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## WHY DO COUNTRIES HAVE FISCAL RULES?\*

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### I. INTRODUCTION

Professor Vittorio Corbo, in whose honor this conference is organized, has an outstanding academic and professional career that spans teaching, research, policy making, and advice provided to the private sector, international institutions, and governments. In the latter capacity of government advisor, he served recently as Chairman of the Advisory Committee on Fiscal Policy to Finance Minister Felipe Larraín, coordinating preparation of the Committee's proposals for strengthening Chile's fiscal institutions and decade-old fiscal policy rule. The final document delivered by the Committee to Minister Larraín offers relevant and well-grounded recommendations on fiscal policy reform in Chile, which undoubtedly will be useful to other reforming countries, too (Advisory Committee on Fiscal Policy in Chile, 2011). The latter document—like many others written or led by Vittorio Corbo—is a tribute to his skills in guiding deep and productive debate among economists that hold different views, toward the goal of attaining consensus on research and policy advice.

Chile, like many other countries, is certainly not alone among countries that have adopted fiscal rules. While four countries had fiscal rules in place in 1982, many more countries have adopted rules since the 1990s, from a universe of 10 countries in 1990 to 30 in 2001 and 51 in 2009 (figure 1). Another group of 46 countries had supra-national rules in place in 2009—most of them are EU members. Countries with fiscal rules had on average 2.5 active fiscal rules in 2009.

Reforms of fiscal institutions and fiscal rules are motivated by objectives similar to those that inspired the changes in central banking. 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 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

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\* This paper is motivated by our academic and personal admiration of Vittorio Corbo, under whose leadership we worked in the Macroeconomic Adjustment and Growth Division in the World Bank's Research Department, where we started our research collaboration.

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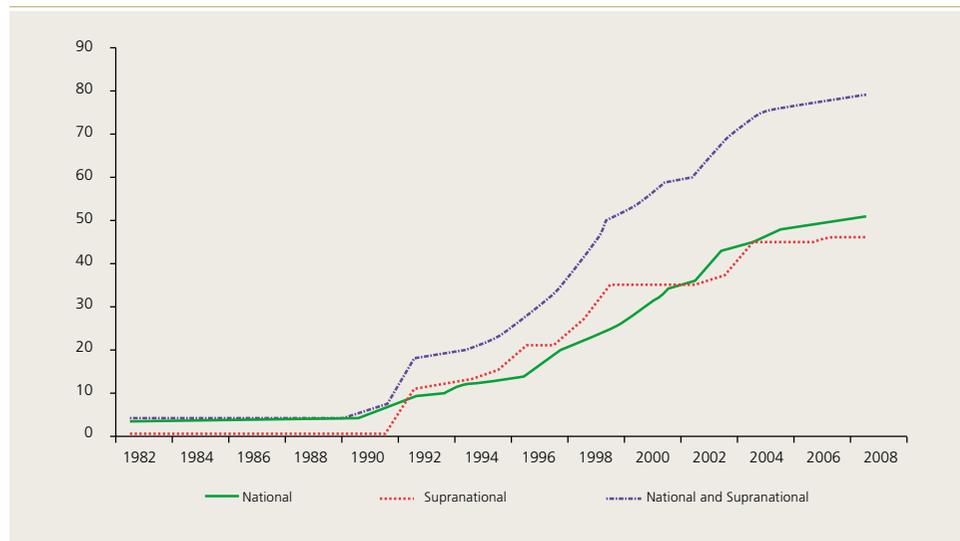
corruption and private-sector lobbies (i.e., strengthening the political economy of fiscal policy decisions and budget management).

The latter objectives are shared by most fiscal policy makers worldwide. Hence why do countries adopt fiscal rules? This question boils down to identifying the conditions under which some countries do adopt fiscal rules and maintain them over time, while others do not. 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 openness? Is it more likely that countries have fiscal rules in place when they exhibit stronger fiscal policy performance—or is it the opposite? Are fiscal rules more likely to be adopted by richer countries? These are the empirical questions addressed by this paper.

Yet fiscal rules are only one element of fiscal reform. Currently many countries—industrial and emerging economies alike—are designing and implementing major reforms of their institutional framework for fiscal policy. These reforms are motivated by different reasons. 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 is the case of the systematic violation of the fiscal rules of the Stability and Growth Pact by many member countries of the Euro Zone.

Figure 1

Number of countries with fiscal rules



Source: International Monetary Fund (2009).



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 suggests adopting an institutional framework for fiscal policy based on the following components (Ter-Minassian 2010, IMF 2009, Schmidt-Hebbel 2012): 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 on the government's financial management, effective external control and auditing, and establishment of a fiscal council and/or fiscal committees—and a fiscal rule for the budget.

Reforms of fiscal institutions and adoption of fiscal rules came with a time lag following the revolution in monetary policy institutions that took place in the 1980s and 1990s, with the adoption of independent and accountable central banks conducting rule-based monetary policy under conditions of increased transparency and accountability. The reform of central banks and their monetary policy frameworks was politically motivated by the 1970s Great Inflation and intellectually grounded in the rational expectations revolution in macroeconomics, reflected in the 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 for objectives to raise policy effectiveness, increase economic efficiency, and strengthen democratic accountability.

Fiscal rules differ widely across countries in how they are defined. Fiscal rules include rules that set targets, ceilings or floors for the government budget balance (on overall or primary balance; on 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, as growth rates or as ratios to GDP.

Different types of rules are related to different fiscal policy objectives. One category are deficit and debt ceilings set predominantly to strengthen fiscal sustainability. A paramount example of the latter 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 by fiscal rules that aim at strengthening both fiscal sustainability and counter-cyclical fiscal stabilization (or at least avoiding pro-cyclical policy bias). Ten countries had such rules in place in 2009 (IMF 2009), including Chile, 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 throughout the economic cycle.

There is a growing literature on fiscal rules, comprising descriptive and empirical papers on country and cross-country experiences, their design and institutional issues, and the fiscal, macroeconomic, growth, and welfare 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 our best knowledge there are only two previous empirical studies that identify institutional and economic variables that explain why countries have fiscal rules in place. Calderón and Schmidt-Hebbel (2008a) estimate a model for the likelihood of having a fiscal rule in place on 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 estimations) 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.

In an appendix, IMF (2009) presents some panel data results for the likelihood of adopting a fiscal rule and for having a *de jure* fiscal regime in place, using a panel dataset constructed by the IMF for 68 countries (of which two thirds have fiscal rules) and spanning 1985-2008. Results show that the likelihood of adopting a fiscal rule (based on an exponential hazard model that identifies the probability of switching to a rule in any given country and year) 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 show that the likelihood of having a fiscal rule in place (based on a conditional fixed-effects logit model that identifies the probability of having a fiscal rule in any given country and year) respond to the same variables that help explaining adoption of a rule.

While its focus is also on explaining the likelihood of having a fiscal rule in place, this paper extends very significantly the two previous studies. Its specification form is much broader, focusing on five categories of potential determinants of the choice of *de jure* national fiscal rules that address the particular questions raised by us above. The sample size is larger, comprising an annual-data panel sample of 94 countries (of which 35 have adopted fiscal rules) and spanning the 1975-2008 period. Empirical estimation is performed using a battery of estimation models, chosen 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 rules).

This paper is structured in the following way. Section 2 presents the comprehensive set of potential determinants of the decision to adopt fiscal rules, providing the broad theoretical arguments for the relevance of five categories of such correlates. Section 3 describes data and descriptive statistics, including providing detailed descriptions of the variables and empirical proxies used to



account for the theoretical determinants of the previous sections. Section 4 briefly reviews the state of non-linear panel data econometrics for discrete dependent variable in order to motivate the model selection. Section 5 analyzes the estimation results. Section 6 concludes.

## II. VARIABLE SELECTION AND MODEL SPECIFICATION

The availability of data on fiscal rules is limited. The pioneering work of Kopits and Symansky (1998) has been updated and extended recently by the IMF (2009) to include the 89 countries (21 advanced, 33 emerging, and 26 low-income economies) with national and/or supra-national *de jure* fiscal rules in place in 2008, as depicted in figure 1. Using this information, countries have been classified for this paper using a binary variable that takes a value of one if the country has in place any form of national fiscal rule and zero otherwise. The measure is arguably simplistic and it certainly does not reflect the variety of fiscal rules<sup>1</sup> or the degree of enforcement of rules.<sup>2</sup> However, coding fiscal rules 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, complementarity with regimes in other policy areas (e.g., inflation targeting and exchange rate floats) 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 others 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 paper follows the latter literature, extending significantly the two previous studies on fiscal rules. 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 overall development level. For these categories we select the most representative variables available for each category. We match the sample of

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1 As discussed in the introduction, there is a large variety of fiscal rules. We limit our empirical analysis to national (and supra-national) rules of any type.

2 Most fiscal rules do not specify escape clauses. Even those governments with *ex ante* defined escape clauses attached to their rules face sometimes 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.

countries with fiscal rules with a larger control group of economies without fiscal rules.

## 2.1 Political and Institutional Variables

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

Fiscal rules are very likely to be an outcome of particular political regimes and institutions. Fiscal rules—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—contribute to transparency, 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 for 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 large literature on fiscal federalism attests to the important differences in the conduct and outcome of fiscal policy between federal and unitary countries (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.<sup>3</sup> Hence we include a binary dummy variable for federal governments.

There is evidence suggesting that rules reflect an implicit contract between governments and voters, that is, 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, the Political Constraint Index.

Political instability of governments make it difficult or pre-commit to rules. Hence fiscal rules are more likely to be adopted and continued over time under conditions of government stability.<sup>4</sup> Hence we include a government stability measure as potential regressor.

## 2.2 Fiscal Policy Conditions

We identify three variables related to fiscal policy strength and conduct that may exert an influence on choosing a fiscal rule. First, we include the population dependency ratio, i.e., the ratio of under-15 and above-64 population to those

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<sup>3</sup> *Federal states complement adoption of fiscal rules at the federal (or national) level with adoption of sub-national rules at state or provincial levels (IMF 2009).*

<sup>4</sup> *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 and Schmidt-Hebbel 2008d, Calderón and others 2010).*



in the 15-64 year range. 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 government to commit to a fiscal rule, reducing the likelihood of putting them in place.

Next we include the (lagged) 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, the fiscal outcomes are observed. It thus remains an empirical issue to determine which causality prevails—an issue outside 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

Several explanations for the existence of pro-cyclicality in government expenditures are provided in the analytical and empirical literature. First, restricted government access to credit markets, particularly during recessions, preclude borrowing to weather temporary shocks or recessions (Gavin and Perotti 1997, Agénor and Aizenman 2000, Kaminsky and others 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 Végh, 2004). The recent empirical literature shows that weaknesses in political institutions and financial underdevelopment are the main determinants of fiscal pro-cyclicality in the world (Calderón and Schmidt-Hebel 2008c, Ilzetzki and Végh 2008).

We expect that governments prone to pro-cyclical government expenditure behavior are less willing to subject themselves to the discipline of a fiscal rule. Therefore we include a measure of fiscal pro-cyclicality.

### **2.3 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 a pre-condition for the success of inflation targeting is the absence of fiscal dominance. In turn, fiscal dominance—the need to rely on central bank resources (ultimately seigniorage)—is more unlikely 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.<sup>5</sup> Testing of this model by Lucotte (2010), using propensity score matching, indicates that in thirteen emerging countries inflation targeting has a significant positive effect on public revenue collection. Hence we include a discrete variable for the countries where monetary policy is based on an inflation targeting regime. We expect that 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 and others (1991), among others) is that pegs provide more fiscal discipline than floats. If governments adopt a lax fiscal policy under a fixed exchange rate, this would lead to a speculative attack on reserves and consequently to currency devaluation. Because the eventual collapse 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 uncertainty of government about their 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 to 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.

## 2.4 Financial-Market Development Variables

Financial-market 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 subjects 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 a course of 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

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*5 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.*



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.

## 2.5 Overall Development Level

Finally, we control for the overall level of development, for which we use per-capita GDP in real terms (US\$ of 2000). Much of the literature has focused on the reverse causality, i.e., on the impact of fiscal rules on economic growth (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 implementing, monitoring, and evaluating operation of a fiscal rule.

## III. 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 about the variables, their distributions and correlations in graphical and tabular form. Appendix table A.1 provides more detail on data definitions and sources, while appendix table A.2 contains a country list showing adoption of fiscal rules, inflation targeting and federal system.

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 IMF (2009). We code national rules and supra-national rules separately. Most of our empirical analysis is conducted for national rules only, but we use national and supra-national rules for conducting sensitivity analysis.

Our first political and institutional variable is a measure of democracy: the democracy and Polity 2 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 the *de jure* classification matches the *de facto* fiscal structure; 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 *de facto* a federal structure.

As measure of political checks and balances, we use the Political Constraint Index (POLCON-V), developed originally 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 for any one actor (e.g., the executive or a chamber of the legislature) is constrained in his choice of future policies.

An alternative to the latter is the index developed by the World Bank in its database of Political Indicators (CHECKS2a), which 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 and others, 2001). Checks rank countries from 1 (low) to 6 (high). While the CHECKS2a index takes into account the complex relations between veto points, party preferences, and preference heterogeneity, it also assumes a linear relationship between the number of adjusted veto points and the degree of constraints on policy change. Similarly, the number of adjusted veto points increases linearly in parliamentary systems with each addition of a party to the ruling coalition without regard to the relative size of the parties in the coalition. The Political Constraint Index (POLCON-V) overcomes these limitations. The pair wise correlation between both measures of political checks and balances is 68%.

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

Now let us turn to fiscal condition variables. We use the standard population dependency ratio determined by a country's population structure (share of the population between 15 and 64 years old). For the budget balance we use the general government balance on a cash basis. 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 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 computed subsequently as a rolling correlation of three, five, and ten periods.

For monetary and exchange-rate regimes, we use a binary variable for countries under an inflationtargeting and another binary variables under a fixed exchange-rate regime. On 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 dating of the start of inflation targeting. This is in contrast with classification of exchange-rate regimes, which are either *de facto* or *de jure*. Following the recent literature, we use the *de facto classification*. Our binary variable is for fixed exchange-rate regimes (encompassing monetary union, dollarization, and currency boards) with a value of one, and other regimes (intermediate and floating exchange rates) with a value of zero. Because our interest is mainly on institutions, we consider as fixed exchange-rate systems only dollarization, currency boards, and monetary unions. To account for (unlikely) mutual causation between these extreme and largely institutional fixed exchange-rate regimes 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 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 (expressed in US\$ of 2000).

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

We summarize country information for our sample of three key variables: starting dates of national and supra-national fiscal rules, classification of countries by constitutional federal governments, and starting dates of inflation targeting. While fiscal rules were started in the 1970s (as reflected by figure 1), inflation-targeting regimes started around 1990.

Table 1 reports descriptive statistics for the dependent and all independent variables for the sample period 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 in the 1970s) so that the effective sample used in the econometric analysis is around 2,200 observations. It can be seen that around 16% of the sample corresponds to observations of countries employing fiscal rules. Likewise, in around 9% of the years, countries had conducted monetary policy using inflation-targeting schemes while in another 24% of the cases, countries had relinquished monetary policy by having fixed exchange-rate regimes. The coefficient of variation of each variable indicates that heterogeneity is notorious among several control variables, including those representing political aspects (democracy, federalism) and fiscal policies (government budget balances and pro-cyclicality of government expenditures).

Table 1

## Descriptive statistics

	Observations	Mean	Standard deviation	Coefficient of variation	Range
Fiscal rule	3,026	0.158	0.365	2.306	[0,1]
Checks and balances	2,855	0.451	0.328	0.727	[0,0.9]
Democracy	2,871	2.690	7.382	2.744	[-10,10]
Federalism	3,026	0.169	0.374	2.221	[0,1]
Government stability	2,798	7.344	2.125	0.289	[1,11]
Dependency ratio	2,937	-0.413	0.277	-0.671	[-1.08, 0.12]
Government budget	2,434	-0.058	0.412	-7.089	[-13.4,0.23]
Pro-cyclicality gov. Expend.	2,840	0.168	0.554	3.293	[-0.99,0.99]
Fixed-exchange rate	2,781	0.242	0.428	1.772	[0,1]
Inflation target	3,026	0.090	0.286	3.189	[0,1]
Capital account openness	2,823	0.272	1.586	5.836	[-1.84, 2.48]
Financial development	2,810	3.562	0.877	0.246	[-0.38, 5.55]
GDP per capita	2,807	7.897	1.543	0.195	[4.81, 10.65]

Source: Authors' calculation.

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, there is only 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 between fiscal variables (dependency ratio, fiscal balances and the pro-cyclicality of government expenditures) and a positive—yet unsurprising—correlation between the degree of development (measure by GDP per capita) and the two variables representing financial development and integration to international capital markets. Across these groups of variables, there is minor evidence that higher development levels are positively correlated with higher degrees of checks and balances.

Table 2

## Correlations, 1975-2008

Variable	Checks and balances	Democracy	Federalism	Gov. stability	Dependency ratio	Gov. budget	Pro-cyclicality gov. expend.	Fixed exchange	Inflation target	Capital acc. openness	Financial develop.	GDP per capita
Checks and balances	1.000											
Democracy	0.605	1.000										
Federalism	0.231	0.175	1.000									
Government stability	0.386	0.204	0.076	1.000								
Dependency ratio	0.630	-0.470	-0.154	-0.400	1.000							
Government balance	-0.014	-0.030	0.022	0.048	0.047	1.000						
Pro-cyclicality gov. expend.	-0.136	-0.059	-0.021	-0.136	0.172	0.021	1.000					
Fixed-exchange	0.258	0.183	0.066	0.142	-0.328	-0.129	-0.078	1.000				
Inflation target	-0.186	-0.173	-0.070	0.005	0.179	0.027	-0.015	-0.175	1.000			
Capital acc. openness	0.435	0.304	0.104	0.319	-0.530	-0.024	-0.171	0.216	0.035	1.000		
Financial development	0.472	0.193	0.199	0.287	-0.654	0.019	-0.144	0.261	-0.026	0.480	1.000	
GDP per capita	0.620	0.439	0.220	0.341	-0.790	0.003	-0.143	0.274	-0.133	0.555	0.712	1.000

Source: Authors' calculation.

## IV. ESTIMATORS AND ECONOMETRIC ISSUES

The econometric literature on panel data models has progressed substantially in the last half-century. The properties of the 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 hence it is preferred in the absence of correlation between effects and control variables.<sup>6</sup>

<sup>6</sup> 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 variables procedures to account for the endogeneity of pre-determined variables.

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 current consensus view about the choice of fixed versus random effects in linear models does not carry through 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  $T \rightarrow \infty$ .<sup>7</sup> Consider the general fixed-effects model:

$$f(y_{it} | x_{it}, x_{it}, \dots, x_{it}) = g(y_{it}, \beta x_{it} + \alpha_i, \theta), \quad (1)$$

where  $y$  is the variable of interest,  $x$  are exogenous control variables,  $\alpha$  is the individual effect,  $\beta$  is the vector of slope coefficients, and  $\theta$  is an ancillary parameter (e.g., scale parameter or dispersion of disturbances). The log likelihood function for a sample of size  $(N, T)$  is:

$$\log L = \sum_{i=1}^N \sum_{t=1}^T \log g(y_{it}, \beta x_{it} + \alpha_i, \theta). \quad (2)$$

Maximization of equation (2) to obtain the maximum likelihood (*ML*) estimators is complicated by the fact that the first-order conditions conform to a set of non-linear equations and therefore 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  $\beta$  and  $\theta$  were known. Then the estimator of  $\alpha_i$  would use the  $T_i$  observations for each individual. Only when  $T$  converges to  $\infty$ , the estimator of  $\hat{\alpha}_i$  converges to the population parameter and it allows 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  $T$ , so that 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  $g(\bullet)$  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 by either all 1s or all 0s, there is no *ML* estimator for  $\alpha_i$ —the likelihood equation for  $\log Li$  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

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<sup>7</sup> 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.

between control variables before and after such variation, the fixed effects cancel 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 (Greene 2009). By avoiding the estimation of the fixed effects it precludes computation of the partial effects or estimates of the probabilities for the outcomes. After all, there is no way to tell if an individual has any value of  $\alpha_i$  if he does not change his behavior. Therefore this approach limits the analyst to infer only about  $\beta$ .<sup>8</sup>

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 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  $\beta$  as well. Greene (2001) disputes the computation intractability of the probit fixed-effect model but he acknowledges the inconsistency of the estimator.<sup>9</sup>

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).<sup>10</sup> As these conditions are frequently violated in economic data, the random-effects estimator is an attractive alternative. For panel data, the probit model is computationally tractable while the logit model is not.<sup>11</sup>

For the random-effects estimator, equation (1) is modified to acknowledge the fact that individual effects ( $\mu_i$ ) come from realizations of a density function  $f(\mu_i)$ . The complete model is then:

$$\begin{aligned} f(y_{it}, \mu_i | x_{it}, x_{it}, \dots, x_{it}) &= g(y_{it}, \beta x_{it}, \mu_i, \theta). \\ f(\mu_i) &= h(\mu_i | \theta). \end{aligned} \tag{3}$$

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<sup>8</sup> 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.

<sup>9</sup> 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% ( $\pi/80$ ).

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

<sup>11</sup> 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.

One can safely assume that in static models, conditional on  $\mu_i$ , the  $T_i$  observations in each group are independent. This allows us to write the joint distribution of the  $y_{it}$  observations and the  $\mu_i$  individual effects as:

$$\begin{aligned} f(y_{it}, \mu_i | x_{it}, x_{it}, \dots, x_{it}, \beta, \theta) &= f(y_{it} | x_{it}, x_{it}, \dots, x_{it}, \mu_i, \beta, \theta) f(\mu_i) \\ &= \prod_1^{T_i} g(y_{it}, \beta x_{it}, \mu_i, \theta) h(\mu_i | \theta). \end{aligned} \quad (4)$$

In order to form the likelihood function for the observed data,  $\mu_i$  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:

$$\log L = \sum_{i=1}^N \log \left[ \int_{\mu} \prod_1^{T_i} g(y_{it}, \beta x_{it}, \mu_i, \theta) h(\mu_i | \theta) d\mu_i \right]. \quad (5)$$

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 operates effectively when the dimension of the integral is small—as in our case—but not with higher dimensions.

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 variable 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 causal linkage while institutions would just be proxies for those omitted determinants of fiscal rules.

The general specification of our regression model for the likelihood of having a fiscal rule in place is as follows:

$$y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it}, \quad (6)$$

where  $y_{it}$  is a vector of discrete-choice country-year observations for a fiscal rule (a dummy that takes a value of 1 for having a fiscal regime in place, 0 otherwise),  $x_{it}$  is the matrix of country-year observations for the 12 explanatory variables that were introduced in the previous section,  $\alpha$  is a vector of individual country effects that reflect unobservable country heterogeneity,  $\beta$  is a vector of slope coefficients that are common to all countries, and  $\varepsilon$  is a vector of error terms.

We estimate equation (6) making use of pooled-data probit and logit, random-effects probit, and conditional fixed-effects probit estimators.

## V. 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, now we turn to our estimation results of pooled logit and probit as well as random-effects probit and fixed-effect logit models. As discussed above we confine ourselves to the random-effects probit model because its fixed-effects counterpart produces a biased estimator, even asymptotically. On the other hand, the estimates of the random-effects logit model are difficult to interpret because the estimated coefficients are characterized by a mixed of distributions, normal (for the error) and logistic (for the fundamentals).

The results of the pooled-data regressions are reported in table 3. The results lend strong support to the conceptual framework discussed above. However, we do not pursue further discussion of the pooled regression results because they do not account for country heterogeneity, which we find to be present in our sample. According to likelihood-ratio tests reported in tables 5 to 10, the data strongly reject the null hypothesis of country homogeneity in all cases.

Hence we focus on random-effects probit and conditional fixed-effects logit models, starting with full sample regressions of table 4. 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 by 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 entire period and the conditional estimator only uses information from countries that switched regimes. In contrast, in random-effects models the treatment group includes the 37 countries with fiscal rules and the 52 non-fiscal regime countries. We should, therefore, be mindful of the large differences in overall sample size when contrasting the results of the two models.

The results in table 4 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, the

results of the conditional fixed-effects logit model are less robust for the capital account openness and the fixed exchange-rate regime, since this model accounts only 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). 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.

Now we turn to discuss the results by category of variables. Institutional and political variables (democracy, federalism, checks and balances, and government stability) are robustly significant for most regressions under the two models.<sup>12</sup> 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 (figure 2). In particular, the high democracy-low checks and balances quadrant of the figure contains a few Latin American countries that have experienced democracy for some time now, yet failed to develop strong system of political checks and balances.

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 fiscal rule, reflecting the 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. Both effects tend to be highly significant and robust to the choice of the estimating model. However, our first fiscal policy condition, government spending pro-cyclicality, was found to be uniformly non-significant under the random-effects model and in regression 3 of the fixed-effects model (which excludes GDP per capita to alleviate multicollinearity). 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.

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 incentive to adopt fiscal rules.

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

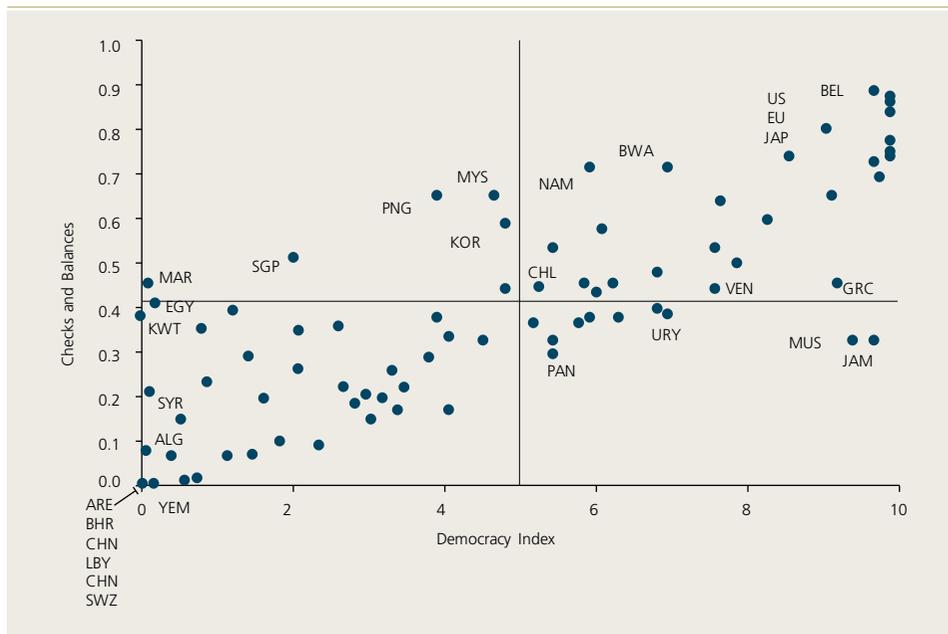
Our results are mixed for the two variables reflecting financial-market development. Domestic financial development was generally not found to be significant. However, open capital accounts are positively associated with fiscal rules under the random-effects probit model and in regression 6 of the conditional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

Finally, per-capita GDP, the proxy of 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, the richer countries are more likely to adopt and stick to fiscal rules, possibly because they have in place the institutional and human-resource capabilities that are required for abiding successfully to fiscal rules.

We conclude that our priors about potential determinants are largely confirmed by the main results reported in table 4. Our preferred results are those reported by regression 3. There we find 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.

Figure 2

Scatter of political variables, average 1975-2009



Sources: Henisz and Zelner (2010); Integrated Network for Societal Conflict Research.

Table 3

### Base-case results for national fiscal rules: Pooled-data probit and logit models, 1975-2008

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit models			Probit models		
Checks and balances	1.87*** (0.40)	1.96*** (0.39)	2.07*** (0.37)	1.06*** (0.22)	1.14*** (0.22)	1.20*** (0.21)
Democracy	0.03** (0.01)	0.03** (0.01)	0.03** (0.01)	0.02** (0.01)	0.02** (0.01)	0.02** (0.01)
Federalism	0.66*** (0.16)	0.62*** (0.16)	0.60*** (0.16)	0.43*** (0.09)	0.41*** (0.09)	0.40*** (0.09)
Government stability	0.11*** (0.03)	0.10*** (0.03)	0.10*** (0.03)	0.06*** (0.02)	0.06*** (0.02)	0.07*** (0.02)
Dependency ratio	-3.00*** (0.46)	-2.80*** (0.44)	-2.67*** (0.38)	-1.63*** (0.25)	-1.52*** (0.24)	-1.42*** (0.21)
Government budget	0.57** (0.24)	0.56** (0.24)	0.55** (0.24)	0.34*** (0.14)	0.34*** (0.14)	0.33*** (0.14)
Pro-cyclicality gov. expenditures	0.43*** (0.12)	0.37*** (0.12)	0.38*** (0.12)	0.23*** (0.07)	0.21*** (0.07)	0.21*** (0.07)
Fixed-exchange rate	0.23 (0.17)	0.16 (0.17)	0.14 (0.17)	0.13 (0.10)	0.09 (0.09)	0.06 (0.10)
Inflation target	1.60*** (0.18)	1.60*** (0.17)	1.60*** (0.18)	0.96*** (0.10)	0.96*** (0.10)	0.96*** (0.10)
Capital account openness	0.75*** (0.06)	0.74*** (0.06)	0.73*** (0.06)	0.41*** (0.03)	0.41*** (0.03)	0.40*** (0.03)
Financial development	-0.16 (0.12)			-0.11 (0.07)		
GDP per capita	-0.01 (0.09)	-0.06 (0.09)		-0.01 (0.05)	-0.04 (0.03)	
Constant	-3.50*** (0.62)	-3.50*** (0.59)	-3.85*** (0.33)	-1.95*** (0.32)	-1.97*** (0.32)	-2.18*** (0.18)
Observations	2,190	2,213	2,215	2,190	2,213	2,215
Countries	89	89	89	89	89	89
Without fiscal regime	52	52	52	52	52	52
With fiscal regime	37	37	37	37	37	37
LR statistic	610.95	618.35	617.77	618.75	625.97	625.28
Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log likelihood	-718.95	-735.02	-735.71	-715.05	-731.21	-731.95

Source: Authors' estimations.



Table 4

### Main results for national fiscal rules: Random-effects probit and conditional fixed-effects logit models, 1975-2008

	(1)	(2)	(3)	(4)	(5)	(6)
	Random-effects probit			Conditional fixed-effects logit models		
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)
Pro-cyclicality 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

Source: Authors' estimations.

### 5.1 Robustness Checks

Next we undertake three robustness checks, including against shorter time period; smaller sample comprised of advanced countries only; and an alternative concept of fiscal rule that combines both national and supranational rules. We find that our results are not affected under the shorter period, where the estimated individual effects remain remarkably similar—in terms of sign, order of magnitudes and degree of significance (table 5). However, for the other two robustness checks some variables turned insignificant, which in our view, reveal some interesting insights (tables 6 and 7).

For the advanced country regressions, the estimation of the pooled<sup>13</sup> logit and probit regressions reveal two interesting results (table 6). First, democracy, checks and balances and government stability were no longer significant. Second, government budget balance and dependency ratio were also uniformly insignificant. These results suggest that, within this group, there are little variations in these variables; hence they cannot be a factor in explaining the adoption decision. However, variables, such as inflation target, federalism and GDP per capita, that tend to exhibit sufficient variations across the advanced group of countries, retain their significance as determinants of the fiscal rules decision.

Finally, for the alternative concept of fiscal rules that combines both national and supranational ones (table 7), all previously significant variables (under the national fiscal rules concept of table 4) remain so, except for two variables: checks and balances and the government budget balance. Again, we would argue, this in our view is an interesting finding. It seems that the broadening of the fiscal rules concept to include a supranational component has diluted the link between these two variables and the decision process. While under monetary unions fiscal rules act like a mechanical eligibility criteria for member countries; neither checks and balances nor were budget balances rigorously enforced. Evidence abounds from recent experiences of the EU, CFA, and Mercosur.

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<sup>13</sup> We used pooled regressions because country heterogeneity is not likely to be important for this sample and sample size would reduce too much (only 22 countries).



Table 5

### Alternative results for national fiscal rules and smaller time sample: Random-effects probit and conditional fixed-effects logit models, 1990-2008

	(1)	(2)	(3)	(4)	(5)	(6)
	Random-effects probit			Conditional fixed-effects logit models		
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)
Pro-cyclicality 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 (0.37)	-	-	-4.97*** (2.10)	-	-
GDP per capita	0.25 (0.55)	0.98** (0.41)	0.88*** (0.45)	57.91*** (11.58)	46.90*** (8.75)	-
Constant	-19.98*** (2.62)	-27.81*** (2.21)	-24.97*** (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

Source: Authors' estimations.

Table 6

### Alternative results for national fiscal rules in advanced economies: Pooled-data probit and logit models, 1975-2008

	(1)	(2)	(3)	(4)	(5)	(6)
	Conditional-logit models			Random-effects probit models		
Checks and balances	-76.42 (144.79)	54.06 (72.32)	-32.99 (23.68)	6.20 (12.89)	3.99 (7.00)	6.20 (12.89)
Democracy	12.73 (34,388)	11.41 (16,025)	14.25 (3,512)	0.13 (0.20)	0.19 (0.33)	0.129 (0.20)
Federalism	-	-	-	-4.72** (2.05)	-4.50*** (1.66)	-4.72** (2.05)
Government stability	-0.65 (0.50)	-0.31 (0.37)	0.44 (0.18)	0.10 (0.14)	0.14 (0.13)	0.10 (0.14)
Dependency ratio	-133.94 (98.57)	-67.85 (69.33)	-25.86 (13.02)	-12.00 (11.64)	-12.89 (11.60)	-12.00 (11.64)
Government budget	-47.52 (37.50)	-50.05 (32.54)	17.49 (11.36)	1.42 (6.87)	0.77 (7.00)	1.42 (6.87)
Pro-cyclicality gov. expenditures	-3.69* (1.90)	-3.87** (1.78)	0.55 (0.46)	-0.02 (0.33)	-0.05 (0.33)	-0.02 (0.33)
Fixed-exchange rate	12.92 (6,871)	10.80 (1,809)	21.83 (1,132)	2.30** (1.17)	2.84** (1.17)	2.30** (1.17)
Inflation target	5.18* (2.66)	4.18* (1.93)	4.93*** (1.09)	1.98** (0.79)	2.30** (0.65)	1.98** (0.79)
Capital account openness	0.60 (3.32)	0.05 (2.47)	2.43*** (0.70)	1.57*** (0.60)	1.27** (0.61)	1.57*** (0.60)
Financial development	-3.58 (8.13)	-	-	1.34 (1.15)	-	-
GDP per capita	140.37*** (46.80)	135.75*** (41.20)	-	14.59*** (1.48)	14.96*** (1.19)	-
Constant	-	-	-	-170.72*** (14.58)	-167.84*** (12.83)	-170.72*** (14.58)
Observations	415	422	422	632	640	2,215
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	422.76	438.60	345.51	240.79	248.79	753.43
Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log likelihood	-12.32	-13.48	-60.04	-86.94	-89.74	-889.56

Source: Authors' estimations.



Table 7

### Alternative results for national and supra-national fiscal rules: Random-effects probit and conditional fixed-effects logit models, 1975-2008

	(1)	(2)	(3)	(4)	(5)	(6)
	Random-effects probit			Conditional fixed-effects logit models		
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)
Pro-cyclicality 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

Source: Authors' estimations.

## CONCLUSIONS

The 1990s ushered the world not only into a democracy wave, following the collapse of the former Soviet Union, but also a wave of fiscal rules, where the number of countries adopting this fiscal regime steadily rose from only 10 in 1990 to reach 97 in 2009, including 46 with supra-national rules in place, mostly from EU members. This paper, therefore, asks the all important research and policy question as to why do countries adopt fiscal rules?

In this context the paper contributes to a small nascent literature, comprised of only two previous studies, by significantly extending the analytical framework for analyzing the potential determinants of the choice of *de jure* national fiscal rules. We provide detailed theoretical arguments for five sets of potential determinants spanning political institutions; fiscal policy conditions; monetary and exchange-rate regimes; financial market development and overall development. On view of the overlap between the two democratic and fiscal waves this paper's most notable contribution to the literature, we would argue, should be the introduction of democracy and political checks and balance as two pivotal institutional determinants, which were not accounted for by the received literature.

Moreover, aside from significantly expanding the sample, this paper briefly reviews the state of non-linear panel data econometrics for discrete dependent variable in order to motivate the model selection process—from a menu of random-fixed and logit-probit sets of regression models, in a literature that is largely in a state of flux and, therefore, mired with many unresolved econometric issues. Though naturally such literature would not offer definitive guidance on the strengths and weaknesses of the different estimators, our review broadly suggests that random-effects probit models and conditional fixed-effects logit models should be preferred to other estimators in our case, given the relatively large sample size we have on both the time series and cross-sectional dimensions. The regression results of both models strongly corroborate the prediction of the paper's conceptual framework.

We find that in the full sample that includes 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 corroborate earlier findings in the received literature, but more importantly we also find that the new variables are robustly associated with the adoption of fiscal rules. For example, for the monetary and exchange-rate regime variables, our results suggest that inflation-targeting countries, and to a lesser extent those with a fixed exchange-rate regime, have stronger incentive to adopt fiscal rules. And with regard to the financial market variables, we find that open capital account economies, rather than those with financially developed ones per se, are likely to also have fiscal rules in place.

Perhaps the most important finding of this paper relates to the role of political institutions, which were all (democracy, federalism, checks and balances, and government stability) found to be robustly significant.



However, it is interesting to note that while democracy is an important determinant of fiscal rules, checks and balances tend to have an independent and even stronger effect. Moreover, except for fiscal federalism all other three political variables are not significant when only developed countries are included in the regressions, which reflect the lack of large variations on these variables for this particular group of countries. Instead, the key determinants of the adoption of fiscal rules for these countries are inflation target, federalism and GDP per capita. Furthermore, when we broaden the concept of fiscal rules to include both national and supra-national ones, checks and balances and the government budget balance cease to be significant. Again, as we argue above the broadening of the fiscal rules concept might have diluted the role of these two factors due to the fact that under monetary unions fiscal rules act like a mechanical eligibility criteria for member countries; while neither checks and balances nor budgetary discipline were rigorously enforced as the recent country experiences make clear.

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## APPENDIX

Table A.1

### Data definition and sources

Variable	Definition	Source
Fiscal rules	Defined as 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).
Dependency ratio	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).
Real income per capita	GDP per capita in constant 2000 US\$.	Variable NY_GDP_PCAP_KD World Development Indicators (WDI) by the World Bank (2011).
Government budget balance	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.
Pro-cyclical government expenditures	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_GOVTT_KD and NY_GDP_MKTP_KD World Development Indicators (WDI) by the World Bank (2011).
Financial development	Domestic credit to private sector (% of GDP).	Variable FS_AST_PRIVT_GD_ZS World Development Indicators (WDI) by the World Bank (2011).
Political risk and checks and balances	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).
Democracy	Democracy and Polity 2 indices of the Polity IV.	Developed by Integrated Network for Societal Conflict Research (INSCR).
Government stability	ICRG Index.	Obtained from the WDI 2010.
Inflation targeting	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 <a href="http://www.centralbanknews.info/p/inflation-targets.html">http://www.centralbanknews.info/p/inflation-targets.html</a>
Capital account openness	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.
Exchange rate regime	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.
Federalism	Dummy variable = 1 if the country defines itself formally as a federal entity.	Information from Forum of Federations web page.



Table A.2

## Fiscal rules, federalism, and inflation targeting

	Fiscal rules		Federal country	Inflation targeting
	National	Supra-nat.		
Angola	2005			
Ant & Barb.		1998		
Argentina	2000		1	
Australia	1998		1	1993
Austria	1999	1995	1	
Belgium		1992	1	
Benin		1999		
Botswana	2003			2008
Brazil	2000		1	1999
Bulgaria	2003			2007
B. Faso		1999		
Cameroon		1996		
Canada	1991		1	1991
Cape Verde	1998			
CAF		1996		
Chad		1996		
Chile	2000			1991
Colombia	1997			2000
Comoros	2001		1	
Congo, Rep.		1996		
Costa Rica	2001			
Coted'Ivoire		1999		
Cyprus		2003		
Czech Rep.	2005	2004		1998
Denmark	1992	1992		
Dominica		1998		
Ecuador	2003			
Estonia	1993	2004		
Finland*	1999	1995		1993
France	1998	1992		
Gabon		1996		
Germany	1975	1993	1	
Ghana				2007
Greece		1992		
Grenada		1998		
G.-Bissau		1999		
Hong Kong	1997			
Hungary	2007	2004		2002
Iceland	2004			2001
India	2003		1	
Indonesia	1975			2005
Ireland		1992		
Israel	1992			1992

Table A.2 (continued)

	Fiscal rules		Federal country	Inflation targeting
	National	Supra-nat.		
Italy		1992		
Japan	1975			
Kenya	1997			
Korea, Rep.				1998
Latvia		2003		
Lithuania	1997	2004		
Luxembourg	1990	1992		
Madagascar	2006			
Mali		1999		
Malta		2004		
Mauritius	2008			
Mexico	1975		1	1999
Namibia	2001			
Netherlands	1994	1992		
New Zealand	1994	1994		1990
Niger		1999		
Nigeria	2004		1	
Norway	2001			2001
Pakistan	2005		1	
Panama	2002			
Peru	2000			2002
Philippines				2002
Poland	1997	2004		2004
Portugal	2002	1992		
Romania		2007		2005
Senegal		1999		
Singapore	1991			
Slovak Rep.		2004		2005
Slovenia	2001	2004		
South Africa			1	2000
Spain*	2003	1992		1995
Sri Lanka	2003			
St. Kitts Nevis		1998	1	
St. Lucia		1998		
St. Vincent		1998		
Sweden	1996	1995		1993
Switzerland	2003		1	2000
Thailand				2000
Togo		1999		
Turkey				2006
UAE			1	
United Kingdom	1997	1992		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.

Sources: See Appendix Table A.1.