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Fiscal Federalism

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THE EFFECT OF SUB-NATIONAL BORROWING CONTROL ON FISCAL SUSTAINABILITY: HOW TO REGULATE?

Violeta Vulovic

ABSTRACT: This article examines effectiveness of sub-national borrowing control regimes in maintaining overall fiscal sustainability. The results suggest that regulating sub-national borrowing based on fiscal rules performs most efficiently in maintaining fiscal consolidation. Furthermore, sole reliance on financial markets seems to lead to faster end of fiscal consolidation episodes, which may be explained by not fully developed financial markets in many countries that dominantly apply this approach, Finally, strong central government control, as in case of administrative and cooperative regimes, in presence of high fiscal dependence on central government financing seem to increase the probability of ending consolidation episodes.

JEL Codes: H61, H63, H71, H72, H74, H77

Keywords: Sub-national borrowing, fiscal sustainability, panel data

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I. Introduction

Decentralization of borrowing authority to sub-national government and fiscal sustainability at the national level are two issues in permanent tension in public financial management. On one side of the argument, it is desirable to give sub-national authorities room for raising their own financial resources in order to finance capital investment for the provision of goods and services to their communities. On the other side of the argument, the lack of institutional capacity, history of sub-national government defaults in other decentralized systems, and the potential lack of effective controls at the least give central governments substantial arguments to restrict sub-national government autonomy. Thus, the challenge is whether is possible to simultaneously achieve the goals of providing borrowing autonomy and maintain fiscal discipline preventing the insolvency of sub-national governments.

Furthermore, sub-national governments have less incentive than the central governments to be concerned with macroeconomic impact of their policies because they do no bear the full cost of their actions ("moral hazard"). Therefore, to sub-national governments, macroeconomic stability has public goods characteristics. Some authors contend that fiscal decentralization can enhance macroeconomic stability (Fukasaku and De Mello, 1998) while others assert there are significant costs associated with insuring macroeconomic stability through decentralization and that achieving this goal requires thoroughly disciplined sub-national borrowing (Ter-Minassian, 1997). The empirical literature on this issue is inconclusive. It is therefore important to investigate the effect of fiscal decentralization on macroeconomic stability in the presence of borrowing regulation.

Fiscal decentralization is increasingly seen as a tool to promote economic efficiency. Oates (1993) explains, "the provision of local outputs that are differentiated according to local tastes and circumstances results in higher levels of social welfare than centrally determined and more uniform levels of outputs across all jurisdictions." (p. 240). Two basic mechanisms are involved here. The first mechanism relates to Hayek's (1945) knowledge problem, which states that wide dispersion of knowledge causes central planning to fail.[1] Decentralized authorities, on the other hand, are in much better position to be responsive to variations in local demand. The second mechanism is related to the idea government as a monopolist. As Brennan and Buchanan (1980) suggest, "the potential for fiscal exploitation varies inversely with the number of competing governmental units in the inclusive territory." (p. 180). Therefore, greater competition between governments can limit their ability to extract monopoly rents, enhancing economic efficiency and economic growth.

[1] "The economic problem of society is . . . a problem of the utilization of knowledge not given to anyone in its totality. . . . [This] is at least one of the main problems of economic policy - or of designing an efficient economic system. . . . This is not a dispute about whether planning is to be done or not. It is a dispute as to whether planning if to be done centrally, by one authority for the whole economic system, or to be divided among many individuals" (pp. 519–521).
"If we can agree that the economic problem of society is mainly one of rapid adaptation to changes in the particular circumstances of time and place, it would seem to follow that the ultimate decisions must be left to the people who are familiar with these circumstances, who know directly of the relevant changes and of the resources immediately available to meet them. We cannot expect that this problem will be solved by first communicating all this knowledge to a central board which, after integrating *all* knowledge, issues its orders. We must solve it by some form of decentralization. . . . We need decentralization because only thus can we ensure that the knowledge of the particular circumstances of time and place will be promptly used" (p. 524).

Due to widespread decentralization of spending responsibilities, increasing revenue power and borrowing capacity of sub-national governments, sub-national borrowing has become an increasingly important source of sub-national finance. Proponents of sub-national borrowing emphasize four benefits: (i) expansion of sub-national fiscal space for infrastructure financing; (ii) efficient and inter-generational equitable outcomes from infrastructure financing through borrowing; (iii) increased fiscal transparency of sub-national governments; and (iv) deepening of financial markets. However, while there is considerable consensus on those potential benefits, there is also wide agreement that without an effective regulatory framework sub-national borrowing may lead to fiscal and debt crises and significantly contribute to an unstable macroeconomic environment.

For certain, appropriate regulatory frameworks where borrowing or deficit financing is only allowed to finance capital investments (the so called "golden rule") accompanied by limits on the level of debt and debt servicing capacity can reduce the chances of default and debt crises. However, other institutional factors must be present. In particular, sub sub-national governments must have access to significant tax bases, because otherwise, even if borrowing is put into productive use, it may still cause fiscal crises. Dependence on inter governmental transfers might lead to unsustainable borrowing since high levels of transfer dependence often undermine the credibility of the central government's commitment not to bail out troubled sub-national governments. By a similar logic, when sub-national governments are funded primarily by the taxes they raise and collect themselves, the central government can commit more easily to a no bail out policy, thus giving creditors and voters stronger signals and incentives to "punish" sub-national officials for excessive spending and borrowing.

Despite the importance of these issues, little systematic empirical work has been done so far on the role of sub-national borrowing and borrowing control on fiscal sustainability. Therefore, the question this study tries to answer is whether controlled sub-national performs better or worse comparing to prohibition of borrowing in maintaining fiscal sustainability, and if yes, which setting performs superiorly and under which circumstances.

These issues are of particular importance because rapidly rising sub-national debt has played a crucial role in recent financial crisis in several countries and those experiences hold important lessons for other countries undergoing fiscal decentralization. The few studies that evaluate the effect of sub-national borrowing on fiscal performance either use only debt level or some aggregate measure of borrowing autonomy that does not take into account different types of regulations, monitoring and enforcement. From our perspective, qualitative indicators of fiscal decentralization, such as taxing powers or autonomy of sub-national governments to decide on tax base and tax rates, different forms of borrowing powers and regulation and enforcement, must be considered to avoid obtaining biased and misleading empirical results on the effect of sub-national borrowing on fiscal performance.

This study employs a panel data set of 60[2] countries, between 1990 and 2008. Variables of primary interest are qualitative indicators on sub-national borrowing control regimes which countries in the sample employ during the observed period. The information on these qualitative indicators is collected by the author from various sources[3]. Because sub-national borrowing control regimes are not mutually excludable, and countries usually implement more than one set of controls, the qualitative indicator for each country in the sample represents the regime which is dominantly applied. Fiscal sustainability is defined based on

[2] See Appendix for the list of countries.

[3] For the list of sources by country, see Table A4 in the Appendix.

annual change in general government budget balance and budget is considered as sustainable if the annual change is equal or greater that some predetermined threshold. This study uses zero percent change as baseline threshold and, for the purpose of robustness analysis, applies alternative thresholds of 0.5, 0.75 and 1 percent. The applied methodology is survival analysis which is appropriate for evaluating the effect of each borrowing control regimes on duration of fiscal sustainability.

Obtained results suggest fiscal rules to perform dominantly in sustaining fiscal consolidation. Second, results suggest that market discipline performs the least favorably comparing to other three approaches and prohibited sub-national borrowing, which corresponds to the fact that in many countries the requirements for market discipline as a successful instrument for sub-national borrowing control are not met. Finally, administrative and cooperative regimes in presence of high fiscal dependence on central government financing seem to increase the probability of ending a consolidation episode. This result is not surprising given that these two regimes refer to significantly high degree of central government control, which may increase the risk of moral hazard. Strong central government control may give encouraging signs to the sub-national governments to over borrow and to expect being bailed out by the central government. This deteriorates the general government budget directly, through unplanned bailout from the central government, and indirectly, through spillover effect on other sub-national governments who are as well highly fiscally dependent on central government financing. Finally, the robustness analysis suggests that the rule based and administrative controls over sub-national borrowing consistently perform dominantly comparing to other regimes.

The results obtained in this study imply following important policy recommendations. First, sub-national government borrowing does not have to endanger overall fiscal sustainability if the borrowing control framework is well designed. Second, reducing fiscal dependence on central government financing and, in return, giving more tax autonomy to sub-national government, reduces the risk of moral hazard and improves the effectiveness of borrowing control in maintaining fiscal balance at the sustainable level.

The rest of this paper is organized as follows. Section II provides brief literature review on the effect of fiscal decentralization and sub-national borrowing on macroeconomic stability. Section III describes institutional background of four broad approaches that have been used to regulate or control the operation of sub-national credit markets. Section IV provides details on applied methodology. Section V explains results obtained using baseline threshold and from robustness analysis. Finally, section VI concludes the study.

II. Literature Review

The first theoretical examination of fiscal decentralization was undertaken by Tiebout (1956), Musgrave (1959), and Oates (1972). Fiscal decentralization is widely advocated with an argument that it improves economic performance by increasing economic efficiency in the provision of public sector services. Some, however, argue that fiscal decentralization can impact economic performance when sub-national governments have uncontrolled expenditures, which adversely affects national fiscal policy and macroeconomic stability.

There is a large and wide-ranging literature investigating economic benefits of fiscal decentralization that are claimed by its advocates. Majority of these studies focuses on the effect of either revenue or

expenditure decentralization on economic performance, with just few exemptions considering the relationship between borrowing autonomy and fiscal sustainability (De Mello, 2001; Martinez-Vazquez and Boex, 2001; Rodden, 2002; Wibbels and Rodden, 2007; Martell, 2008).

Decentralization and Macroeconomic Stability
Large part of recent literature focuses on the macroeconomic problems that arise with devolving greater responsibilities to the sub-national governments. Empirical results obtained by Prud'homme (1994), Hunter and Shah (1996) and Ter-Minassian (1997) suggest that decentralization results in sub-national fiscal indiscipline and aggravated fiscal problems at the central level. De Mello (2000) finds that in developing countries expenditure devolution tends to worsen central government balance. Fornasari and Steven (2000) also find that increases in sub-national spending leads to increases in national spending and deficits. However, Stein (1999) shows that decentralization is not associated with higher deficits in Latin America. Similarly, Shome (2002) finds that decentralization is associated with lower fiscal deficits both at the state and central government levels in India. [4]

However, some authors emphasize that decentralization can also cause macroeconomic problems when key institutional and financial pillars are absent from the federal framework. Coordination difficulties between the various layers of government can challenge macroeconomic sustainability even in the least decentralized of systems. Various studies (Tanzi, 2000; Dabla-Norris and Wade, 2002) find that incentives for responsible fiscal behavior and hard-budget constraints are undermined when the federal framework is characterized by a (i) lack of local autonomy over expenditure and revenue decisions, and a high degree of dependence on transfers; (ii) lack of constraints on sub-national indebtedness; (iii) lack of clarity in the respective roles of each tier of government; and (iv) weak budget institutions. In his study, Rodden (2002) shows that decentralization is associated with large and persistent general government deficits when sub-national governments are simultaneously dependent on transfers and are free to borrow.

How to regulate sub-national borrowing?
There are different ways in which the national government can contribute to prudent borrowing. Which option to take is a much-debated issue (Peterson, 2000). Literature on sub-national borrowing emphasizes the ability of higher levels of government to provide an implicit guarantee on sub-national government debt as one of main problems with borrowing at the sub-national level. This is a classical moral hazard situation, whereby borrowers are likely to over borrow and creditors are likely to over lend in response to this unwritten official insurance. The question is whether such a risk can be successfully controlled by some kind of rule, or if the credit market can do the job on its own. A fundamental decision that a national government has to take is whether to provide a sovereign guarantee or not. With a sovereign guarantee, the national government takes final responsibility in dealing with a financial crisis of sub-national entities. If a sub-national entity is unable to re-pay debt, the national government would step in and bail out the failed creditor. Each country needs to decide how to deal with the above-mentioned challenges when establishing a legal framework. National governments have adopted different responses to the challenges of decentralized decision-making. A key question is how a country chooses to control sub-national borrowing in order to avoid the risks associated with it.

Based on a sample that includes Indonesia, Mexico, the Philippines, Poland, and South Africa, Martell and Guess (2006) consider the legal framework to be of paramount importance and suggest establishing such a

[4] Except when transfers are excluded. The inability of states to fund their own-expenditure without central government transfers results in higher state-level deficits.

framework first in a sequence of reforms, followed by a viable supply-side and a creditworthy demand-side of the borrowing market. A regulatory framework should at least deal with three challenges:

- First, a regulatory framework must not prohibit sub-national borrowing. Rather, the legal framework should be such that sub-national entities are allowed to engage on their own with financial markets to finance their projects. In that sense, the regulatory framework enables demand by devolution of borrowing power to sub-national entities. It is furthermore important to stipulate which levels of government may borrow. This helps regulating the interaction of different levels of government.

- Second, a regulatory framework should provide predictability, clarity and confidence in sub-national borrowing. Only a clearly stated legal framework can encourage participants, ranging from investors to municipal officers to engage with sub-national borrowing. To play this overarching role, the design of the framework is crucial: The framework needs to be well formulated, comprehensible and consistent. It also has to cover all necessary aspects.

- Third, a good regulatory framework can reduce the risk of imprudent borrowing by preventing over-borrowing and by providing instructions on how to deal with financial crises. Over-borrowing at the sub-national level and instability at the macroeconomic level in form of financial deficits or inflation are less likely to happen when there is a good system of regulations.

Empirical support for the hypothesis that institutional constraints limit government spending is not fully conclusive. While rare cross country evidence shows that the effectiveness of institutional constraints heavily depends on the type of control being imposed and a number of idiosyncrasies of the country in question (Plekhanov and Singh, 2006), there is mixed evidence from country-level studies conducted in the United States and Europe. For other sources of debt finance in the United States, Abrams and Dougan (1986) conclude that restrictions on borrowing and spending are not significant in explaining state budget outcomes. The French case appears to suggest that macroeconomic policy measures emanating from the central government do affect local government borrowing decisions (Derycke and Gilbert, 1985). Less conclusive results are obtained by Kenyon (1991) on the effects of caps on federal and local tax-exempt bond issues in the United States. While caps were shown to be effective in reducing the volume of borrowing, they do not appear to have a significant impact on whether sub-national governments substitute tax-exempt bonds for other sources of borrowing.

Further confirmation that institutional restrictions do matter can be found in Alt and Lowry (1994), who examine the effectiveness of state-level fiscal control in the United States. Their empirical results suggest that divided party governance matters when it comes to responding to exogenous shocks. Interestingly, they also find significant differences between Democrats and Republicans when it comes to fiscally relevant decisions. Although more cautious in arriving at general conclusions, Poterba (1995) provides further confirmation of the role of fiscal rules in the United States. The opposite result can be found in a study of Spain by Cabases et al. (2007). This provides evidence that municipalities are sensitive to institutional restrictions on their decisions to borrow. On the one hand, borrowing appears to be used mainly for investment as established by the law. On the other hand, restrictions on short-term and emergency borrowing based upon a maximum percentage of the previous year's revenues significantly affect levels of current-year indebtedness. The type of municipality and the level of local co-funding also matter as far as municipal borrowing is concerned.

III. Institutional Background: Sub-national borrowing control regimes

In order to have a better understanding of the impact of sub-national borrowing, it is desirable to review the different institutional settings that have been used to regulate or control the operation of sub-national credit markets. In this section we review four main, not mutually excludable, settings that can be found in the international practice, namely: (i) market discipline; (ii) rule-based controls; (iii) administrative controls; and (iv) cooperative approach (Ter-Minassian and Craig, 1997).

III.1 Market Discipline

Some countries rely exclusively on capital markets to restrain sub-national borrowing. Market discipline means that financial markets are capable to send appropriate signals to prevent a borrower from entering the "unsustainable area." There are, however, certain preconditions that need to be satisfied for financial private markets to be an effective control instrument for sub-national borrowing. These include (Lane, 1993): (i) capital markets must be free and open; (ii) potential lenders must have available information about the borrower's outstanding debt and repayment capacity; (iii) there should be no chance or possibility of bailout of lenders by the central government; and (iv) borrowers must have the ability to respond with adequate policies to the signals sent by the market.

In this sort of setting, sub-national governments have generally direct access to financial markets to meet their borrowing requirements. Also they independently decide how much and from whom to borrow, and on what to spend the borrowed money. Relying on market discipline in controlling the sub-national borrowing has worked in countries with high standards of transparency and governance at all government levels, and with no significant history of bailouts. In most emerging markets and developing countries, however, as well as in some developed countries, one or more the requirements for effective market discipline on sub-national borrowing are missing. In particular, information on sub-national finance is often not accurate and comprehensive enough, sub-national governments often have access to borrowing funds under "privileged" terms (e.g. municipal development banks or sub-national enterprises), and many have significant bailout histories (through fiscal gap filling transfers or through debt restructuring). Moreover, existence of implicit guarantee by the central government prevents market signals to work effectively.

Examples of market disciple in controlling the sub-national borrowing can be found, among some others, in provinces in Canada, the U.S. states and Swedish municipalities. However, as mentioned above, in many parts of the world, the capital markets at the local level are inadequately developed to be able to efficiently discipline sub-national governments. In such circumstances, credit rating agencies at the sub-national level are becoming increasingly important to evaluate the performance of intergovernmental system. In this same context, some sub-national governments have adopted fiscal responsibility rules (that are self-imposed) trying to improve their credit rating in the market. Examples for these trends are present in Canada, Switzerland, and the United States. Some countries in Latin America, such as Argentina, Brazil, Colombia and Peru, recently have sought to follow this approach, at least partially, with the introduction of a Fiscal Responsibility Laws (Webb, 2004).

III.2 Rule Based Approach

Rule-based controls consist of fiscal rules imposed by the central government and specified in the constitution or in organic laws. Such rules introduce a constraint on fiscal choices by sub-national governments to guarantee that fiscal outcomes will remain predictable and robust regardless of the government in charge. Rules may take different forms: ceilings on debt or total borrowing, deficit targets,

maximum expenditure rules, the "golden rule" (borrowing proceeds must be spent exclusively on capital projects), or rules related to debt payment capacity.

Debt ceilings are in general simple and easy to monitor. A deficit target has the advantage of simplicity as well, and of being easily understood by the wider public, but it may be unsuccessful in preventing excessive debt accumulation because of off-budget items. The most frequent deficit target rules are those targeting the overall budget deficit (for example, Austria, Belgium, Spain, and most U.S. states) or operating deficit (for example, Norway). However, deficit target rules can be met with higher revenues and expenditures as well, which may have macroeconomic implications. Expenditure rules set the limits on expenditure level, and are conceptually simple, easy to monitor, and can be most directly controlled. The golden rule, limiting sub-national governments' borrowing to investment purposes only, mostly satisfies the intergenerational equity justification for borrowing. However, borrowing for infrastructure does not guarantee by itself macroeconomic and debt stability. Typically, infrastructure investments are required to provide "adequate" economic and social rates of return to be desirable or be approved. Many countries currently implement some form of the golden rule (for example, the United Kingdom, Germany, Spain, and most states in the U.S.) Rules related to debt repayment capacity attempt to simulate the workings of the market discipline approach by relating the limits on the indebtedness to expected debt service on the debt.

Fiscal rules have the advantage of being generally transparent, more effective in addressing long-term sustainability and intergenerational equity, depending on the accuracy of financial indicators, and relatively easy to monitor. Their effectiveness, however, depends on their specificity, comprehensiveness of coverage, and, most importantly, the degree of political commitment to their observance and enforcement. They as well can be counterproductive if poorly designed, that is, if in particular, there is no clear specification of appropriate escape clauses and of credible sanctions for noncompliance. It is needless to say that the availability of information to timely access compliance is crucial to the fiscal rules' effectiveness. Most countries using a rule-based approach use a variety of rules, sometimes redundant.

III.3 Administrative Approach

This approach gives the central government direct control over sub-national borrowing. Administrative controls may take different forms that vary in comprehensiveness and degree of detail. Examples are setting an annual (or even more frequently) limits on the overall sub-national government debt; prohibition of external (foreign) borrowing; review and approval of individual borrowing operations (including approval of the terms and conditions); or the centralization of all government borrowing with on-lending to sub-national governments. Administrative controls have tended to focus more on overall levels of borrowing and debt, rather than on authorization of individual borrowing operations.

Countries like Greece, Ireland, Mexico, or the United Kingdom practice administrative controls. In Mexico, the states and municipalities, including their decentralized agencies and public enterprises, can only borrow domestically to finance investment outlays up to the ceilings set by their respective legislatures. Unlike several other countries in Latin America, Mexico does not have a Fiscal Responsibility Law even under consideration. It uses financial sector regulations instead to motivate state-level prudence. In the United Kingdom, a local authority may not, without the consent of the Treasury, borrow from a lender from abroad or other than in sterling. In Spain, for example, foreign debt and bond issuances by sub-national governments are subject to the approval of the ministry of finance.

Administrative controls, especially when central authorization of individual sub-national borrowing is involved, carry a significant moral hazard, resulting from the fact that central government may find it difficult

to refuse to financially support the lower levels of government in the case of impending defaults. On the other hand, the administrative approach has several advantages. First, the central government can control both the macroeconomic and external debt policy. Second, central government's control may increase sub-national borrower's credibility, given that foreign lenders often require a central government guarantee, and it is likely result in better terms and conditions received in foreign financial markets. In overall, the effectiveness of administrative approach in controlling sub-national borrowing and promoting their fiscal discipline depends crucially on the de-politicization of the central government's decisions, and on availability of information needed to shape these decisions and check their enforcement. [5]

III.4 Cooperative Approach

Under this approach, sub-national borrowing controls are designed through a negotiation process between the federal/central and the lower levels of government. Sub-national governments are actively involved in reaching an agreement on overall general government deficit targets, on main revenue and expenditure items, as well as on the limits on financing of individual sub-national jurisdictions. This approach is in practice in some European countries and in Australia.

In Austria, for example, the "Consultation mechanism" between different levels of government and the "Stability pact" were implemented in 1999 (Thoni, Garbislander, and Haas, 2002) to ensure lowering and maintaining the overall deficit below 3 percent. Similar arrangements exist in Spain (Lopez-Laborda et al. ,200??). In Belgium, the sub national borrowing is supervised by a High Finance Council (HFC), which comprises members nominated by the federal, regional, and community levels, and the Belgian National Bank. In Australia, a fiscal institution called the Loan Council coordinates the fiscal policies and borrowing decisions of Australian states. Brazil and Argentina as well promote cooperation between levels of government. [6]

The cooperative approach combines many individual advantages of the other three approaches which is both its main strength and its main weakness. A clear advantage lies in promoting dialogue and exchange of information across various government levels, as well as in raising awareness of the macroeconomic implications of their budgetary choices. However, the preconditions for its success include the absence of severe fiscal stress; relative homogeneity of the sub-national units; a tradition of cooperation in intergovernmental relations; relatively strong bargaining position of the central government to be able to effectively guide the intergovernmental negotiations, which in many emerging markets' conditions may not be the case; and availability of reliable and timely information to access compliance with agreed borrowing limits. Finally, weakness of the cooperative approach is that when it is poorly implemented it reproduces the flaws of other approaches, instead of their advantages (Ahmad, Albino, and Singh, 2005).

IV. Methodology and Variables

IV.1 Methodology

Two alternative approaches can be undertaken to assess the determinants of fiscal sustainability using survival analysis, namely gradient approach and level approach (Adam and Bevan, 2003). Under the gradient approach, fiscal adjustment ends when a country fails to keep reducing the deficit by a certain

[5] Including information on off-budget activities of the sub-national government, and on incurred arrears.

[6] Brazil through debt restructuring agreements with states and municipalities, and Argentina through bilateral pacts between the nation and the provinces.

threshold amount each year. Under the level approach, the end of fiscal consolidation episode is reached when the deficit goes above a certain deficit threshold. In this study a modified gradient approach is chosen with 0 percent threshold. A fiscal adjustment is considered as continuing if budget balance as a share of total expenditure changes by more than 0 percentage points per year.

This study employs annual panel data between 1990 and 2008 for 60[7] developed, developing and countries in transition. To define the dependent variable, this study uses general government[8] primary[9] balance (Budget Balance), as a share of gross domestic product (GDP). The reason for choosing general government rather than primary budget balance at the sub-national level is the following: When the central government faces the sub-national fiscal imbalances, it can react in the following three ways. First option for the central government is to cover the sub-national imbalances. Second option is to design the tax and/or transfer system through which the sub-national government would receive larger portion of the overall revenues collected. Finally, the third option is that the central government ignores the sub-national fiscal imbalances. Regardless of which option the central government will choose, the overall national fiscal balance is likely to deteriorate.

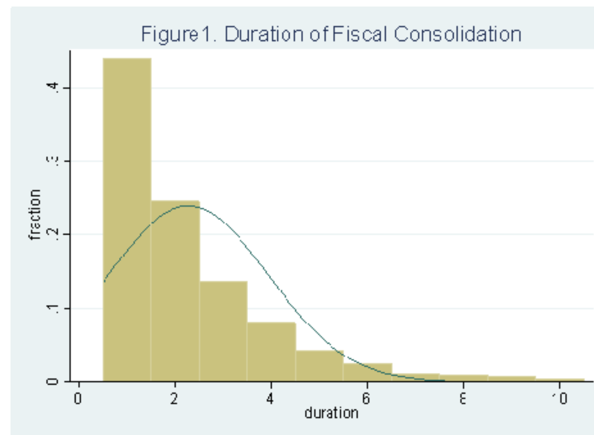
Based on these data, a dummy variable called "Failure" is generated, which takes value zero when the annual variation of Budget Balance is greater or equal zero (years of fiscal consolidation), and takes value one when the annual variation is lower than zero (years of fiscal expansion). Using the dates in which failure event occurs, a new variable called "Duration" is built, which counts the intervening years between consecutive failures (the time span that fiscal consolidation lasts). In our sample, the minimum number of years that a consolidation lasts is one year, and the maximum is fifteen years.

Table1 presents the structure of data on Failure and Duration. The total number of observations is 847 and the average duration of fiscal consolidations is around 2 years, the maximum duration being 10 years. The number of registered failures is 330, and the average probability of ending a fiscal consolidation is 39 percent. Figure1 shows the duration of fiscal consolidations in the period 1990-2008, where 44 percent of fiscal consolidations lasts one year, 25 percent two years, 13.7 percent lasts three years, and 17.3 percent lasts four and more years.

[7] List of countries provided in the Appendix.
[8] The general government sector consists of entities that fulfill the functions of government as their primary activity and can be divided into central, state, and local government subsectors, depending on a country. In the Government Finance System (GFS), statistics for the general government sector and each of its subsectors are presented on a consolidated basis, to avoid the double counting of transactions. Consolidation involves the elimination of all transactions "that occur among the units being consolidated. In other words, a transaction of one unit is paired with the same transaction as recorded for the second unit and both transactions are eliminated … For example … consolidated interest revenue and expense exclude the interest paid by the debtor general government unit to the creditor. Similarly, sales of goods and services between consolidated units are also eliminated." (Internatinal Monetary Fund, 2001)(Internatinal Monetary Fund, 2001: 33)
[9] Revenues – Expenditures + Interest Payments

Table 1. Descriptive Statistics: Failure and Duration

	Failure	Duration
Mean	0.390	2.267
Standard Deviation	0.488	1.164
Variance	0.238	2.770
Skewness	0.453	1.819
Kurtosis	1.205	6.742
Number of failures	330	
Observations	847	



A. Non-parametric Estimation

The time dependency of duration. This section proceeds very briefly with the non-parametric analysis, which tries to investigate whether fiscal consolidation is positively or negatively dependent on their accumulated duration. This is typically done by estimating the two following functions:

1. The survivor function gives the probability that the duration of the fiscal consolidation (T)[10] is greater or equal to t, and is defined as
$$S(t) = \Pr(T \geq t) = 1 - F(t) \quad (1)$$

2. The hazard function gives, for each duration, the probability of ending a consolidation episode, conditioned on the duration of the consolidation through that moment, and is defined as

[10] T is the discrete random variable that measures the time that passes between the beginning of a fiscal consolidation and its transition to a non-consolidation period.

$$h(t) = \Pr\left(T = {}^{t}/_{T} \geq t\right) \quad (2)$$

Figure 2 shows the estimated survivor function, where we can see that about 30 percent of episodes lasts 3 years or more.

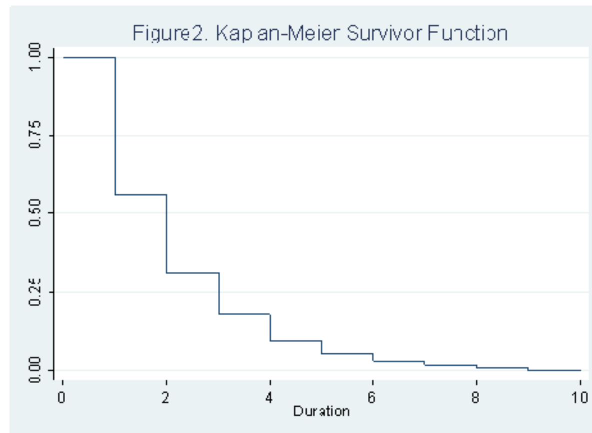


Figure2. Kaplan-Meier Survivor Function

The estimated hazard function, in Figure 3, gives evidence of positive dependence of fiscal consolidations on their accumulated duration.

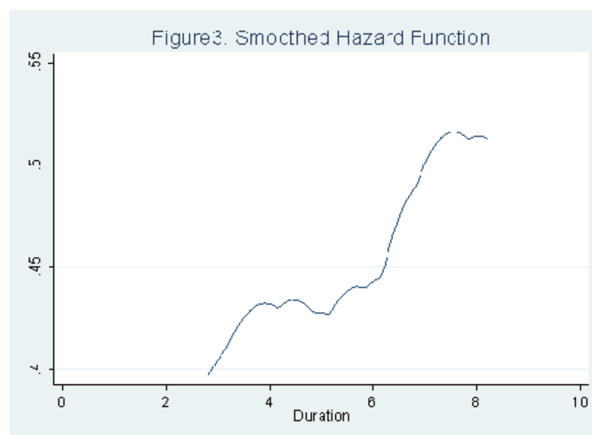


Figure3. Smoothed Hazard Function

B. Parametric Estimation

Non-parametric analysis does not allow one to analyze other factors other than accumulated duration that may explain the probability of ending fiscal consolidations. To address this issue, we estimate a Model of Proportional Hazard (PH), which assumes that the hazard function can be split as follows:

$$h(t, X) = h_0(t) \cdot g(X) \quad (3)$$

where $h_0(t)$ is the baseline hazard that captures the dependency of data to duration, while $g(X)$ is a function of individual variables. This function of explanatory variables is a negative function, usually defined as $g(X) = \exp(X'\beta)$, so model has the following form:

$$h(t, X) = h_0(t) \cdot \exp(X'\beta) \quad (4)$$

This model can be estimated initially without imposing any specific functional form on the baseline hazard function, following the Cox Model. An alternative estimation can be done by imposing one specific parametric form to the function $h_0(t)$. In this case, the models most commonly used are the Weibull Model and the Exponential Model. In the Weibull Model, $h_0(t) = pt^{p-1}$, where p is a parameter that has to be estimated. When $p = 1$, the Weibull Model is equal to the Exponential Model, where there exists no dependency on duration. On the other hand, when the parameter $p > 1$, there exists a positive dependency on duration, and a negative dependency when $p < 1$. Therefore, by estimating p it is possible to test the hypotheses of duration dependency of fiscal consolidations.

Apparently, the case examined in this study is a case of multiple failure-time data where more than one failure occurs for the same subject (country), causing failure-times to be correlated within cluster (country), violating the independence of failure-times assumption required in traditional survival analysis. If more than one spell is observed for a country, it is realistic to assume that these spells are not independent. Thus, likelihood function based on model (4) is misspecified for multiple spells since it does not account for intra-country correlation of the spells observed on the same country.

Following (Lin & Wei, 1989), it is necessary and sufficient to modify only the variance-covariance matrix of the estimators since the correlated durations affect the variance while the model parameters can be estimated consistently without accounting for this correlation. This implies that parameters of the model can be estimated by treating spells as independent, and then obtained variance and covariance estimates can be modified to account for the dependences. More precisely, given that estimated variance-covariance matrix obtained as the inverse of the information matrix does not take into account the additional correlation in the data, Lin and Wei (1989) propose a modification of the following form:

$$V = I^{-1}(\beta)G'(\beta)G(\beta)I^{-1}(\beta) \quad (5)$$

where $G(\beta)$ is a $m \times p$ matrix of the group efficient score residuals (m is the number of clusters $(G_\downarrow 1, G_\downarrow 2, \ldots, G_\downarrow m)$, while p is the number of time-dependent covariates).

IV.2 Variables

Variables of interest are alternative borrowing control regimes, namely administrative, rule based, cooperative regime and market discipline, with base category including countries in which borrowing is prohibited at the sub-national level.

Control Variables

Vector of control variables includes a set of institutional, economic, political, and demographic variables that are expected to be related to different demands for expenditure financing and, therefore, different need for borrowing. Hence, these demands put a pressure on sub-national fiscal performance and affect the length of fiscal consolidation.

The control variables are:

1. *Number of previous failures*: this variable controls for the accumulated number of ends of fiscal consolidations that have taken place in each country before the current consolidation. It is, ceteris paribus, expected that the larger this number, the higher is the probability an episode of fiscal consolidation would end.

2. *Initial budget balance*: this variable takes into account the fact that initial fiscal consolidations influence policymakers in deciding how much adjustment is needed to stabilize the public finances. This controls for the fact that countries with high budget balance may not feel compelled to continue with fiscal adjustment, as the balance may already be close to sustainable level. Therefore, this variable is expected to increase the probability of ending the consolidation episode.

3. *The size of the fiscal adjustment*: this variable is measured as a cumulative change in the budget balance during the fiscal consolidation episode. The larger the size of the consolidation, the longer the episode is hypothesized to last, because a larger adjustment tends to signal the willingness of the authorities to achieve fiscal sustainability.

4. *Central government budget balance:* Rodden (2002) argues that sub-national government fiscal performance may be positively correlated with the central government long-term fiscal performance. Plekhanov and Singh (2006) provide the following three reasons for this relationship. First, the average central government fiscal balance is a proxy for the society´s preference toward the fiscal sustainability. Second, the average central government fiscal balance captures possible business cycle effects, especially for countries having few observations on sub-national government fiscal balance. Third, central government fiscal balance partly absorbs the effects of fiscal crises that affect the fiscal performance. Therefore, longer consolidation episodes are expected in sub-national and general government budgets in countries with well behaved central governments.

5. *Vertical Fiscal Imbalance*: this variable is measured as a percentage of sub-national received grants of their total revenue and represents the sub-national government dependence on the central government. The literature provides the evidence that higher vertical fiscal imbalance is positively correlated with sub-national fiscal indiscipline and high spending, hence with shorter consolidation episodes.

6. *Fiscal decentralization*: fiscal decentralization is measured as a share of sub-national own revenues in total general government revenues Prud'homme (1994) argues that one of the dangers of decentralization is that it makes macroeconomic stabilization programs more difficult to implement because sub-national government fiscal policies can run counter to national policies. It can, therefore, lead to worse

fiscal outcomes. Singh and Plekhanov (2006) indicate that it may also reflect the central government's attempt to shift part of the fiscal burden onto sub-national governments. On the other side, (Shah, 2005) finds that fiscal decentralization is associated with improved fiscal performance and better functioning of internal common market. Hence, the effect of fiscal decentralization on duration of consolidation episode is ambiguous.

7. *Sub-national tax autonomy*: variable tax autonomy takes value one if sub-national government has an authority to set tax rate and/or change the tax base. It is expected that sub-national governments with more tax autonomy are better able to optimize their revenues to their expenditure needs and avoid jeopardizing their fiscal balance. This variable is therefore expected to be associated with longer consolidation periods.

8. *Borrowing for only investments purposes* as opposed to allowing borrowing for deficit financing is expected to have positive effect on primary fiscal balance trough more than one channel. First, prohibiting borrowing for financing fiscal deficit positively affects sub-national fiscal responsibility. Second, borrowing for capital investments has potentially positive effect on increasing the sub-national revenue base in the long run and, through it, potential higher revenue collection.

9. *Corruption* is measured by the survey-based perception index which takes value between zero and six, with higher index meaning lower corruption. Perceived corruption is assumed to be associated with weak government institutions and, therefore, lower fiscal discipline and higher probability of an end of consolidation episode.

10. *Government stability* is an assessment both of the government's ability to carry out its declared programs, and its ability to stay in office. The risk rating assigned is the sum of three subcomponents (government unity, legislative strength, popular support), each with a maximum score of four points and a minimum score of 0 points. A score of 4 points equates to Very Low Risk and a score of 0 points to Very High Risk. More stable governments are expected to more likely impose a harder budget constraint on all levels of government and may improve fiscal outcomes.

11. *GDP per capita growth:* this variable is meant to account for better fiscal performance of developed countries.

12. *Population density:* Increasing population density implies a higher cost of the publicly provided good due to congestion (Fenge & Meier, 2002) However, for some public goods, such as sewer, the cost can fall with increasing population density (Haug, 2004). This variable as well serves as a proxy for sub-national administrative capacity and ability to successfully administer sub-national borrowing. Lower population density may indicate existence of smaller size of sub-national units that usually lack of staff. Having all mentioned in mind, as in case of fiscal decentralization, the effect of population density on fiscal performance is ambiguos.

13. Finally, dummy for *European Union* member countries accounts for the "Maastricht effect" that imposes restrictions on fiscal behavior, both sub-national and national, and is expected to be associated with longer consolidation periods and lower probability of ending a consolidation episode.

V. Results

Table 2 presents parameter estimates for the three alternative previously discussed hazard function specifications. Country-dummies are included in all regressions to account for unobserved heterogeneity coming from individual country effects. The *p* parameter in the Weibull estimation is positive and greater than 1, indicating increasing hazard function over time.

Log likelihood ratio, Akaike Information Criteria (AIC) and Bayesian information criterion (BIC) is used to discriminate among three parametric models. Although the best fitting model is the one with the largest log likelihood, the preferred model is the one with the smallest AIC value. As Table 2 shows, the Weibull estimation is the parametric model that at the same time best fits our data (has the largest log likelihood) and is the most preferred (has the smallest both AIC and BIC value).

As results suggest, most of the control variables that are statistically significant have expected effect on probability of ending consolidation episode. Estimated coefficients on variables of our primary interest, borrowing control regimes, suggest that, comparing with an option of prohibiting borrowing at the sub-national level, countries that primarily rely on rule based, cooperative and administrative regime are more effective in maintaining fiscal consolidation, rule based regime being the most successful (about 77 percent smaller hazard than prohibiting sub-national borrowing). Results also suggest that market discipline as an instrument for controlling borrowing at the sub-national level perform worse in achieving fiscal sustainability than prohibit sub-national borrowing. This result may be explained by the requirements for successful market discipline that, as discussed above, in many countries, especially developing, are not fully met. However, our result suggest that the difference in the performance between prohibited and sub-national borrowing regulated by the marker is neither statistically nor economically significant.

On the other hand, results suggest that in presence of high sub-national revenue dependence on intergovernmental transfers from the central government, countries relying on cooperative and administrative controls have significantly higher probability of ending fiscal consolidation episode that countries prohibiting borrowing at the sub-national level. This result as well corresponds to the characteristics of these two regimes that both represent the highest level of central government control of sub-national borrowing, which in presence of high vertical fiscal imbalance may as well include larger probability of soft budget constraint. In this case, overall government fiscal balance suffers through two channels. First, existence of soft budget constraint results in lower sub-national fiscal responsibility. Second, bailing out the sub-national government deteriorates the central government budget and, through a spillover effect, budgets of other sub-national governments in the country that are as well highly fiscally dependent on intergovernmental transfers. Previously explanation of characteristics of the cooperative regime, that combines many individual advantages of the other three approaches, is in line with this result.

VI. Robustness Analysis

To check for robustness of the results, the parametric estimation from the previous section is replicated by using three alternative "Stronger" definitions of fiscal consolidation, namely, if an annual change in general government primary budget balance is less than 0.5, 0.75 and 1 percent. It can be said that the 0 percent threshold is the minimum threshold that one can impose to differentiate fiscal consolidation years from fiscal expansion ones. The 1 percent threshold is the most common in the literature on fiscal adjustments,

because it discriminates in favor of strong consolidation experiences, where the political commitment to reduce the public deficit is strong and cannot be attributed to unintended outcomes.

Table 2. Parametric estimation of proportional hazard model

	(1)	(2)	(3)
	Weibull	Exponential	Cox
Number of previous failures	1.146***	1.075***	1.096***
	(0.038)	(0.018)	(0.024)
Initial budget balance	0.980	0.991	0.988
	(0.028)	(0.010)	(0.017)
Size of the adjustment	0.007**	0.042***	0.029***
	(0.017)	(0.044)	(0.039)
Central Government Primary Balance	0.832	0.931	0.836
	(1.893)	(0.826)	(1.108)
Administrative regime	0.306***	0.621**	0.493***
	(0.136)	(0.125)	(0.132)
Cooperative regime	0.343**	0.658*	0.552**
	(0.166)	(0.153)	(0.165)
Rule based regime	0.230**	0.523**	0.422**
	(0.135)	(0.139)	(0.147)
Market discipline	1.048	1.012	1.006
	(1.536)	(0.701)	(0.894)
Sub-national tax autonomy	0.642*	0.878	0.702*
	(0.169)	(0.103)	(0.137)
Borrowing only for capital investments	1.453	1.222	1.296
	(0.581)	(0.212)	(0.291)
Tax autonomy*Investments	0.571	0.749	0.730
	(0.505)	(0.297)	(0.386)
Sub-national own revenues	0.105	0.390	0.197
	(0.196)	(0.325)	(0.234)
Vertical Fiscal Imbalance	0.026***	0.276***	0.127***
	(0.028)	(0.126)	(0.082)
Administrative*VFI	25.391***	3.086**	6.350***
	(30.216)	(1.585)	(4.520)
Cooperative*VFI	15.017**	2.364	3.735*
	(18.288)	(1.256)	(2.799)
Rule based*VFI	6.741	1.607	2.156
	(9.751)	(1.036)	(1.893)
Market discipline*VFI	2.798	1.231	1.631
	(6.561)	(1.360)	(2.347)
Corruption	1.162	1.083*	1.109
	(0.119)	(0.051)	(0.071)
Government Stability	0.874***	0.951**	0.922***
	(0.041)	(0.020)	(0.028)
GDP per capita growth	0.980	0.989*	0.987
	(0.013)	(0.006)	(0.008)
Population Density	0.986*	0.993**	0.991**
	(0.007)	(0.003)	(0.005)
EU membership	0.452***	0.703***	0.630***

	(0.114)	(0.082)	(0.097)
Duration Dependence Parameter (P)	2.607		
Log likelihood	-689.446	-959.756	-4996.8
AIC	1424.892	1963.512	10055.6
BIC	1533.951	2067.829	10202.59
Observations	847	847	847

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

As Table 3 shows, the number of failures under all three *Stronger* definitions is larger than under the Weaker definition. Furthermore, under the *Stronger* definitions, the average probability of ending the fiscal consolidation is higher than under the *Weaker* one, and increases with the threshold, while the average duration decreases with the threshold. The maximum duration under all three *Stronger* definitions is 7 years, with around 68, 72 and 77 percent of consolidations ending after only one year for threshold 0.5, 0.75 and 1 percent, respectively.

Table 3. Descriptive Statistics: Failure and Duration, Alternative definitions of fiscal consolidation

	Threshold 0%	Threshold 0.5%	Threshold 0.75%	Threshold 1%
		Failure		
Mean	0.390	0.668	0.717	0.760
Standard Deviation	0.488	0.471	0.451	0.428
Variance	0.238	0.222	0.204	0.184
Skewness	0.453	-0.715	-0.962	-1.213
Kurtosis	1.205	1.511	1.925	2.470
Number of failures	330	566	607	643
Observations	847	847	847	847
		Duration		
Mean	2.267	1.542	1.431	1.345
Standard Deviation	1.164	0.972	0.861	0.748
Variance	2.770	0.944	0.740	0.560
Skewness	1.819	2.244	2.619	2.871
Kurtosis	6.742	8.740	11.175	13.428
Observations	847	847	847	847

Figure 4 compares the duration of fiscal consolidations between alternative definitions of fiscal consolidation. Unlike with the *Weak* definition, where 30 percent of fiscal consolidations lasted three or more years, with *Stronger* definitions this percentage decreases to only 13 percent or less.[11]

[11] 13.6 percent for 0.5 threshold; 9.6 percent for 0.75 threshold; 7.3 percent for 1 percent threshold.

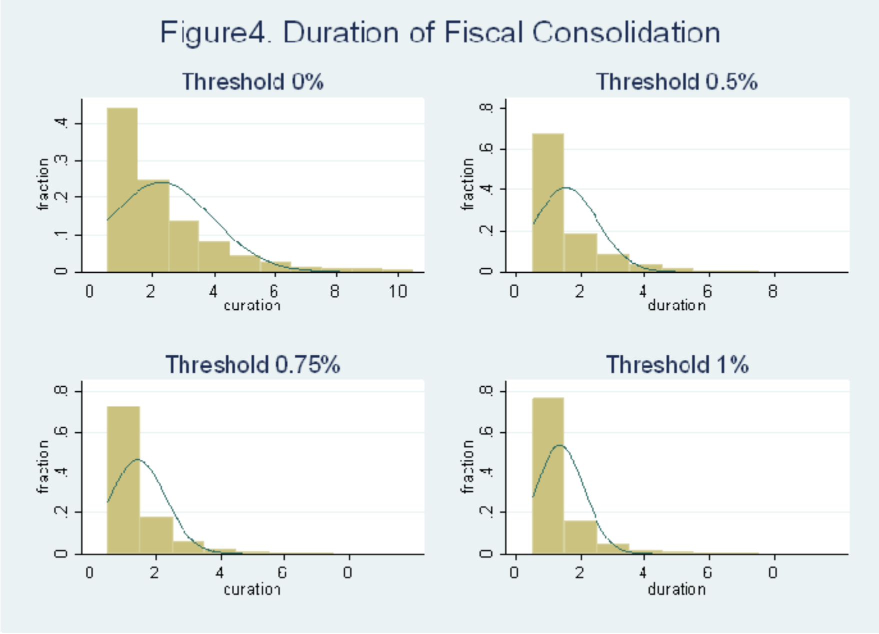


Figure4. Duration of Fiscal Consolidation

Figure 5 and Figure 6 show the Kaplan-Meier survivor and hazard estimates respectively, for all thresholds. Graphs show that the probability of maintaining the consolidation after the first year decreases with larger threshold, while after the second or third year the probability decreases at a slower rate under the *Stronger* definitions than under the *Weak* one. This behavior is translated into a smoothed hazard function that shows higher positive dependence on accumulated duration under the *Stronger* definitions than under the *Weaker* one.

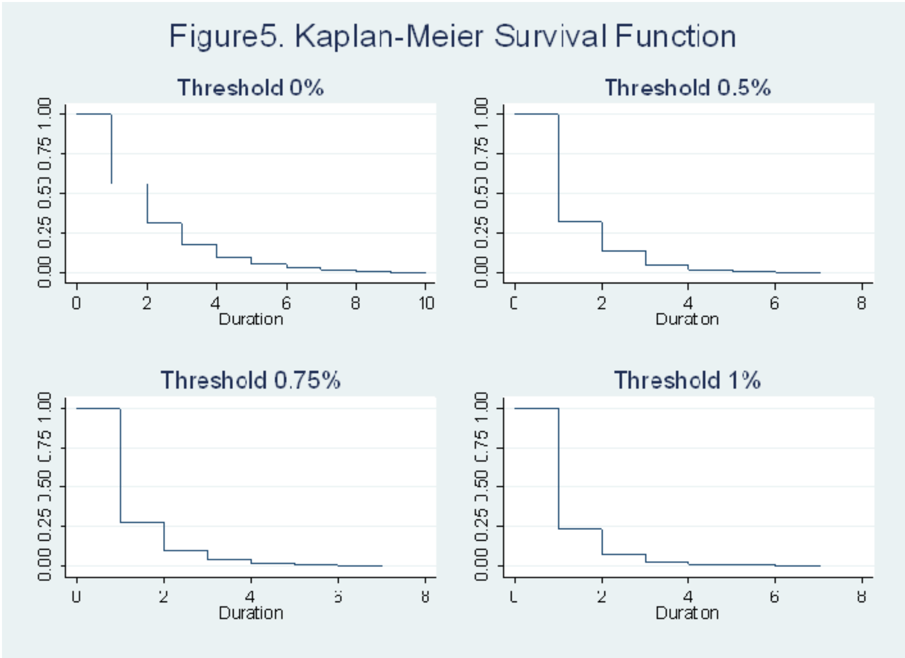


Figure5. Kaplan-Meier Survival Function

Finally, the original model is re-estimated using the *Stronger* definitions of fiscal consolidation under the new definition of fiscal consolidation. If results obtained under the 1 percent threshold are robust, estimates on explanatory variables will maintain their "signs" and statistical significance. Table 4 presents a comparison of the Weibull estimation under the *Weaker* (threshold 0%) and all three *Stronger* (threshold 0.5%, 0.75% and 1%) definitions of fiscal consolidation.

Table 4 presents results on main variables of interest, sub-national control regimes and selected control variables. Results suggest that with stronger definition of fiscal consolidation, only rule based control and administrative control seem to be consistently more effective in maintaining fiscal discipline than prohibited borrowing at the sub-national level. A surprising result is obtained on market discipline which completely changes sign once a stronger definition of fiscal consolidation is employed. This result may possibly be explained by stronger importance of transparency and governance in imposing tighter requirements in maintaining fiscal consolidation, and in such countries, market discipline is efficient instrument for sub-national borrowing control. Result on government stability is in favor of this preposition. Moreover, with high fiscal dependence on intergovernmental transfers from central government, none of the regimes seem to be efficient in maintaining fiscal consolidation when the applied threshold is higher. This result certainly is in favor of the conjecture that larger sub-national dependence on financing from the central government budget increases the risk of moral hazard, reduces sub-national fiscal responsibility and may result in overspending.

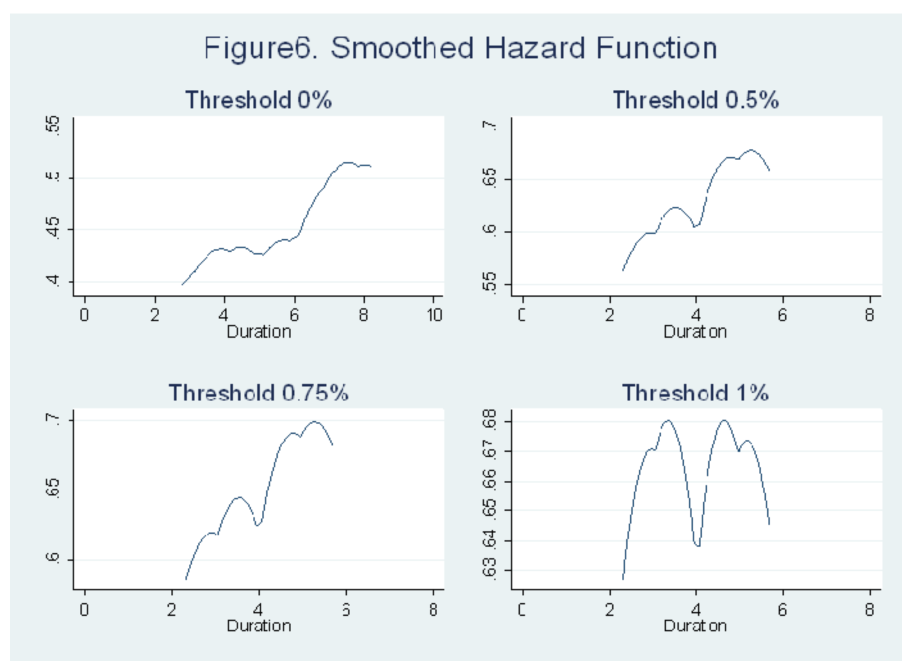


Figure6. Smoothed Hazard Function

Table4. Parametric Weibull Estimation by Threshold

	0.0%	0.5%	0.75%	0.1%
Number of previous failures	1.146***	0.991	0.977	0.980
	(0.038)	(0.030)	(0.030)	(0.030)
Initial budget balance	0.980	0.952**	0.933**	0.917***
	(0.028)	(0.023)	(0.025)	(0.029)
Size of the adjustment	0.007**	0.000	0.000	0.000
	(0.017)	(0.003)	(0.001)	(0.000)
Administrative regime	0.306***	0.264**	0.390*	0.381
	(0.136)	(0.161)	(0.190)	(0.224)
Cooperative regime	0.343**	0.567	1.095	0.993
	(0.166)	(0.395)	(0.680)	(0.676)
Rule based regime	0.230**	0.206**	0.434	0.371*
	(0.135)	(0.128)	(0.231)	(0.209)
Market discipline	1.048	0.060**	0.167	0.161
	(1.536)	(0.079)	(0.225)	(0.272)
Administrative*VFI	25.391***	14.699	16.648**	15.069
	(30.216)	(24.426)	(23.669)	(26.255)
Cooperative*VFI	15.017**	6.104	1.954	1.733
	(18.288)	(10.943)	(3.138)	(3.069)
Rule based*VFI	6.741	8.694	17.416*	22.452*
	(9.751)	(15.859)	(28.882)	(40.090)
Market discipline*VFI	2.798	56.836*	25.773	106.422
	(6.561)	(135.319)	(63.607)	(314.500)
Duration Dependence Parameter (P)	2.607	2.678	2.695	2.709
Log likelihood	-689.446	-550.965	-493.473	-430.221
AIC	1424.892	1147.929	1032.945	906.443
BIC	1533.951	1256.988	1142.004	1015.502
Observations	847	847	847	847

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

VII. Conclusion and Policy Recommendations

This article examined the effect of main four sub-national borrowing control regimes, relative to prohibited borrowing at the sub-national level, on duration of sub-national governments' fiscal consolidations using panel data for 60 countries for the period between 1990 and 2008. Baseline definition for fiscal sustainability in this study assumes threshold of 0 percent and robustness of the results obtained using this definition is tested by increasing the threshold from zero to 1.

The results suggest cooperative regime performs dominantly in sustaining fiscal consolidation, which is somewhat in line with the property of this approach that it combines the advantages off all other three approaches. Second, results suggest that market discipline performs the least favorably comparing to other three approaches and prohibited sub-national borrowing, which corresponds to the fact that in many countries the requirements for market discipline as a successful instrument for sub-national borrowing control are not met. Finally, administrative and cooperative regimes in presence of high fiscal dependence on central government financing seem to increase the probability of ending a consolidation episode. This result is not surprising given that these two regimes refer to significantly high degree of central government control, which may increase the risk of moral hazard. Strong central government control may give encouraging signs to the sub-national governments to over borrow and to expect being bailed out by the central government. This deteriorates the general government budget directly, through unplanned bailout

from the central government, and indirectly, through spillover effect on other sub-national governments who are as well highly fiscally dependent on central government financing. Finally, the robustness analysis suggests that the administrative controls over sub-national borrowing consistently perform dominantly comparing to other regimes. However, this effect vanishes with large central government financing to the sub-national budget.

The results obtained in this study imply following policy recommendations. First, sub-national government borrowing does not have to endanger overall fiscal sustainability if the borrowing control framework is well designed. Second, reducing fiscal dependence on central government financing and, in return, giving more tax autonomy to sub-national government, reduces the risk of moral hazard and improves the effectiveness of borrowing control in maintaining fiscal balance at the sustainable level.

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Appendix

Table A1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Prohibited	847	0.17	0.38	0.00	1.00
Administrative	847	0.39	0.49	0.00	1.00
Cooperative	847	0.14	0.35	0.00	1.00
Rule Based	847	0.12	0.33	0.00	1.00
Market Discipline	847	0.17	0.38	0.00	1.00
Sub-national Tax Autonomy	847	0.57	0.49	0.00	1.00
Borrowing for only investment purpose	847	0.44	0.50	0.00	1.00
General Government Primary Balance	847	0.04	0.08	-0.32	0.75
Central Government Primary Balance	847	0.02	0.06	-0.36	0.37
Sub-national Own Revenues	847	0.15	0.12	0.00	0.69
Vertical Fiscal Imbalance	847	0.39	0.21	0.01	0.89
GDP per capita growth rate	847	3.11	4.01	-21.17	14.02
Population density	847	106.57	105.56	2.22	492.32
Corruption	847	3.61	1.44	0.33	6.00
Government Stability	847	8.31	1.71	2.92	12.00

Table A2. Sample structure by sub-national borrowing control regime

	Number of observations	Percentage	Number of id*
Prohibited	146	17.24	16
Administrative	331	39.08	30
Cooperative	119	14.05	7
Rule Based	103	12.16	10
Market Discipline	148	17.47	9
Total	847	100	

* Does not add to 60 because countries change dominant control regime over the observed period

Table A3. Variable description and sources

Variable	Description	Source
Prohibited	=1 if sub-national government prohibited	Various sources (See Table A4 for details)
Administrative	=1 if administrative is dominant sub-national borrowing control regime	
Cooperative	=1 if cooperative is dominant sub-national borrowing control regime	
Rule Based	=1 if rule based is dominant sub-national borrowing control regime	
Market Discipline	=1 if market discipline is dominant as sub-national borrowing control regime	
Sub-national Tax Autonomy	=1 if sub-national government has authority to set tax rates and/or choose tax base	
Borrowing for only investment	=1 if sub-national borrowing is allowed only for investment purposes	
General Government Primary Balance	General Government: Revenue - Expenditures + Interest Payments	Government Finance Statistics Database, International Monetary Fund; Various individual country sources (See Table A4 for details)
Central Governmetn Primary Balance	Central Government: Revenue - Expenditures + Interest Payments	
Sub-national Own Revenues	Share of sub-national own revenues in total general government revenues	
Vertical Fiscal Imbalance	Share of sub-national intergovernmental transfers received from the central government in total sub-national revenues	
GDP per capita growth rate	Annual nominal GDP per capita growth rate	World Development Indicators
Population density	Population per square kilometer	
Corruption	Assessment of corruption within the political system	International Country Risk Guide, The PRS Group
Government Stability	Assessment both of the government's ability to carry out its declared program(s), and its ability to stay in office	

Table A4. Suurces on Government Finance and Qualitative Indicators by Country

id	Country	Observed Period	Government Finance	Qualitative Indicators
1	Albania	2000 - 2008	Fiscal Statistics of Government, 2008, Ministry of Finance, Albania	Dabla-Norris (2006); Urban Institute (2007); World Bank (2008)
2	Argentina	1990 - 2004	IMF GFS	Reid (2003); O'Neill (2006)
3	Armenia	2002 - 2008	IMF GFS	Boex et al. (2005); OECD (2006)
4	Australia	1990 - 2008	IMF GFS	Koutsogeorgopoulou (2007)
5	Austria	1990 - 2008	IMF GFS	Council of Europe (1999); OECD (2003); Fuentes et al. (2006); IMF (2008)
6	Azerbaijan	1994 - 1999	IMF GFS	Mikayilov (2007)
7	Belarus	1992 - 2008	IMF GFS	World Bank (1997)
8	Belgium	1990 - 2007	IMF GFS	IMF (2001); OECD (2007)
9	Bolivia	1990 - 2008	IMF GFS	IMF (2006)
10	Bosnia and Herzegovina	2004 - 2008	IMF GFS	Glasser et al. (2000)
11	Brazil	1990 - 2008	IMF GFS; Ministry of Finance Brazil (http://www.fazenda.gov.br/)	Mora and Varsano (2001); Eaton and Dickovick (2004); De Mello (2007)
12	Bulgaria	1990 - 2008	IMF GFS	Nikolov (2006)
13	Canada	1990 - 2008	IMF GFS	OECD (2003)
14	Chile	1991 - 2008	IMF GFS	OECD (2009)
15	China	1995 - 2008	IMF GFS	Dabla-Norris (2005)
16	Colombia	1998 - 2008	IMF GFS	Dillinger and Webb (1999); Chaparro et al. ((2005)
17	Costa Rica	2001 - 2007	IMF GFS	Hall et al. (2002)
18	Croatia	1994 - 2008	IMF GFS	Bajo (2004); Bajo (2007); Alibegovic (2007)
19	Czech Republic	1993 - 2008	IMF GFS	Jezek et al. (2004); Dillinger (2007)
20	Denmark	1990 - 2008	IMF GFS	Council of Europe (1997, 2008); Rattso (2005)
21	El Salvador	2001 - 2008	IMF GFS	IADB (1997)
22	Estonia	1995 - 2008	IMF GFS	Janso et al. (2004); Trasberg (2004); Dillinger (2007)
23	Finland	1990 - 2008	IMF GFS	Council of Europe (1997, 2009); OECD (2003)

24	France	1990 - 2008	IMF GFS	Council of Europe (1997), Leprince (2007)
25	Georgia	1996 - 2007	IMF GFS	Boex et al. (2005)
26	Germany	1990 - 2008	IMF GFS	Council of Europe (1998)
27	Greece	1994 - 2007	IMF GFS	Council of Europe (2000); Hawkesworth (2008)
28	Honduras	2002 - 2008	IMF GFS	IADB (1997)
29	Hungary	1990 - 2008	IMF GFS	Pigey (1999), Balas et al. (2004); Kovacs (2007)
30	Iceland	1990 - 2008	IMF GFS	Council of Europe (1997, 2006); OECD (2006)
31	India	1990 - 2008	IMF GFS; Ministry of Finance India (http://finmin.nic.in/)	Rao and Singh (2001), Purfield (2004); Heredia-Ortiz and Rider (2005); Garg (2007)
32	Indonesia	1990 - 2008	IMF GFS; Central Bureau of Statistics of the Republic of Indonesia (http://www.bps.go.id/aboutus.php?tabel=1&id_subyek=13)	ADB (2003); Alm and Indrawati (2004); World Bank (2007)
33	Ireland	1990 - 2007	IMF GFS	Council of Europe (1998); OECD (2003)
34	Italy	1994 - 2008	IMF GFS	Giuriato and Gastaldi (2009)
35	Japan	2001 - 2007	IMF GFS; Japan Statistical Yearbook, various years	Mochida (2001), Aoki (2008), Mochida (2008)
36	Kazakhstan	1997 - 2008	IMF GFS	Leschenko and Troschke (2006)
37	Korea	2005 - 2008	IMF GFS; Ministry of Strategy and Finance, South Korea	Kim (2003), OECD (2003)
38	Latvia	1994 - 2008	IMF GFS	Dunn and Wetzel (1999); Viktor (2004); Council of Europe (2006)
39	Lithuania	1991 - 2008	IMF GFS	Council of Europe (1996, 2006), Zigiene et al. (2008)
40	Macedonia	2005 - 2008	IMF GFS	Nikolov (2006)
41	Mexico	1990 - 2000	IMF GFS	Giugale et al. (2000)
42	Netherlands	1990 - 2008	IMF GFS	Kopits and Symansky (1998)
43	Norway	1990 - 2008	IMF GFS	Council of Europe (1997), Rattso (2005)

44	Pakistan	1997 - 2008	IMF GFS; Pakistan Statistical Yearbook, various years, Federal Bureau of Statistics	Bahl, Wallace and Cyan (2008)
45	Panama	1990 - 1994	IMF GFS	IMF (2006)
46	Poland	1993 - 2008	IMF GFS	Kopanska and Levitas (2004); Dillinger (2007)
47	Portugal	1990 - 2007	IMF GFS	Council of Europe (2006); OECD (2008)
48	Romania	1990 - 2008	IMF GFS	Belcher et al. (1997); Nikolov (2006)
49	Russian Federation	1998 - 2008	IMF GFS	Freinkman and Yossifov (1999); Danielian (2002); Nikiforov et al. (2004); Singh (2009)
50	Serbia	2002 - 2008	Bulletin, Public Finance, December 2009, Ministry of Finance Serbia (http://www.mfin.sr.gov.yu/eng/)	Republic of Serbia (2005, 2006)
51	Slovakia	1996 - 2008	IMF GFS	Kling and Niznansky (2004)
52	Slovenia	1992 - 2007	IMF GFS	Klun (2006)
53	South Africa	1990 - 2007	IMF GFS	Liebig et al. (2008)
54	Spain	1990 - 2008	IMF GFS	Garcia-Mila and McGuire (2002); Ahmad et al. (2005); Toboso (2007)
55	Sweden	1990 - 2001	IMF GFS	Council of Europe (1996); Rattso (2005); Ministry of Finance Sweden (2005); SALAR (2006), Toonen et al. (2007)
56	Switzerland	1990 - 2007	IMF GFS	Feld et al. (2003)
57	Ukraine	1998 - 2008	IMF GFS	German Advisory Group (2004), OECD (2006)
58	United Kingdom	1990 - 2008	IMF GFS	Council of Europe (1999), OECD (2003)
59	United States	1990 - 2001	IMF GFS	Thomas (2005)
60	Vietnam	2002 - 2008	Ministry of Finance, Vietnam (http://www.mof.gov.vn/DefaultE.aspx?tabid=5740)	Wescott (2006)

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