment group (comprised of up to 37 countries) is the same under fixed and random effects –it includes all country-year observations of countries with a fiscal regime since their starting dates. In fixed-effects conditional logit models, the full sample is reduced to 34 countries because three countries have had fiscal rules through the full sample period and the conditional estimator only uses information from countries that switch regimes. In contrast, in random-effects models, the treatment group includes the 37 countries with fiscal rules, and the 52 non-fiscal regime countries. Therefore we should be mindful of the large differences in overall sample size when contrasting the results of the two models.

The results in table 3 provide strong evidence in support of our priors. Moreover, the evidence is generally robust across fixed-effects and random-effects estimations, notwithstanding their large sample differences. However, since this model only accounts for the country years close to the regime change (such as the switch from fixed to flexible exchange-rate regimes or from closed to open capital accounts), the results of the conditional fixed-effects logit model are less robust for the capital account openness and the fixed exchange-rate regime variables. Moreover, due to the smaller sample size under fixed effects, multicollinearity appears to be affecting some variables, such as financial development pro-cyclicality of government expenditure and GDP per capita.

We now turn to discuss the results by variable categories. Institutional and political variables (democracy, federalism, checks and balances, and government stability) are robustly significant for most regressions under the two models.¹² As expected, having fiscal rules is likely to be associated with democratic regimes, federal governments, strong political checks and balances, and stable governments. While democracy is an important determinant of fiscal rules, checks and balances tend to have an independent and even stronger effect. This is important because democracy, which mainly measures the competitiveness of the political process, may not necessarily promote strong checks and balances. In fact, Figure 2 suggests that democracy and checks and balances are far from perfectly correlated across countries.

Second, among all categories of determinants, fiscal conditions are the most obvious correlates of fiscal rules. In fact, they are found to be empirically significant in the decision of having fiscal rules in place. Countries with high shares of young and old people are less likely to opt for a

¹² However, the time-invariant federal dummy is from the fixed-effects model. Also, in the random-effects model, government stability turns out to only be significant when removing the financial development variable.

fiscal rule, reflecting large (and typically rising) government liabilities due to government spending programs on the young and the old. Countries running fiscal surpluses are more likely to adopt fiscal rules, according to random-effects models. However, government spending pro-cyclicality was found to be significant only in the conditional fixed-effects models. Although the theoretical case for inclusion of spending pro-cyclicality appears to be compelling, it does not seem to have a significant influence on fiscal rules.

Table 3: Base-line Results for National Fiscal Rules, Panel Estimations, 1975-2008

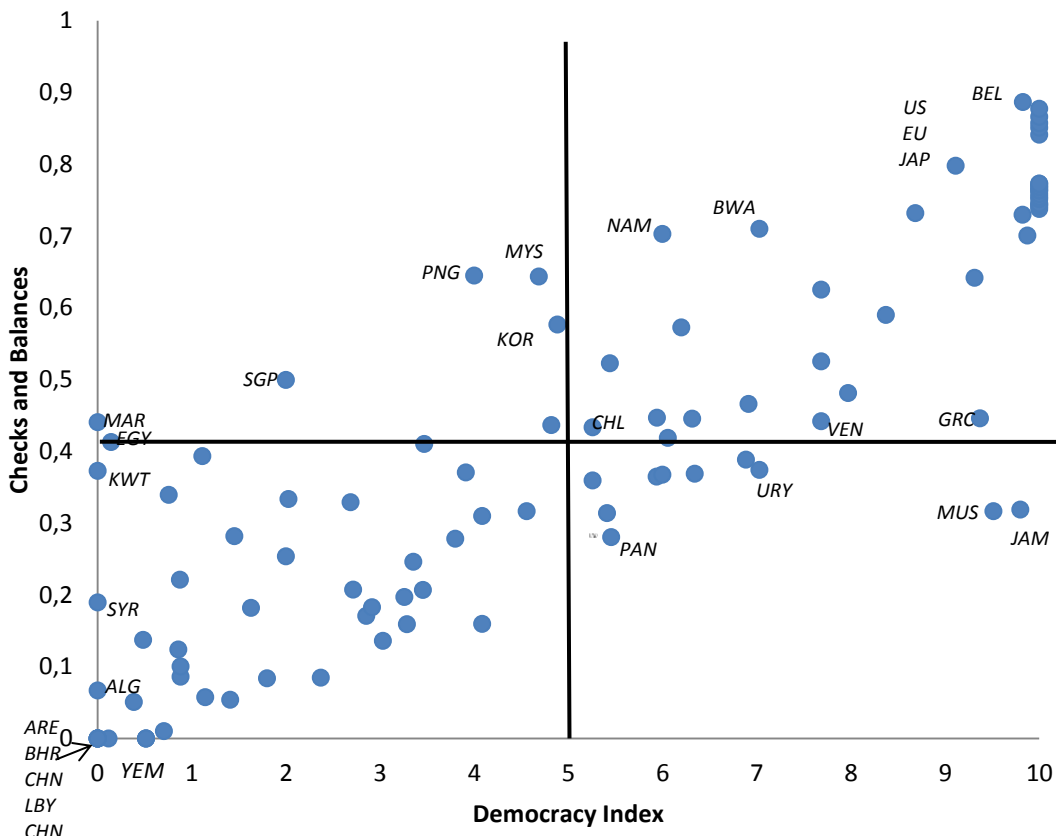
	Random Effects Probit			Conditional Fixed Effects Logit		
	(1)	(2)	(3)	(4)	(5)	(6)
Checks and Balances	4.04*** (0.81)	4.07*** (1.10)	3.29*** (0.91)	10.24** (5.89)	8.88** (4.10)	7.84** (4.02)
Democracy	0.24*** (0.05)	0.14** (0.06)	0.24*** (0.06)	0.94*** (0.34)	0.78*** (0.30)	0.75*** (0.30)
Federalism	5.09*** (0.61)	1.98** (1.11)	3.41*** (0.67)	-	-	-
Government Stability	0.15*** (0.06)	0.16*** (0.06)	0.19*** (0.05)	-0.04 (0.20)	0.08 (0.18)	0.05 (0.18)
Dependency Ratio	-19.55*** (1.55)	-26.49*** (2.71)	-19.15*** (2.15)	-151.76*** (32.32)	-138.31*** (28.06)	-133.9*** (26.22)
Government Budget	3.84*** (0.84)	3.02 (2.62)	3.60** (1.11)	-0.14 (1.57)	-0.09 (1.38)	-0.10 (1.33)
Procyclicality of Gov. Expenditures	0.10 (0.16)	0.14 (0.16)	-	-1.43*** (0.68)	-0.94* (0.57)	-
Fixed Exchange Rate	2.15*** (0.35)	1.85*** (0.41)	2.09*** (0.35)	-0.46 (1.30)	0.44 (1.23)	0.71 (1.30)
Inflation Target	1.87*** (0.31)	1.90*** (0.35)	1.82*** (0.29)	5.33*** (1.35)	3.95*** (1.06)	3.94*** (1.04)
Capital Account Openness	0.59*** (0.14)	0.46*** (0.17)	0.56*** (0.14)	0.44 (0.66)	0.88 (0.58)	0.94* (0.53)
Financial Development	0.03 (0.26)	-	-	-5.50*** (1.67)	-	-
GDP per capita	2.96*** (0.40)	7.02*** (0.36)	2.54*** (0.37)	66.92*** (11.43)	48.28*** (8.35)	45.25*** (7.66)
Constant	-39.66*** (2.47)	-85.19*** (2.46)	-38.62*** (1.97)	-	-	-
Observations	2,190	2,213	2,252	932	941	941
Countries	89	89	89	89	89	89
Without fiscal regime	52	52	52	55	55	55
With fiscal regime	37	37	37	34	34	34
LR statistic	863.91	944.40	907.28	839.52	844.45	843.69
Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log Likelihood	-283.09	-259.00	-293.47	-38.41	-45.75	-47.29

Note: standard errors in parenthesis, (***, **, *) significant at 99%.95% and 90% confidence, respectively.

In the category of monetary and exchange-rate regimes, we find that inflation targeting countries are more likely to adopt fiscal rules –a result that is found to be robust under both models.

Fixed exchange-rate regimes are also found to be positively associated with fiscal rules under the random-effects model and in regression 6 of the conditional fixed-effect model. These findings lend support to the view that inflation-targeting countries, and to a lesser extent those with a fixed exchange rate regime, have stronger incentives to adopt fiscal rules.

Figure 2: Cross-country Relation between Democracy and Checks and Balances, Country Averages, 1975-2009



Our results are mixed for the two variables reflecting financial-market development. Domestic financial development was not generally found to be significant. However, open capital accounts are positively associated with fiscal rules under the random-effects probit model and in regression 6 of the conditional fixed-effects logit regression.

Finally, per-capita GDP, the proxy for economic development, is also positively and robustly associated with fiscal rules under both models. This result suggests that, controlling for all other determinants that were discussed above, richer countries are more likely to adopt and stick to fiscal rules, possibly because they have the institutional and human-resource capabilities in place that are required for successful enforcement of fiscal policies that are consistent with to rules.

We conclude that our priors about potential determinants are largely confirmed by the main results reported in table 3. Our preferred results are those reported by regression 3. There we find that four political and institutional variables, two fiscal-policy conditions, two monetary and exchange-rate regime variables, one financial-market development variable, and overall development are significantly robust determinants of the choice of fiscal rules. Only two variables are not robustly significant determinants of fiscal rules: government spending pro-cyclicality and domestic financial development.

4.2 Alternative Results

Next we undertake three robustness checks, reporting estimation results for a shorter time period (1990-2008), a smaller country sample (comprised only by advanced countries), and broader measures of fiscal rules (adding supranational rules to national rules).

We find that our results are unaffected when using the shorter period, where the estimated individual effects remain remarkably similar- in terms of sign, order of magnitude, and degree of significance (Table 4).

Table 4: Alternative Results for National Fiscal Rules and Shorter Time Period, Panel Estimations, 1990-2008

	Random-Effects Probit			Conditional Fixed-Effects Logit		
	(1)	(2)	(3)	(4)	(5)	(6)
Checks and Balances	5.13*** (1.18)	5.28*** (1.40)	4.22*** (1.05)	8.84** (4.76)	8.25** (4.11)	10.04*** (3.54)
Democracy	0.29*** (0.06)	0.35*** (0.12)	0.30*** (0.05)	0.92*** (0.32)	0.77*** (0.30)	0.98*** (0.32)
Federalism	2.78*** (1.03)	3.22*** (0.95)	3.43*** (0.90)	-	-	-
Government Stability	0.27*** (0.06)	0.28*** (0.07)	0.24*** (0.06)	0.05 (0.20)	0.13 (0.19)	0.61*** (0.15)
Dependency Ratio	-18.87*** (2.37)	-21.96*** (2.56)	-19.95*** (2.47)	-133.1*** (28.73)	-140.9*** (28.92)	-78.9*** (11.54)
Government Budget	2.47* (1.45)	2.80* (1.71)	3.07* (1.63)	-0.16 (1.37)	-0.07 (1.35)	8.17*** (7.86)
Procyclicality of Gov. Expenditures	-0.05 (0.18)	-0.09 (0.19)	-	-1.40** (0.65)	-1.00* (0.59)	0.04 (0.37)
Fixed Exchange Rate	2.33*** (0.40)	2.44*** (0.42)	2.33*** (0.39)	0.06 (1.36)	0.15 (1.19)	5.19*** (0.93)
Inflation Target	1.47*** (0.38)	1.59*** (0.39)	1.56*** (0.38)	3.54*** (1.37)	3.14*** (1.19)	2.93*** (0.83)
Capital Account Openness	0.39*** (0.16)	0.38** (0.17)	0.37** (0.16)	0.25 (0.64)	0.79 (0.58)	1.00*** (0.42)
Financial Development	0.52	-	-	-4.97***	-	-

	(0.37)			(2.10)		
GDP per capita	0.25	0.98**	0.88***	57.91***	46.90***	-
	(0.55)	(0.41)	(0.45)	(11.58)	(8.75)	
Constant	-19.98***	-27.81***	-24.97***	-	-	-
	(2.62)	(2.21)	(2.49)			
Observations	1,380	1,392	1,409	564	570	570
Countries	89	89	89	89	89	89
Without fiscal regime	55	55	55	55	55	55
With fiscal regime	34	34	34	34	34	34
LR statistic	599.20	613.19	609.62	466.85	468.59	386.41
Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log Likelihood	-261.32	-260.24	-272.69	-39.19	-42.99	-84.09

However, for the two other robustness checks, some variables turned to be non-significant, which, in our view, reveal some interesting insights (Tables 5 and 6).

For the advanced-economy regressions, two interesting findings emerge (table 5). First, democracy, checks and balances, and government stability are no longer significant. Second, the government budget balance and the dependency ratio are also uniformly non-significant. These results suggest that, within this group, there is little cross-country variation in the latter variables, Therefore they are not a discriminating factor in explaining adoption of fiscal rules. However, variables such as inflation targeting, federalism, and GDP per capita, that tend to exhibit sufficient variation across advanced countries, retain their significance as determinants of the fiscal rules decision.

Table 5: Alternative Results for National Fiscal Rules in Advanced Economies, Panel Estimations, 1975-2008

	Random Effects Probit Models			Conditional Logit Models		
	(1)	(2)	(3)	(4)	(5)	(6)
Checks and Balances	6.20	3.99	6.20	-76.42	54.06	-32.99
	(12.89)	(7.00)	(12.89)	(144.79)	(72.32)	(23.68)
Democracy	0.13	0.19	0.129	12.73	11.41	14.25
	(0.20)	(0.33)	(0.20)	(34,388)	(16025)	(3,512)
Federalism	-4.72**	-4.50***	-4.72**	-	-	-
	(2.05)	(1.66)	(2.05)			
Government Stability	0.10	0.14	0.10	-0.65	-0.31	0.44
	(0.14)	(0.13)	(0.14)	(0.50)	(0.37)	(0.18)
Dependency Ratio	-12.00	-12.89	-12.00	-133.94	-67.85	-25.86
	(11.64)	(11.60)	(11.64)	(98.57)	(69.33)	(13.02)
Government Budget	1.42	0.77	1.42	-47.52	-50.05	17.49
	(6.87)	(7.00)	(6.87)	(37.50)	(32.54)	(11.36)
Procyclicality of Gov. Expenditures	-0.02	-0.05	-0.02	-3.69*	-3.87**	0.55
	(0.33)	(0.33)	(0.33)	(1.90)	(1.78)	(0.46)
Fixed Exchange Rate	2.30**	2.84**	2.30**	12.92	10.80	21,83
	(1.17)	(1.17)	(1.17)	(6,871)	(1,809)	(1,132)

Inflation Target	1.98** (0.79)	2.30** (0.65)	1.98** (0.79)	5.18* (2.66)	4.18* (1.93)	4.93*** (1.09)
Capital Account Openness	1.57*** (0.60)	1.27** (0.61)	1.57*** (0.60)	0.60 (3.32)	0.05 (2.47)	2.43*** (0.70)
Financial Development	1.34 (1.15)	-	-	-3.58 (8.13)	-	-
GDP per capita	14.59*** (1.48)	14.96*** (1.19)	-	140.37*** (46.80)	135.75*** (41.20)	-
Constant	-170.72*** (14.58)	-167.84*** (12.83)	- 170.72*** (14.58)	-	-	-
Observations	632	640	2,215	415	422	422
Countries	22	22	22	22	22	22
Without fiscal regime	8	8	8	8	8	8
With fiscal regime	14	14	14	14	14	14
LR statistic	240.79	248.79	753.43	422.76	438.60	345.51
Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log Likelihood	-86.94	-89.74	-889.56	-12.32	-13.48	-60.04

Finally, for the broader measure of fiscal rules that encompasses both national and supranational rules, the results (table 6) reflect that all variables that were significant for national fiscal rules remain so here, except for two: checks and balances and the government budget balance. This, in our view, is again an interesting finding: the broader measure of fiscal rules that includes supranational rules has diluted the link between the latter variables and the adoption of rules. Supranational fiscal rules, like those adopted in countries belonging to monetary unions, act like a mechanical eligibility criteria for member countries but in the end checks and balances and budget balances are not rigorously enforced. Evidence abounds from recent experiences in European Monetary Union and the CFA zone.

Table 6: Alternative Results for National and Supra-National Fiscal Rules, Panel Estimations, 1975-2008

	Random-Effects Probit			Conditional Fixed Effects Logit		
	(1)	(2)	(3)	(4)	(5)	(6)
Checks and Balances	0.70 (0.74)	0.51 (0.75)	0.49 (0.72)	1.85 (2.08)	-2.66 (1.95)	0.04 (1.69)
Democracy	0.20*** (0.04)	0.20*** (0.04)	0.20*** (0.04)	0.47*** (0.13)	0.44*** (0.12)	0.53*** (0.13)
Federalism	-4.37*** (1.06)	-4.30*** (1.41)	0.92 (0.91)	-	-	-
Government Stability	0.22*** (0.05)	0.23*** (0.05)	0.22*** (0.05)	0.24** (0.11)	0.30*** (0.11)	0.51*** (0.10)
Dependency Ratio	-21.03*** (2.08)	-21.17*** (1.64)	-21.69*** (3.25)	-66.25*** (9.66)	-71.3*** (9.61)	-59.7*** (6.22)

Government Budget	0.57 (0.43)	0.55 (0.42)	0.54 (0.42)	0.02 (1.43)	-0.03 (1.24)	0.80 (0.85)
Procyclicality of Gov. Expenditures	-0.11 (0.14)	-0.10 (0.14)	-	-0.33 (0.31)	-0.31 (0.31)	0.08 (0.25)
Fixed Exchange Rate	2.00*** (0.39)	1.92*** (0.38)	1.94*** (0.43)	1.55 (0.98)	1.58* (0.96)	5.22*** (0.85)
Inflation Target	2.45*** (0.34)	2.38*** (0.32)	2.35*** (0.35)	4.79*** (0.90)	4.35*** (0.83)	4.52*** (0.64)
Capital Account Openness	0.74*** (0.12)	0.74*** (0.12)	0.75*** (0.13)	0.91*** (0.30)	0.98*** (0.30)	1.82*** (0.26)
Financial Development	-0.25 (0.26)	-	-	-1.96** (0.78)	-	-
GDP per capita	2.61*** (0.38)	2.46*** (0.38)	2.38*** (0.54)	25.13*** (3.26)	21.83*** (2.74)	-
Constant	-36.00*** (1.83)	-35.72*** (2.08)	-35.34*** (2.80)	-	-	-
Observations	2,189	2,213	2,252	1,210	1,219	1,219
Countries	89	89	89	89	89	89
Without fiscal regime	40	40	40	43	43	43
With fiscal regime	49	49	49	46	46	46
LR statistic	938.18	973.86	907.28	1082.29	1091.87	973.85
Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log Likelihood	-396.16	-398.79	-293.47	-108.21	-111.90	-170.91

5. CONCLUSIONS

A world-wide surge of countries adopting fiscal rules is observed since the 1990s. Barely 10 countries had fiscal rules in place in 1990, while 97 nations had adopted national and/or supranational fiscal rules until 2008. This chapter addresses empirically the key research and policy question of why countries adopt and stick to fiscal rules.

The chapter contributes to the small nascent literature on the determinants of the fiscal policy choice of *de jure* fiscal rules. It does so by significantly extending the previous work in two dimensions: broadening the framework for analyzing potential determinants of adopting and sustaining fiscal and extending the empirical search to a large panel data sample, comprised by an annual-data panel sample of 94 countries (of which 35 have adopted fiscal rules) and spanning 34 years (1975-2008).

We provide theoretical arguments for considering 12 variables grouped in five sets of potential factors that lead countries to adopt and hold to fiscal rules: political institutions, fiscal policy conditions, monetary and exchange rate regimes, financial market development, and overall development.

The econometric literature on non-linear panel data models, in particular for discrete variables, is largely in a state of flux and is mired by still unresolved econometric issues. After a

brief review of the relevant estimators, we concluded that random-effects probit models and conditional fixed-effects logit models should be preferred to other estimators, in view of the relatively large sample size we have in both the time-series and cross-sectional dimensions.

The base-line regression results of both models strongly corroborate the prediction of the paper's conceptual framework. We find that in the full sample that comprises developed and developing countries, all variables are robustly significant determinants of fiscal rules, except for government spending pro-cyclicality and domestic financial development. Thus we broadly confirm earlier findings in the received literature. However, and more importantly, we also find that the new variables considered here are robustly associated with the adoption of fiscal rules. For example, for monetary and exchange-rate regime variables, our results suggest that inflation-targeting countries and, to a lesser extent, countries with very hard pegs, are more likely to adopt fiscal rules. With regard to financial market variables, we find that open capital accounts raise the likelihood of having fiscal rules in place.

Perhaps the most important finding of this paper relates to the role of political institutions (democracy, federalism, checks and balances, and government stability), which were all found to be robustly significant in the full country sample. While democracy is an important determinant of fiscal rules, checks and balances tend to have an independent and even stronger effect.

However, when restricting the sample to developed countries, among the four political variables only fiscal federalism survives as a significant determinant of fiscal rules. This reflects the lack of cross-country variation in political variables across developed nations. Instead, the key determinants of adoption of fiscal rules in these countries are inflation targeting, federalism, and GDP per capita.

Furthermore, when we broaden the measure of fiscal rules to include both national and supranational rules, both checks and balances and the government budget balance cease to be significant. The broadening of fiscal rules might have diluted the role of the latter factors due to the fact that fiscal rules act as mechanical eligibility criteria for monetary union member countries but checks and balances and budgetary discipline are not rigorously enforced, as illustrated by recent monetary union experiences.

REFERENCES

- Advisory Committee on Fiscal Policy in Chile. 2011. *Propuestas para Perfeccionar la Regla Fiscal*. Ministry of Finance of Chile.
<http://www.hacienda.cl/documentos/publicaciones/comite-asesor-realiza-propuestas-para.html>
- Agénor, P. and J. Aizenman. 2000. "Savings and the Terms of Trade under Borrowing Constraints." *NBER Working Papers* N° 7743, Cambridge, Mass.

- Alesina, F. and G. Tabellini. 2005. "Why is Fiscal Policy Often Procyclical?" *Harvard Institute of Economic Research Discussion Paper* No. 2090, Cambridge, Mass.
- Anderson, B. and J. Minarik. 2006. "Design Choices for Fiscal Policy Rules." *Paper for OECD Working Party for Senior Budget Officials GOV/PGC/SBO 4*, Paris.
- Arellano, M. and S. Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies* 58(2): 277-97.
- Barro, R. and D. Gordon. 1983. "Rules, Discretion and Reputation in a Natural Rate Model of Monetary Policy." *Journal of Monetary Economics* 12(1): 101-21.
- Beck, T., G. Clarke, A. Groff, P. Keefer, and P. Walsh. 2001. "New Tools in Comparative Political Economy: The Database of Political Institutions." *World Bank Economic Review* 15(1): 165-76.
- Calderón, C., R. Duncan, and K. Schmidt-Hebbel (2012). "Do good institutions promote counter-cyclical macroeconomic policies?". *IEUC Working Paper* No. 419, Catholic University of Chile, Santiago, Chile.
- Calderón, C. and K. Schmidt-Hebbel. 2008a. "The Choice of Fiscal Regime in the World." *Central Bank of Chile Working Paper* N° 487, Santiago, Chile.
- . 2008b. "What drives the Choice of Inflation Targets in the World?" *Unpublished manuscript*, Central Bank of Chile, Santiago, Chile.
- . 2008c. "Business Cycles and Fiscal Policies: The Role of Institutions and Financial Markets." *Central Bank of Chile Working Paper* N° 481, Santiago, Chile.
- Chang, Y. 2003. "Nonlinear IV Panel Unit Root Tests." *Unpublished manuscript*, Department of Economics, Rice University.
- Chinn, M. and H. Ito. 2008. "A New Measure of Financial Openness." *Journal of Comparative Policy Analysis* 10(3): 307-20.
- Cukierman, A. 1992. *Central Bank Strategy, Credibility, and Independence: Theory and Evidence*. Cambridge, MA: MIT Press.
- Debrun X. and M. Kumar. 2007. "The Discipline-Enhancing Role of Fiscal Institutions: Theory and Empirical Evidence." *International Monetary Fund Working Paper* N° 07/171.
- Deroose, S., L. Moulin, and P. Wierds. 2006. "National Expenditure Rules and Expenditure Outcomes: Empirical Evidence for EU Member States." *Wirtschaftspolitische Blätter* 1: 27–42.
- Feld, L. and J. Schnellenbach. 2010. "Fiscal Federalism and Long-Run Macroeconomic Performance: A Survey of Recent Research." *Environment and Planning C: Government and Policy* 29(2): 224-43.
- Frenkel, J., M. Goldstein, and P. Masson. 1991. *Characteristics of a Successful Exchange Rate System*. Washington, DC: International Monetary Fund.
- Gavin M. and R. Perotti. 1997. "Fiscal Policy in Latin America." In *NBER Macroeconomics Annual* 12, edited by B. Bernanke and J. Rotemberg. Cambridge, MA: MIT Press.

- Gengenbach, C., F. Palm, and J. Urbain. 2008. "Panel Unit Root Tests in the Presence of Cross-Sectional Dependencies: Comparison and Implications for Modelling." *Econometric Reviews* 29(2): 111-45.
- Giavazzi, F. and M. Pagano. 1988. "The Advantage of Tying One's Hands: EMS Discipline and Central Bank Credibility." *European Economic Review* 32(5): 1055-75.
- Greene, W. 2001. "Fixed and Random Effects in Nonlinear Models." *Stern School of Business Working Paper* N° EC-01-01, New York University.
- Greene, W. 2009. "Discrete Choice Modeling." In *Handbook of Econometrics Vol. 2, Applied Econometrics*, edited by T. Mills and K. Patterson. London: Palgrave.
- Heckman, J. 1981. "Statistical Models for Discrete Panel Data," In *Structural Analysis of Discrete Data with Econometric Applications*, edited by C. Manski and D. McFadden. Cambridge, MA: MIT Press.
- Henisz, W. and B. Zelner. 2010. "Measures of Political Risk Database." *Unpublished manuscript*, The McDonough School of Business, Georgetown University.
- Henisz, W. (2010). "The Political Constraint Index (POLCON) Dataset"
<http://www-management.wharton.upenn.edu/henisz/>
- Hlouskova, J. and M. Wagner. 2006. "The Performance of Panel Unit Root and Stationarity Tests: Results from a Large Scale Simulation Study." *Econometric Reviews* 25(1): 85–116.
- Honoré, B. 2002. "Nonlinear Models with Panel Data." *Portuguese Economic Journal* 1(2): 163-79.
- Ilzetzki, E. and C. Vegh. 2008. "Pro-cyclical Fiscal Policy in Developing Countries: Truth or Fiction?" *NBER Working Paper* N° 14191.
- Im, K., M. Pesaran, and Y. Shin. 2003. "Testing for Unit Roots in Heterogeneous Panels." *Journal of Econometrics*, 115(1): 53–74.
- International Monetary Fund. 2006. "Inflation Targeting and the IMF." *Unpublished manuscript*, Monetary and Financial Systems Department, Policy and Development Review Department, and Research Department.
- . 2009. "Fiscal Rules—Anchoring Expectations for Sustainable Public Finances." *Unpublished manuscript*, Fiscal Affairs Department.
- Kaminsky, G., C. Reinhart, and C. Vegh. 2004. "When it Rains, it Pours: Pro-cyclical Capital Flows and Macroeconomic Policies." *NBER Working Paper* N° 10780.
- Kopits, G. and S. Symansky. 1998. "*Fiscal Rules*." Washington, DC: International Monetary Fund.
- Kwak, D. and J. Wooldridge. 2009. "The Robustness of the Fixed Effects Logit Estimator to Violations of Conditional Independence." *Unpublished manuscript*, Michigan State University Department of Economics.
- Kydland, F. and E. Prescott. 1977. "Rules rather than Discretion: The Inconsistency of Optimal Plans." *Journal of Political Economy* 85(3): 473-92

- Levy-Yeyati, E., F. Sturzenegger, and I. Reggio. 2010. "On the Endogeneity of Exchange Rate Regimes." *European Economic Review* 54(5): 659-77.
- Lucotte, Y. 2012. "Adoption of Inflation Targeting and Tax Revenue Performance in Emerging Market Economies: An Empirical Investigation." *Economic Systems* 36(4): 609-28.
- Maddala, G. 1987. "Limited Dependent Variable Models Using Panel Data." *Journal of Human Resources* 22(3): 307-38.
- Maliszewski, W. 2009. "Fiscal Policy Rules for Oil-Producing Countries: A Welfare-Based Assessment." *International Monetary Fund Working Paper* N° WP/09/126.
- Minea, A. and P. Villieu. 2009. "Can Inflation Targeting Promote Institutional Quality in Developing Countries?" *Unpublished manuscript*, University of Auvergne.
- Muñoz, F. and K. Schmidt-Hebbel (2013). "Monetary Policy Decisions by the World's Central Banks using Real-Time Data". *Unpublished manuscript*, Catholic University of Chile, September.
- Neyman, J. and E. Scott. 1948. "Consistent Estimates Based on Partially Consistent Observations." *Econometrica* 16(1): 1-32.
- Nickell, S. 1981. "Biases in Dynamic Models with Fixed Effects." *Econometrica* 49(6): 1417-26.
- Ravn, M. and H. Uhlig. 2002. "On Adjusting the Hodrick-Prescott Filter for the Frequency of Observations." *Review of Economics and Statistics* 84(2): 371-75.
- Reinhart, C. and K. Rogoff. 2004. "The Modern History of Exchange Rate Arrangements: A Reinterpretation." *Quarterly Journal of Economics* 119(1): 1-48.
- Schmidt-Hebbel, K. 2011. "Chile's Fiscal Rule." *Unpublished manuscript*, Institute of Economics, Catholic University of Chile.
- Svensson, L.E.O. 1997. "Optimal Inflation Targets, 'Conservative' Central Banks, and Linear Inflation Contracts". *American Economic Review* 87: 98-114.
- Svensson, L.E.O. 2003. "What Is Wrong with Taylor Rules? Using Judgment in Monetary Policy through Targeting Rules". *Journal of Economic Literature* 41: 426-477.
- Taylor, J.B. 1993. "Discretion versus policy rules in practice". *Carnegie-Rochester Conference Series on Public Policy* 39: 195-214.
- Ter-Minassian, T. 2010. "Preconditions for a Successful Introduction of Structural Fiscal Balance-Based Rules in Latin America and the Caribbean: a Framework Paper." *Inter-American Development Bank Discussion Paper* No. IDB-DP-157,
- Tornell, A. and A. Velasco. 2000. "Fixed versus Flexible Exchange Rates: Which provides More Fiscal Discipline?" *Journal of Monetary Economics* 45(2): 399-436.
- Von Hagen, J. 2005. "Political Economy of Fiscal Institutions." *Discussion Paper* No. 149, Governance and the Efficiency of Economic Systems, Free University of Berlin, Humboldt University of Berlin, University of Bonn, University of Mannheim, and University of Munich.

- Wooldridge, J. 1995. "Selection Corrections for Panel Data Models under Conditional Mean Independence Assumptions." *Journal of Econometrics* 68(1): 115-32.
- . 2009. "Correlated Random Effects Models with Unbalanced Panels." *Unpublished manuscript*, Department of Economics, Michigan State University.
- World Bank. 2011. "*World Development Indicators 2010*." Washington, DC: World Bank.
- Wren-Lewis, S. 2010. "Comparing the Delegation of Monetary and Fiscal Policy." *Economics Series Working Paper N° 540*, Economics Series, Department of Economics, University of Oxford.

Appendix

Table A.1: Data Definition and Sources

Variable	Definition	Source
<i>Fiscal Rules</i>	A fiscal rule is defined as a permanent constraint on fiscal policy through simple numerical limits on budgetary aggregates.	Kopits and Symanski (2008) and International Monetary Fund (2009)
<i>Democracy</i>	Democracy and Polity2 indices of the Polity IV database	Developed by Integrated Network for Societal Conflict Research (INSCR).
<i>Federalism</i>	Dummy variable = 1 if the country defines itself formally as a federal entity.	Information from Forum of Federations web page.
<i>Political Risk and Checks and Balances</i>	Political Constraint Index (POLCON-V), quantitative measure of the institutional constraints faced by authorities. It ranks countries from 0 (high) to 1 (low).	Originally by Henisz (2000) and later refined and extended by Henisz and Zelner (2010)
<i>Government Stability</i>	ICRG Index	World Development Indicators (WDI) by the World Bank (2011)
<i>Dependency Ratio</i>	Population between 15 and 64 years of age as share of total population	Variable SP_POP_1564_TO_ZS World Development Indicators (WDI) by the World Bank (2011)
<i>Government Budget Balance</i>	Cash surplus/deficit (% of GDP)	Variable GC_BAL_CASH_GD_ZS World Development Indicators (WDI) by the World Bank (2011), complemented by data from country authorities (ministries and central banks) to fill missing information
<i>Pro-cyclical government expenditures</i>	Five-year rolling correlation of HP- filtered final consumption expenditures of General government (constant 2000 US\$) to HP- filtered GDP (constant 2000 US\$).	Variables NE_CON_GOVT_KD and NY_GDP_MKTP_KD World Development Indicators (WDI) by the World Bank (2011)
<i>Inflation Targeting</i>	Dummy variable: 1 if the central bank operates formally an inflation targeting scheme, and 0 otherwise.	Calderón and Schmidt-Hebbel (2008) and own updates using data from the reports at http://www.centralbanknews.info/p/inflation-targets.html
<i>Exchange Rate Regime</i>	Fixed exchange systems include dollarization, currency boards, and monetary unions. Any other system is not considered as fixed regime.	Reinhart and Rogoff (2004) <i>de-facto</i> classification, extended to 2009 using IMF country reports.
<i>Financial Development</i>	Domestic credit to private sector (% of GDP)	Variable FS_AST_PRVT_GD_ZS World Development Indicators (WDI) by the World Bank (2011)
<i>Capital Account Openness</i>	KAOPEN measure, based on binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).	Chinn and Ito (2008), updated by the authors to 2009.
<i>Real Income per capita</i>	GDP per capita in constant 2000 US\$.	Variable NY_GDP_PCAP_KD World Development Indicators (WDI) by the World Bank (2011)

Table A.2: Fiscal Rules, Federalism, and Inflation Targeting

	Fiscal Rules		Federal country	Inflation Targeting	Fiscal Rules		Federal country	Inflation Targeting
	National	Supranational			National	Supranational		
Angola	2005							Italy
Ant & Barb.		1998						Japan
Argentina	2000		1					1975
Australia	1998		1	1993				Kenya
Austria	1999	1995	1					1997
Belgium		1992	1					
Benin		1999						Korea, Rep.
Botswana	2003			2008				
Brazil	2000		1	1999				Latvia
Bulgaria	2003			2007				2003
B. Faso		1999						Lithuania
Cameroon		1996						1997
Canada	1991		1	1991				2004
Cape Verde	1998							Luxembourg
CAF		1996						1990
Chad		1996						1992
Chile	2000			1991				Madagascar
Colombia	1997			2000				2006
Comoros	2001		1					Mali
Congo, Rep.		1996						1999
Costa Rica	2001							2004
Coted'Ivoire		1999						Malta
Cyprus		2003						2008
Czech Rep.	2005	2004		1998				Mexico
Denmark	1992	1992						1975
Dominica		1998						1
Ecuador	2003							1999
Estonia	1993	2004						2004
Finland*	1999	1995		1993				2004
France	1998	1992						Namibia
Gabon		1996						2001
Germany	1975	1993	1					Netherlands
Ghana				2007				1994
								New Zealand
								1994
								1999
								Niger
								2004
								Nigeria
								2001
								Norway
								2001
								Pakistan
								2005
								Panama
								2002
								Peru
								2000
								Philippines
								Poland
								1997
								2004
								Portugal
								2002
								1992
								Romania
								2007
								Senegal
								1999
								Singapore
								1991
								Slovak Rep.
								2004
								Slovenia
								2001
								2004
								South Africa
								1
								2000
								Spain*
								2003
								1992
								Sri Lanka
								2003
								St. Kitts
								1998
								Nevis
								1
								St. Lucia
								1998
								St. Vincent
								1998
								Sweden
								1996
								1995
								Switzerland
								1
								2000
								Thailand
								2000
								Togo
								1999
								Turkey
								2006
								UAE
								1
								UK
								1997
								1992
								Venezuela
								1999
								1

Notes: Dates reported for fiscal rules and for inflation targeting are the years when the corresponding regimes were started. (*) Finland and Spain had inflation targeting schemes but abandoned them when joining the euro. Countries with federal constitutions are identified with a 1. Sources: see Table A.1.