

Fall 12-14-2011

# Sub-National Borrowing, Is It Really a Danger?

Violeta Vulovic

Follow this and additional works at: [https://scholarworks.gsu.edu/econ\\_diss](https://scholarworks.gsu.edu/econ_diss)

---

## Recommended Citation

Vulovic, Violeta, "Sub-National Borrowing, Is It Really a Danger?." Dissertation, Georgia State University, 2011.  
[https://scholarworks.gsu.edu/econ\\_diss/77](https://scholarworks.gsu.edu/econ_diss/77)

This Dissertation is brought to you for free and open access by the Department of Economics at ScholarWorks @ Georgia State University. It has been accepted for inclusion in Economics Dissertations by an authorized administrator of ScholarWorks @ Georgia State University. For more information, please contact [scholarworks@gsu.edu](mailto:scholarworks@gsu.edu).

## PERMISSION TO BORROW

In presenting this dissertation as a partial fulfillment of the requirements for an advanced degree from Georgia State University, I agree that the Library of the University shall make it available for inspection and circulation in accordance with its regulations governing materials of this type. I agree that permission to quote from, to copy from, or to publish this dissertation may be granted by the author or, in his or her absence, the professor under whose direction it was written or, in his or her absence, by the Dean of the Andrew Young School of Policy Studies. Such quoting, copying, or publishing must be solely for scholarly purposes and must not involve potential financial gain. It is understood that any copying from or publication of this dissertation which involves potential gain will not be allowed without written permission of the author.

---

## NOTICE TO BORROWERS

All dissertations deposited in the Georgia State University Library must be used only in accordance with the stipulations prescribed by the author in the preceding statement.

The author of this dissertation is:

Violeta Vulovic  
Department of Economics  
Andrew Young School of Policy Studies  
14 Marietta Street, NW  
Atlanta, GA 30303

The director of this dissertation is:

Dr. Jorge L. Martinez-Vazquez  
Department of Economics  
Andrew Young School of Policy Studies  
14 Marietta Street, NW  
Atlanta, GA 30303

Users of this dissertation not regularly enrolled as students at Georgia State University are required to attest acceptance of the preceding stipulations by signing below. Libraries borrowing this dissertation for the use of their patrons are required to see that each user records here the information requested.

Name of User	Address	Date	Type of use (Examination only or copying)
--------------	---------	------	--

SUB-NATIONAL BORROWING, IS IT REALLY A DANGER?

By

Violeta Vulovic

A Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree

of

Doctor of Philosophy

in the

Andrew Young School of Policy Studies

of

Georgia State University

GEORGIA STATE UNIVERSITY

2011

Copyright by  
Violeta Vulovic  
2011

## ACCEPTANCE

This dissertation was prepared under the direction of the candidate's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics in the Andrew Young School of Policy Studies of Georgia State University.

Dissertation Chair: Dr. Jorge L. Martinez-Vazquez  
Committee: Dr. Roy W. Bahl  
Dr. Klara Sabirianova Peter  
Dr. Jean E. Tesche

Electronic Version Approved:  
Mary Beth Walker, Dean  
Andrew Young School of Policy Studies  
Georgia State University  
December 2011

## ACKNOWLEDGEMENTS

To my parents, Jevdokija and Miloje Vulovic

## TABLE OF CONTENTS

I. INTRODUCTION.....	1
II. SUB-NATIONAL BORROWING AND MACROECONOMIC STABILITY: SELECTED COUNTRY EXPERIENCE.....	15
ARGENTINA.....	15
BRAZIL .....	22
CONCLUSION .....	28
III. LITERATURE REVIEW .....	30
FISCAL DECENTRALIZATION AND FISCAL SUSTAINABILITY AND MACROECONOMIC STABILITY .....	31
MORAL HAZARD AND ADVERSE SELECTION.....	33
SUPPLY AND DEMAND FOR BORROWING .....	35
The Supply Side – Capital Markets.....	35
The Demand Side - Creditworthiness.....	35
HOW TO REGULATE THE SUB-NATIONAL BORROWING?.....	37
Qualitative Reviews.....	38
Empirical Single Country Studies .....	40
Empirical Cross-Country Studies .....	41
CONCLUSION .....	45
IV. SUB-NATIONAL BORROWING REGULATIONS.....	46
THE EX-ANTE REGULATIONS.....	48
Market Discipline .....	49
Cooperative Approach.....	59
EX-POST REGULATION.....	61
CONCLUSION.....	63
V. THEORETICAL ANALYSIS .....	64
SUB-NATIONAL GOVERNMENT BUDGET CONSTRAINT .....	64
ASSUMPTIONS ON THE FUNDAMENTAL SUB-NATIONAL BUDGET COMPONENTS AND ON THE INSTITUTIONAL FRAMEWORK .....	71
Sub-National Own-Source Revenues .....	72
Intergovernmental Transfers.....	74



Sub-National (Non-Interest) Expenditures .....	77
Sub-National Primary Balance .....	80
Sub-National Borrowing and the Real Interest Rate .....	81
Gross Regional Domestic Product Growth Rate .....	86
DEBT LIMIT AND FISCAL DECENTRALIZATION .....	87
Debt Limit Response to an Increase in Revenue Autonomy .....	89
Debt Limit Response to a Change in Borrowing Regulations.....	93
CONCLUSION .....	94
VI. EMPIRICAL ANALYSIS .....	97
SUB-NATIONAL BORROWING REGULATIONS .....	97
METHODOLOGY .....	100
Effect of Sub-National Borrowing On Fiscal Sustainability .....	100
Determinants of Sub-National Borrowing Regulations.....	116
Sub-National Borrowing and Fiscal Performance.....	131
Sub-National Borrowing and Duration of Fiscal Sustainability.....	139
CONCLUSION .....	147
VII. CONCLUSION, POLICY IMPLICATIONS AND THE NEED FOR FUTURE RESEARCH.....	150
APPENDIX.....	155
REFERENCES .....	165

## LIST OF FIGURES

Figure	Page
1. Argentina, Provincial Revenues, Expenditures and Debt (billions of pesos) .....	20
2. Argentina, Provincial Revenues, Expenditures and Debt (percentage of GDP).....	21
3. Brazil, Sub-national Revenues, Expenditures and Total Debt (percent of GDP).....	24
4. Brazil, Sub-national Total and Bonded Debt (percentage of GDP).....	26
5. Broad Types of Ex-ante Sub-national Borrowing Regulations (relative frequency in the sample) .....	46
6. Sanctions for Non-compliance by Type of Ex-post Sub-national Borrowing Regulations (relative frequency in the sub-sample) .....	48
7. Allowing Borrowing at the Sub-national Level and Imposing Legal Sanctions for Non-compliance (relative frequency in the sample).....	49
8. Allowing Sub-national Borrowing in Foreign Capital Markets (relative frequency in the sub-sample).....	54
9. Imposing Limits on Borrowing and Debt and the “Golden Rule” (relative frequency in the sub-sample).....	56

## LIST OF TABLES

Table	Page
1. Sub-National Borrowing Regulations.....	99
2. Factor Change in relative risk ratios of choosing particular sub-national borrowing regulation .....	124
3. Factor Change in the Odds, Specification with General Government Primary Balance .....	125
4. Factor Change in the Odds, Specification with Sub-National Government Primary Balance	127
5. Probabilities of Choosing Sub-National Borrowing Regime at Average Values of Independent Variables, Specification with General Government Primary Balance .....	129
6. Probabilities of Choosing Sub-National Borrowing Regime at Average Values of Independent Variables, Specification with General Government Primary Balance .....	130
7. Effect of Sub-national Borrowing on General Government Primary Balance .....	135
8. Effect of Sub-national Borrowing on Sub-National Government Primary Balance.....	137
9. Marginal Effects on Median Reported Duration, General Government Primary Balance .....	141
10. Marginal Effects on Median Reported Duration, Sub-National Government Primary Balance .....	144

## ABSTRACT

### SUB-NATIONAL BORROWING, IS IT REALLY A DANGER?

By

VIOLETA VULOVIC

December 2011

Committee Chair: Dr. Jorge L. Martinez-Vazquez

Major Department: Economics

Sub-national borrowing has become an increasingly important source of sub-national finance, thanks to widespread decentralization of spending responsibilities, increasing revenue power and borrowing capacity of sub-national governments,. While there are arguments for and against giving sub-national authorities room for raising their own financial resources, appropriate sub-national borrowing regulatory framework can reduce chances of defaults and fiscal crises.

This dissertation investigates the effectiveness of sub-national borrowing regulations in maintaining fiscal sustainability. More precisely, it tests the hypothesis that if sub-national borrowing is restricted to financing capital investments (the “golden rule”), and if the sub-national governments are provided with some measure of revenue autonomy, then the sub-national borrowing should not endanger fiscal sustainability. Based on the sub-national government panel data for 57 countries between 1990 and 2008 and applying the system GMM estimator and the survival analysis, this dissertation provides support for this hypothesis.

The results suggest that the “golden rule” is effective in maintaining fiscal sustainability at both general and sub-national government level. Sub-national tax autonomy, however, seems to have positive but very small marginal effect on fiscal sustainability. The obtained results also emphasize the risk of the soft budget constraint and the moral hazard. Significant central government financing may give encouraging signs to the sub-national governments to over-borrow and to expect being bailed out by the central government. The results obtained in this dissertation imply following policy recommendations. First, sub-national government borrowing does not have to endanger fiscal sustainability if the borrowing regulation framework is well designed and according to specific country circumstances. Second, reducing fiscal dependence on central government financing reduces the risk of moral hazard and improves the effectiveness of borrowing control in maintaining fiscal balance at the sustainable level.

## I. INTRODUCTION

Decentralization of borrowing authority to the sub-national governments and fiscal sustainability at the national level are two issues in public financial management that have been continuously debated. On the one side of the argument, it is encouraged to empower the sub-national authorities to raise their own financial resources for financing capital investments and other types of needed public spending. On the other hand, often limited institutional capacity at the sub-national level, the history of sub-national government defaults in certain fiscally decentralized countries, and the potential lack of effective controls give central governments strong arguments to limit sub-national borrowing autonomy. Thus, the challenge is whether it is possible to simultaneously achieve the goals of providing borrowing autonomy and at the same time maintain fiscal discipline<sup>1</sup> that would prevent the insolvency of sub-national governments and would not endanger national fiscal sustainability.

Sub-national governments have less incentive than central governments to be concerned with the macroeconomic impact of their policies, as they do not bear the full cost of their actions (i.e. the “moral hazard” problem). Therefore, to the sub-national governments, national fiscal sustainability<sup>2</sup> has characteristics of a public good. Some authors contend that fiscal decentralization can enhance fiscal sustainability (Fukasaku & De Mello, 1998) while others argue that ensuring fiscal sustainability in a decentralized system requires carefully regulated sub-national borrowing (Ter-Minassian, 1997b). However, the empirical literature on this issue is

---

<sup>1</sup> Fiscal discipline refers to imposing and enforcing constraints on revenues, fiscal balance, and public debt. It is commonly advised to impose constraints on all the three aggregates at the same time to limit the space for going around it (Fölscher, 2007).

<sup>2</sup> Macroeconomic crises involving public debt such as those in Russia, Argentina, Brazil, and East Asia, emphasize fiscal sustainability as an important component of macroeconomic stability. There is an empirical evidence of a direct relationship between the fiscal policy and the macroeconomic performance, offering evidence that fiscal policy may induce output volatility (Fatás & Mihov, 2003, 2006).

inconclusive. Thus, it is important to investigate the effect of fiscal decentralization on fiscal sustainability in the presence of the sub-national borrowing autonomy and regulation.

Those in favor of fiscal decentralization argue that it could promote economic efficiency. Oates (1993: p.240) states that, “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.” Stansel (2005) explains that there are two basic reasons for this. The first one is related to Hayek’s (1945) knowledge problem, according to which centralized systems fail in responding to diverse local demands because of wide dispersion of knowledge.<sup>3</sup> The second problem relates to the idea of the government as a monopolist, as “the potential for fiscal exploitation varies inversely with the number of competing governmental units in the inclusive territory” (Brennan & Buchanan, 1980: p.180). Therefore, Stansel (2005) concludes that increasing competition between governments could help in limiting their space for extracting monopoly rents, and with enhancing economic efficiency and economic growth.

Importance of infrastructure for economic growth, quality of life and poverty reduction has been widely acknowledged in the development literature, as better infrastructure has shown to lower the costs of production, increase investments and raise productivity (OECD, 2006;

---

<sup>3</sup> “The economic problem of society is thus not merely a problem how to allocate “given” resources . . . It is rather a problem of how to secure the best use of resources known to any of the members of society . . . it is a problem of the utilization of knowledge not given to anyone in its totality. . . . This is not a dispute about whether planning is to be done or not. It is a dispute as to whether planning is to be done centrally, by one authority for the whole economic system, or to be divided among many individuals” (Hayek, 1945: 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. But this solves only part of the problem.. We need decentralization because only thus can we ensure that the knowledge of the particular circumstances of time and place will be promptly used” (Hayek, 1945: p. 524).

World Bank, 1994). According to the principle of subsidiarity, spending responsibility should be assigned to the level of government closest to the people that would be able to provide it efficiently (Council of Europe, 1995). Consequently, as a result of decentralization trends throughout the world and the importance of infrastructure for economic development, there has been increasing importance of the sub-national borrowing for financing infrastructure. This has resulted in many countries in shifting the responsibility of providing infrastructure services such as water, electricity, roads, etc. from the central to the sub-national governments.

Borrowing has become an increasingly important source of the sub-national finance, due to widespread decentralization of spending responsibilities, increasing revenue power and borrowing capacity of the sub-national governments. Proponents of sub-national borrowing emphasize its four potential benefits: (i) expansion of the sub-national fiscal space for the infrastructure financing; (ii) efficient and inter-generationally equitable outcomes from infrastructure financing through borrowing; (iii) increased fiscal transparency of the sub-national governments; and (iv) a deepening of financial markets. Academic literature provides an evidence of a positive effect of sub-national borrowing on the provision of infrastructure service (Freire & Petersen, 2004; Leigland, 1997; Peterson & Hammam, 1998).

Sub-national borrowing may affect infrastructure service delivery directly and indirectly. A direct effect results from the subsidiarity principle and conjecture that the sub-national infrastructure projects are implemented more efficiently when they are financed and implemented by the sub-national governments. An indirect effect results from the sub-national borrowing impacting the quality of sub-national governance (Jackson, 2007). Without the possibility of borrowing, the sub-national governments have fewer options for financing their infrastructure projects, which in the short run, may impair the level and quality of infrastructure



service delivery, while in the long run it may negatively affect sub-national economic competitiveness, future revenues and maintenance costs.

However, while there is a considerable consensus on its 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 fiscal and macroeconomic environment. Despite the acknowledgement of its benefits for finance infrastructure spending, it can create long-term problems for fiscal sustainability if the sub-national governments borrow to finance operating spending. Moreover, the sub-national borrowing may be in conflict with the national macroeconomic policy (Mikesell, 2007). Dafflon (2002b) points out that borrowing for financing the operating deficit would lead to an unmanageable debt burden and growth of the public sector beyond its optimal size.

Due to the potential long-term consequences of sub-national borrowing on fiscal sustainability and macroeconomic stability, most countries manage and supervise sub-national borrowing and debt by implementing ex-ante and/or ex-post borrowing regulations. The ex-ante regulations can consist of more or less direct control by the central government, of fiscal rules predetermined in the constitution or organic laws, or of a reliance on the financial markets and its mechanism to control borrowing. On the other hand, ex-post regulations consist of sanctions for non-compliance to the rules and for imprudent behavior. Webb (2004) contends that both ex-ante and ex-post regulations should be used simultaneously, and should consider both the borrowers and the lenders. Reliance on only the ex-ante regulations gives both the borrowers and the lenders an incentive for irresponsible behavior since they bear no consequences. On the other hand, reliance on only the ex-post regulations may give space to sub-national governments to

over-borrow and build up very large debts for which the central government could not enforce them to bear the consequences and would nevertheless be forced to bail them out.

Some may argue that for regulating sub-national borrowing it should be enough to rely on financial markets and its rules imposed on debtors and creditors. In this case, imposing any other legal rules would be unnecessary because market conditions already impose effective sanctions through higher interest rates. Moreover, creditors would not be willing to lend to those sub-national governments that borrow more than they can repay. In the case of issuing bonds, credit ratings would be low for those sub-national governments that are not creditworthy, because of which the investors may not be willing to buy unless they were offered a high premium. However, the history of sub-national borrowing in some decentralizing countries suggests that exclusive reliance on the financial markets in maintaining sub-national fiscal discipline may not be enough (Ter-Minassian & Craig, 1997). Many conditions, including developed financial markets, availability of financial information, and no expectation of bailouts by the central government, have to be satisfied for the financial markets to be an effective control mechanism for sub-national borrowing. Given that very few countries satisfy these conditions, market-based regulation is very often supported by fiscal rules or by more or less direct central government control (Ter-Minassian & Craig, 1997).

It is certain that the appropriate regulatory framework, where borrowing is only allowed for financing capital investments (the so called “golden rule”), accompanied by limits on the debt level and servicing capacity can reduce the chances of default and debt crises. Limits on the level of debt and debt servicing capacity are important because even if borrowing is issued only for financing capital investments, fiscal sustainability could still be endangered by too high of a debt burden imposed on current expenditures, having long-term consequences on the sub-national

credit ratings. For example, in the 1840s, eight American states defaulted on their debts and they still continued paying a premium on their debt in the 1990s (English, 1996).

However, the “golden rule” and debt limits may not be enough for enforcing sub-national fiscal discipline and maintaining fiscal sustainability. Other institutional factors must be present, as discussed below. For example, implicit or explicit federal government guarantee to the sub-national debtor increases the risk of sub-national borrowing endangering fiscal sustainability and macroeconomic stability. A commitment to reject bailouts to those sub-national governments is even more difficult when the financing of the sub-national government spending is heavily dependent on the intergovernmental transfers. On the other hand, when the sub-national government spending is financed mainly through their own sources of revenues, the central government has more ability to commit to a no bailout policy, thus giving stronger incentives to investors and to voters to “punish” the sub-national officials for uncontrolled spending and borrowing (Rodden & Wibbels, 2002). Hence, the sub-national governments must have access to significant tax bases, because otherwise, even if borrowing is put to productive use, it may still cause fiscal crises.

There are various definitions of fiscal sustainability that could be found in the literature. In their survey on fiscal sustainability, Balassone and Franco (2000) conclude that definitions depend on the sustainability requirements. The standard definition of fiscal sustainability is that the fiscal balance and the underlying trends are such that, in a steady state, the ratio of outstanding debt and debt servicing to GDP is not increasing over time (World Bank, 2010b). The IMF (2001) defines a set of fiscal policies as sustainable if a borrower is able to continue servicing its debt without an unrealistically large future correction to its income and expenditure. Finally, one purpose of fiscal sustainability analysis is to investigate whether or not certain sets

of policies lead to a default on sub-national government debt in the future (Burnside, 2005).

Based on that, this study employs the definition based on which fiscal policy is sustainable when the present value of future primary surpluses is equal to the current level of debt. If this condition is met then, regardless of the current level of outstanding debt, as long as it equals the present value of all future primary balances until the debt's maturity, it is considered to be sustainable.

Therefore, the questions this dissertation tries to answer are:

- What is the impact of regulated sub-national borrowing for financing capital investments, accompanied with revenue autonomy on fiscal sustainability?;
- Does any particular borrowing regulatory framework perform in a superior manner in maintaining fiscal sustainability?
- Is there a difference between the effects of sub-national borrowing regulations on the general and sub-national fiscal performance?
- What factors are important in choosing particular type of the sub-national borrowing regulations?

These issues are of particular importance because rapidly rising sub-national debt has played a crucial role in several countries during the recent financial crisis and those experiences hold important lessons for other countries undergoing the process of fiscal decentralization.

By answering the questions above, this dissertation provides the framework for testing the main hypothesis that is the focus of this study:

*H: If sub-national borrowing is numerically limited and restricted to financing capital investments and the sub-national governments are provided with some measure of revenue autonomy, then sub-national borrowing should not endanger fiscal sustainability.*

Despite the importance of these issues, little systematic empirical work has been done so far on the effect of sub-national borrowing on fiscal sustainability. The existing literature does not offer a definitive answer on whether borrowing at the sub-national level should be allowed, and if so, how it should be regulated. The few cross-country empirical studies that evaluate this effect use either only some aggregate measure of borrowing autonomy that does not take into account different types of regulations, monitoring and enforcement, or focus only on the effect of the fiscal rules. Moreover, most of these studies suffer from the econometric issues, such as not addressing potential reverse causality problem between fiscal sustainability and chosen types of borrowing regulations, not assuming dynamics in fiscal sustainability, or focusing on the sub-national rather than the general government fiscal performance. Finally, qualitative indicators of fiscal decentralization, such as ability of the sub-national governments to make autonomous decisions regarding the tax base and/or the tax rates, different forms of borrowing powers and regulation and enforcement, must be considered to avoid obtaining biased and misleading empirical results on the effects of sub-national borrowing on fiscal performance.

The primary contributions of this dissertation include building a theoretical framework of the relationship between sub-national borrowing and fiscal sustainability and the empirical estimation of this relationship using panel data for a large number of countries. The theoretical model builds on a general model of fiscal sustainability commonly used in the literature. This model is expanded by incorporating the components of fiscal decentralization to show that giving more expenditure, revenue, and borrowing autonomy to sub-national governments can be achieved without endangering fiscal sustainability. Showing under which conditions this holds true provides basic framework for testing the main hypothesis that is the focus of this study.

This study contributes to the empirical literature by investigating the relationship between sub-national debt and fiscal sustainability in the presence of the alternative types of both the ex-ante and ex-post sub-national borrowing regulations, rather than focusing on only one particular type. Moreover, different types of regulations are observed individually, rather than integrated in a type of index, allowing comparisons of their effectiveness in maintaining fiscal sustainability. Furthermore, the effect of sub-national debt and its regulation on fiscal sustainability is estimated while controlling for sub-national ability to set and/or change rates on important tax sources in their budgets. In addition, unlike previous studies on this issue, this dissertation investigates the determinants of choosing a particular type of sub-national borrowing regulations.

For testing the main hypothesis indicated above, this study uses an unbalanced panel data for 57 industrialized, developing, and transition countries between 1990 and 2008. Two alternative dependent variables are used; namely, the primary balance<sup>4</sup> at the general government<sup>5</sup> level and at the sub-national<sup>6</sup> level. The main variables of interest are four broad types of sub-national borrowing regulations, first classified by Ter-Minassian and Craig (1997); namely, market-based, rule-based,<sup>7</sup> cooperative, and administrative regulation. These types of sub-national borrowing regulations are compared with prohibiting borrowing at the sub-national level altogether.

---

<sup>4</sup> That is, Revenues – (Expenditures - Interest Payments)

<sup>5</sup> 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) of the IMF, 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.” (International Monetary Fund, 2001: p.33).

<sup>6</sup> The sub-national government represents all levels of government below the central government level.

<sup>7</sup> With a distinction made between centrally-imposed and self-imposed rules.

To evaluate the relationship between sub-national borrowing regulations and fiscal performance at the general and the sub-national government levels, this study applies two methodologies. First, it uses the “system” GMM estimator to evaluate how the primary balance changes as a result of changes in the level of sub-national outstanding debt, sub-national borrowing regulations, revenue and expenditure autonomy, and in control variables. Second, the duration analysis is employed to investigate the effect of the main and control variables on fiscal sustainability, when alternative levels of the primary balance are defined as fiscally sustainable. Finally, potential reverse causality problem between the primary balance and the types of sub-national borrowing regulations is addressed by applying the multinomial logit approach in the first state to estimate the predicted probabilities of choosing each type of regulations. This methodology allows the investigation of potential determinants of choosing each of the sub-national regulation types at the same time.

The theoretical results of this study can be summarized as follows:

- If sub-national borrowing is allowed only for financing capital investments, the fiscally sustainable debt limit increases with more revenue autonomy given to the sub-national governments if the transfer structure gives more incentive to an increase in revenue efforts and creditworthiness; and
- If sub-national borrowing is allowed only for financing capital investments, the fiscally sustainable debt limit increases with borrowing regulations that target fiscal performance and borrowing costs.

These theoretical results suggest that giving more revenue autonomy to the sub-national governments and allocating intergovernmental transfers in a way which would reward the sub-national revenue efforts should give the sub-national governments more ability to borrow

without endangering fiscal sustainability. In addition, the results suggest that, besides allowing sub-national borrowing for financing only capital investments, sub-national borrowing regulations based on fiscal rules and market discipline would be effective in maintaining the sub-national debt within a sustainable limit.

The empirical results suggest that, in general, the empirical support for the obtained theoretical results depends on the government level at which they are tested, and can be summarized as follows:

- Depth of the financial market is particularly important when choosing cooperative regulations and regulations based on centrally and self-imposed rules. Furthermore, countries with higher primary balances (both general and sub-national) are more likely to choose self-imposed rules and market-based regulations over the other types. Finally, countries with higher sub-national outstanding debt seem to be more likely to choose self-imposed fiscal rules to regulate the sub-national borrowing;
- Cooperative type of sub-national borrowing regulations seems to have positive effect on improving general government fiscal performance even in the case of high level sub-national debt and high dependence on intergovernmental transfers. However, none of the broad types of sub-national borrowing regulations seem to have a significant effect on fiscal sustainability at the sub-national level. These results are not consistent with the expectations that the policies focused on regulating sub-national behavior should be the effectiveness at the sub-national level. On the contrary, our results suggest that they have no effect at the sub-national level and provide support to the conjecture that sub-national fiscal behavior primarily affects the overall fiscal balance of the country;



- When a particular level of the primary balance is predetermined as sustainable, then self-imposed rules seem to be the only effective method in maintaining the primary balance above that threshold, for all government levels;
- The “golden rule” and limits on debt and borrowing positively affect the primary balance at all levels of government. However, their effectiveness in maintaining the primary balance above a predetermined threshold for a sustainable primary balance depends on the level of the threshold, being more efficient in the case of the lower threshold;
- More centralized types of regulations (administrative and cooperative) seem to be more effective with a higher threshold for fiscally sustainable primary balance, while more decentralized regulations (self-imposed rules) seem to show better performance with lower thresholds;
- Sub-national tax autonomy contributes to an increase in the general government primary balance but only when the sub-national governments do not depend on intergovernmental transfers. This effect is not found to be significant at the sub-national level, suggesting that the effect of sub-national tax autonomy is actually, on the margin, not significantly high;
- In those countries with a history of bailouts at the sub-national government level, the primary balance is, on average, lower at both the sub-national and the general government levels than in other countries, suggesting the importance of the absence of moral hazard for fiscal responsibility.

The obtained results suggest that sub-national borrowing should not endanger fiscal sustainability if it is allowed only for financing capital investments, regardless of how centralized decisions on the borrowing issuances are. The limit on borrowing and debt is also proven to play

an important role in maintaining fiscal discipline. The importance of sub-national tax autonomy does not seem to be as important as it was expected given its low marginal effect. However, the results highlight the risk of a soft budget constraint and moral hazard, as significant dependence on financing through the intergovernmental transfers may give encouraging signs to the sub-national governments to over-borrow and to expect to be bailed out by the central government. This causes the general government budget to deteriorate directly, through an unplanned bailout from the central government, and indirectly, through spillover effect on other sub-national governments which are highly fiscally dependent on central government transfers.

When choosing sub-national borrowing regulations, central government authorities should be guided, among other requirements, by their preferences towards fiscal sustainability. Depending on how the central government defines a sustainable fiscal balance, it may choose more or less centralized types of sub-national borrowing regulations. More centralized regulations of sub-national borrowing (e.g., administrative and cooperative) seem to be more appropriate when the central government's definition of fiscal sustainability is more strict, while for a more relaxed definition of fiscal sustainability, the more decentralized options for regulating the sub-national borrowing seem to be more suitable. Finally, none of the broad types of regulations shows a dominant effect on fiscal behavior at both the sub-national and the general government level.

This dissertation is organized as follows. Chapter II discusses potential dangers on sub-national borrowing and how it can play major role in debt and fiscal crises by providing an overview of crises in Argentina and in Brazil since the early 1980s. Chapter III reviews the literature on the effect of sub-national borrowing and regulations on fiscal sustainability and finds no consistent results and policy recommendations. Chapter IV discusses the ex-ante and ex-

post sub-national borrowing regulations and concludes that for enforcing sub-national fiscal discipline, both regulations have to be implemented. Moreover, countries choose types of ex-ante and ex-post regulations depending on political, economic and social characteristics. Changes in these characteristics over time may cause changes in the preferred type of regulation. . Chapter V develops a theoretical model which provides the basic framework for testing the main hypothesis of this study. Chapter VI explains the applied methodology and discusses the results supporting the tested hypothesis of this dissertation. Finally, chapter VII concludes this study and discusses potential areas for future research.

## II. SUB-NATIONAL BORROWING AND MACROECONOMIC STABILITY: SELECTED COUNTRY EXPERIENCE

As those who disagree with fiscal decentralization emphasize, giving more responsibilities to sub-national governments may endanger macroeconomic stability, suggesting that its maintenance requires imposing borrowing controls at the sub-national level. The literature on the sub-national borrowing emphasizes the provision of implicit guarantees to the sub-national government debt as one of the main problems with borrowing at the sub-national level, causing a classical moral hazard situation.

Argentina and Brazil represent two of the most decentralized developing countries and their past experiences with sub-national borrowing are still being used in the literature and by policy-makers to demonstrate the potential danger of fiscal decentralization for macroeconomic stability. For mostly political reasons, imposing a hard budget constraint has proved impossible in both countries in past periods, resulting in a large debt burden accumulated at the federal government level to cover the sub-national operating deficits. To add to the motivation of this study, this chapter describes the history of debt crises in Argentina and Brazil since the early 1980s.

### ARGENTINA

Argentina provides a very good example of how the sub-national credit market may be a significant contributor to financial crises. Even though Argentinian government system has been historically highly decentralized, with provinces enjoying significant autonomy, they did not have revenue power but were rather largely depended on the intergovernmental transfers. All levels of government were permitted to borrow, including the financing of the operating deficits. During the 1980s and 1990s, most of the financing went through the provincial banks, resulting

in large and unsustainable debt levels. Sub-national government borrowing played a major role in Argentine financial crises due to a loose federal government structure, high deficit financing, and significant government ownership of banks (Freire & Petersen, 2004).

Argentina started having debt problems during the 1976-1982 period when, after the oil shocks, many banks were eager to lend billions of dollars. In such circumstances, the government decided to liberalize the financial markets and to introduce a fixed exchange rate regime. This, however, caused a significant increase in public debt, which, by the end of 1982, reached almost 40 percent of GDP (Braun, 2006).

In August 1982 Mexico announced default on its financial obligations. Within a few weeks, the problem spread all throughout Latin America and to other countries, including Argentina which also defaulted. Period between 1983 and 1989 was characterized by deteriorated fiscal and debt conditions in Argentina. The government accumulated arrears, unpaid interests, and unregistered debts, resulting in an increase in debt to 60 percent of GDP in 1988.

In 1989, Carlos Menem, just elected President, enacted a structural adjustment program whose centerpiece was the Convertibility Law, which took effect on April 1, 1991. The Convertibility Plan fixed the exchange rate of the peso to the dollar and reduced inflation. Furthermore, tax revenues, especially from shared taxes, increased significantly due to stronger collection efforts, the presence of reverse-Oliveira-Tanzi effects,<sup>8</sup> and economic growth. Provincial real revenues increased by over 25 percent, and over a percentage point in GDP between 1991 and 1992 (Dillinger & Webb, 1999).

---

<sup>8</sup> The Oliveira-Tanzi effect is a phenomenon, named based on the work of Oliveira (1967) and Tanzi (1978), which relates to a decrease in real government revenues in a period of high inflation. The Oliveira-Tanzi effect also works in reverse, when following a sudden reduction in inflation, especially if inflation was high, there is a significant increase in revenues. This increase in revenue collection, however, is not a result of increased fiscal effort.

Prior to 1991, Argentine provinces borrowed excessively. A significant part of these loans was from their own provincial banks. As some provincial banks had a very poor loan recovery and were to collapse, the central bank lent them significant amounts of rediscounts to prevent that. However, with the 1991 Convertibility Plan the provincial banks were no more able to rely on the central government to save them. The central bank was no longer able to discount any provincial bank loans, and the deposit insurance was limited and fully funded by the banks themselves.<sup>9</sup>

With the 1991 Convertibility Plan, the federal government also renegotiated its outstanding debts with the provinces. Both provincial governments and the federal government had mutual obligations whose value was subject to dispute, especially because the 1989 hyperinflation distorted their real value. The negotiations ended with the federal government as a net debtor and provincial governments without owing any debt to the federal government (Dillinger and Webb, 1999).

During the 1990s, the central government bailed out the sub-national governments by replacing sub-national debt with national debt. Moreover, provincial banks were no longer allowed to lend to the provincial governments. Nevertheless, provinces continued to borrow from private banks using intergovernmental transfers as the collateral. The central government was not able to control sub-national borrowing behavior, especially using the borrowing issuance to finance the current deficits, due to the significant degree of sub-national independence provided in the Constitution.

There were no effective national regulations on the sub-national governments' ability to raise debt in Argentina. The Constitution allowed each province to regulate its own borrowing,

---

<sup>9</sup> Since 1996, each provincial bank has been required to issue subordinated debt which other provincial banks would hold, which enables banks to monitor each other (Freire & Petersen, 2004).

resulting in varying procedures among provinces. Most provinces, however, required that each borrowing issuance receives approval from the institution in charge of controlling provincial borrowing. Furthermore, the provincial borrowing issuance could not finance current expenditures, while foreign borrowing required approval of the Ministry of Economy (Freire & Petersen, 2004). In addition, municipalities were required to be authorized by the municipal councils or by the provincial financial authorities to be able to borrow.

However, the authorities did not tightly exercise their role in controlling provincial borrowing. Some argued that, even though this seemed like a violation of the sub-national government hard budget constraint, it, in fact, was useful in preventing the expectation that the federal government would take responsibility and provide an eventual bailout (Dillinger & Webb, 1999). The 1991 Convertibility Law prevented rolling over existing debts from the provincial banks. Moreover, starting 1993, the Ministry of Economy explicitly prohibited any federal agency to pay a creditor on behalf of a province. Furthermore, if intergovernmental transfers were used as collateral for provincial borrowing, the federal government would deduct any debt service from future transfers.

The post-convertibility revenue boom ended in December 1994 with the Mexican Tequila crisis, as real GDP fell by 4 percent and provincial revenues fell by 8 percent in 1995. Moreover, as provinces could not rely anymore on the Central Bank as a savior, they were forced to use their own resources to prevent the endangered provincial banks from failing.

Provinces reacted to the fall in revenues with more borrowing and requesting additional funding from the federal government, which resulted in a dramatic increase in the provincial debt. By mid-1996 debt increased to \$17.2 billion or 6.3 percent of GDP (Figure 1 and Figure 2). Provincial governments mainly borrowed by running arrears, paying staff and suppliers with

bonds, and from private banks using intergovernmental transfers as a guarantee. In the case of the latter, the debt servicing used to be deducted by the National Bank (Banco de la Nación) from the shared revenues with the federal government, so the provinces used to receive only the remainder of the transfer. As a result, provinces with high levels of debt ended up receiving significantly reduced net transfers, reaching up to one-third of the full transfers.

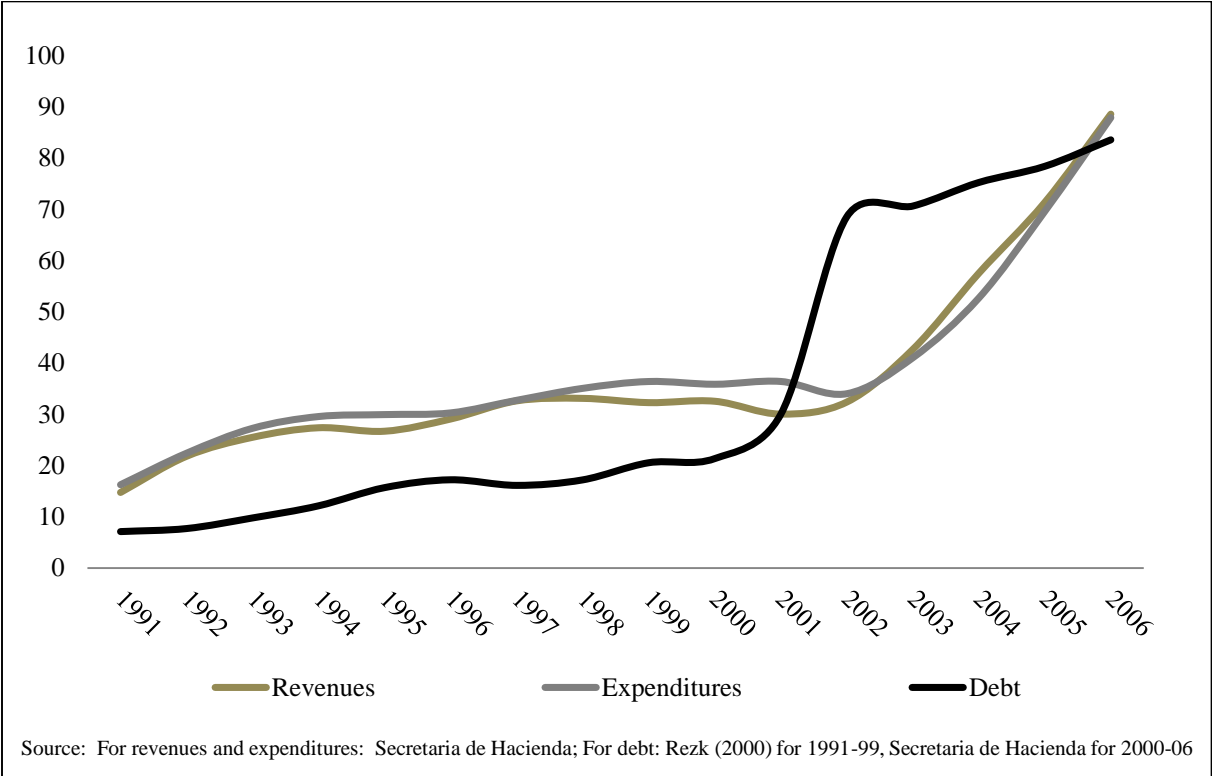
Different provinces had a different amount of fiscal adjustment, with Buenos Aires province receiving the least adjustment among the major ones. In 1991, Buenos Aires province had an overall deficit to revenues ratio of 10 percent. Between 1991 and 1994, real revenues increased by 83 percent, non-interest expenditures by 50 percent, capital spending increased four times, and interest costs more than five times. The final result was an increase in total spending of 71 percent between 1991 and 1994 and the budget deficit decreased to 4 percent in 1994, due to a higher increase in revenues than spending. As the 1994 Tequila crisis caused a real 3 percent decline in Buenos Aires' 1995 revenues, the province had to respond with a reduction in expenditures in order to sustain the 1994 level of deficit. However, between 1995 and 1997, real revenues increased by 23 percent and expenditures by 36 percent, which resulted in increased overall deficit, average annual new borrowing issuance of around \$400 million over the period 1995-1997, and total debt of 32 percent of GDP by 1997.

In 1991, the province of Córdoba had a budget deficit of 16 percent to GDP - higher than Buenos Aires - which further increased by 1994 due to a higher increase in expenditures (83 percent) than in revenues (75 percent). To finance its deficit, Córdoba borrowed from its provincial bank - \$436 million in 1993, and \$725 million 1994. However, the 1994 Tequila crisis caused Córdoba's real revenues to fall by 5 percent and the provincial bank was not able to give more loans to the province. Because of this, the province was forced to repay some of its own



debt and to borrow externally, instead, to finance the deficit. Following that, Córdoba’s overall budget deficit improved in the next two years, reaching 3 percent in 1996, and turning into a 2 percent surplus in 1997. In addition, much of its short-term debt was converted into longer-term obligations, mostly to private banks, and debt to the provincial bank of Córdoba declined to \$181 million by the end of 1996, and to \$100 million in 1997.

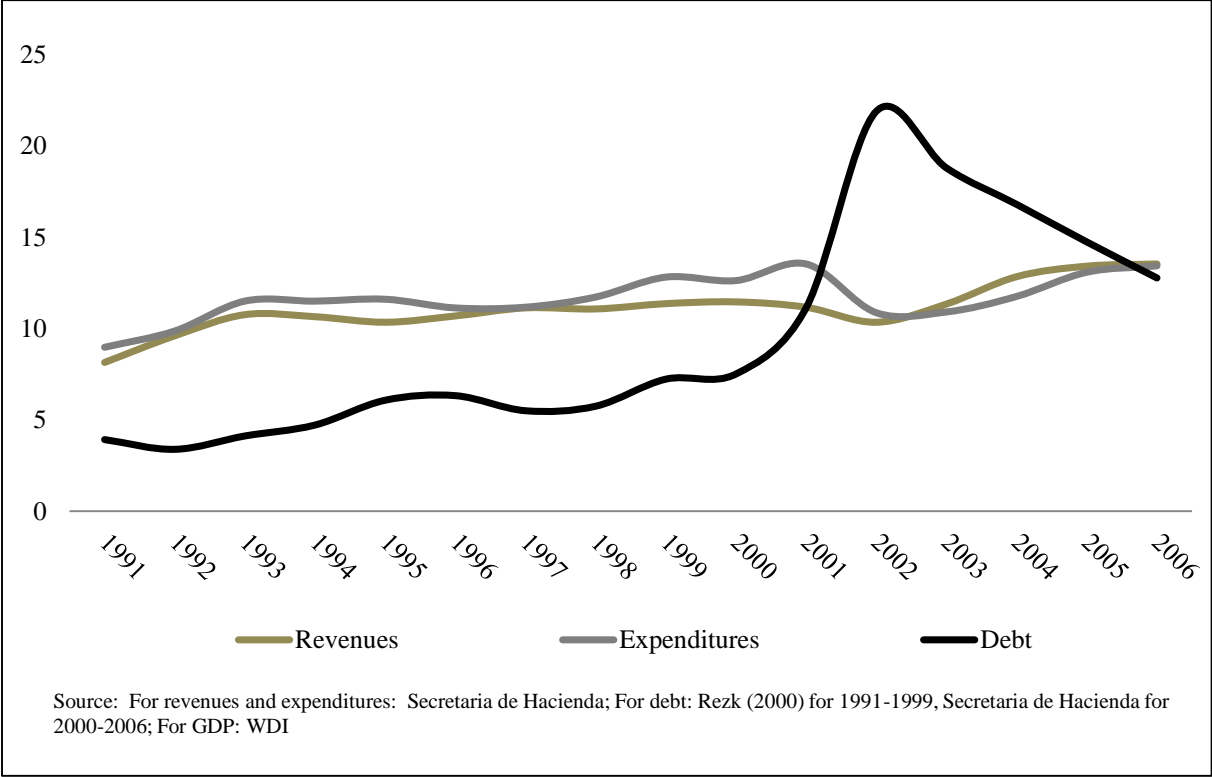
Figure 1. Argentina, Provincial Revenues, Expenditures and Debt (billions of pesos)



In an attempt to deal with the increased budget deficits and debt payments, in September 1999, the Congress approved the Fiscal Solvency Law, which meant to significantly reduce government spending. Out of 23 provinces, 14 followed the national example and between 1999 and 2001 they introduced their own fiscal solvency rules, whose characteristics varied across provinces. As a result, 12 provinces imposed a hard budget constraint, 10 imposed limits on debt, 9 provinces limited current expenditures (Braun & Tommasi, 2002). In addition, 16 provinces had constitutional limit on the debt servicing ratio, ranging from 20 to 25 percent of

debt service to total revenues. However, by 2000, only 6 provinces fulfilled their hard-budget constraint commitment, 6 complied with their expenditure limits, and only 10 out of 16 provinces complied with their debt servicing ratio rules.

Figure 2. Argentina, Provincial Revenues, Expenditures and Debt (percentage of GDP)



The following two years in Argentina were characterized by a financial, debt and currency crisis, which resulted in a further economic slowdown and debt default by the federal government and most provinces defaulted. Also, the federal government renegotiated the debt of many of the provinces (Artana, 2007). Following the 2001-2002 crisis Argentina enjoyed a strong fiscal recovery. However, government spending was increasing rapidly, deteriorating the fiscal balance, and most of the jurisdictions still found it difficult to deal with servicing their debts, causing substantial increases in discretionary transfers to provinces (IMF, 2006a).

In 2004 the Congress approved a new Fiscal Responsibility Law which kept several measures from the 1999 Law, such as the multi-year budgeting. The most important novelty in

the new Law was the introduction of the numerical expenditure limits and a 15 percent limit of sub-national debt service to its current revenues. In addition, the Federal Council of Fiscal Responsibility was created to enforce sanctions on violations of the Law. The Council could initiate financing programs with those provinces which complied with the Law (21 of 24 provinces, by 2006) (Braun, 2006).

In 2010, the national government restructured almost all provincial debt with the Fiduciary Fund for Provincial Development (FFDP – Fondo Fiduciario para el Desarrollo Provincial). Financing through the Ordered Financing Program (PFO) and the Financial Assistance Program (PAF)<sup>10</sup> had to be negotiated annually, which limited discretion and allowed provinces to do a better fiscal management. In overall, the 2010 bailout reduced present value of debt by 53 percent. Similarity between the 2010 bailout and one in 2002 was in that same provinces benefited from both bailouts and had their payments postponed. However, the 2010 bailout differed from the 2002 one in the elimination of the CER (inflation) adjustment.

## BRAZIL

After 21 years of military rule, the 1988 Constitution established a federal government structure in Brazil, and gave significant authority and resources to the sub-national governments.

However, between 1988 and 1998, Brazil had three major sub-national debt crises. The first one originated in the international debt crisis of the 1980s, when both state and federal governments discontinued servicing their debts to foreign creditors. The second crisis happened at the beginning of the 1990s and was caused by the states' debt to the federal financial institutions. Finally, the third and the largest debt crisis happened in 1997 and, in fact, resulted from the government's stabilization plan (Dillinger, 2002).

---

<sup>10</sup> Both PFO and PAF were both implemented by FFDP

In the late 1960s, international capital markets opened to developing countries, including Brazil. Due to a need for financing external current account deficits, the Brazilian government encouraged states to resort to external funding, which, however, resulted in a fast and significant increase in the state governments' debt in the 1970s. The period between 1985 and the introduction of the Plano Real<sup>11</sup> in mid-1994 was characterized by greater fiscal and political autonomy for the sub-national governments, but as well as recurrent states' debt crises (Bevilaqua, 2002).

With the 1967 Constitution, the Senate started regulating all government borrowing in the country, including setting the guidelines for approving the sub-national borrowing issuances. However, the sub-national foreign borrowing issuances were subject to these regulations only in cases when a guarantee from the central government was required (Braun & Tommasi, 2002).

During the 1970s and 1980s, the sub-national governments borrowed from the international organizations, foreign commercial banks, and from the federal government. The states were the largest debtors in the country, reaching 42 percent of total public sector debt in 1997. Their indebtedness originated in the 1966 reform and the federal policy to issue new borrowings to finance the old ones, which encouraged the state governments to borrow excessively.

The federal government made several attempts to resolve the states' indebtedness by signing agreements with the states. However, knowing that the federal government would eventually bail them out, the states evaded these agreements. Finally, between 1997 and 1999,

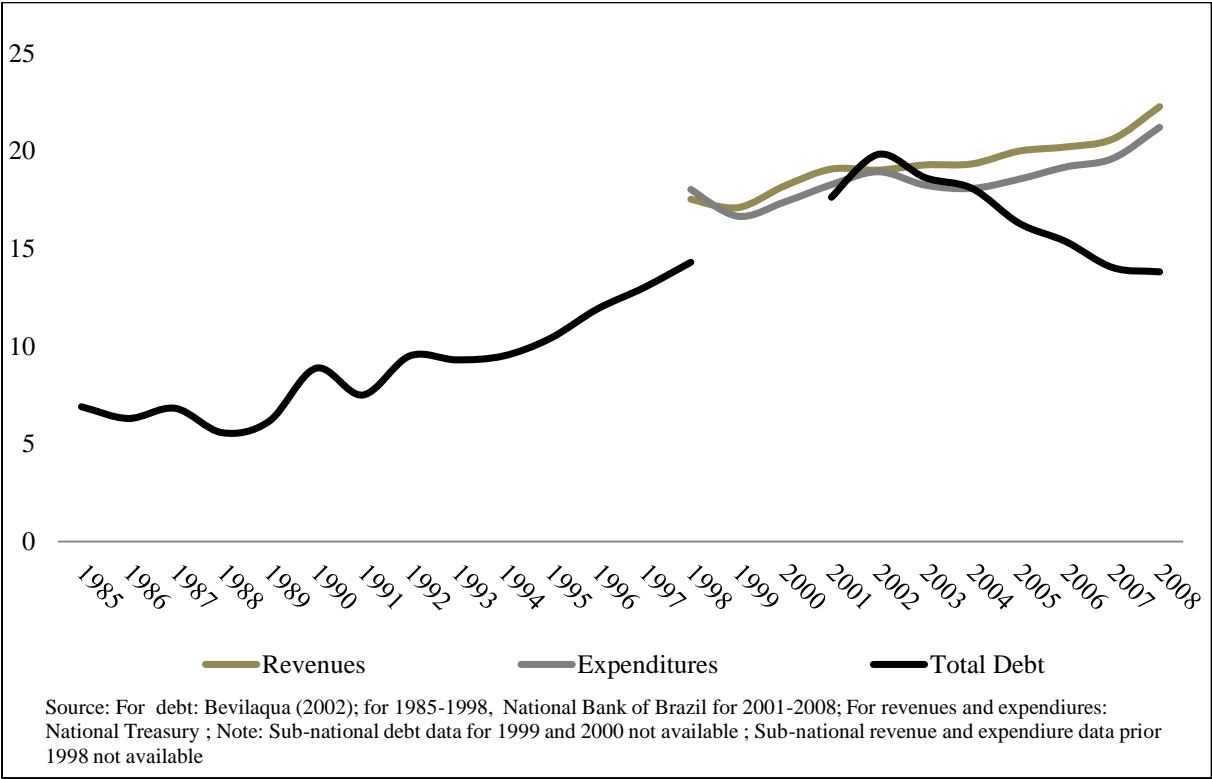
---

<sup>11</sup> The Plano Real was a set of measures adopted in an attempt to stabilize the Brazilian economy in early 1994. It enacted a series of contractionary fiscal and monetary policies, restricting its expenses and raising interest rates. As a result, high inflation was kept under control for several years and high interest rates attracted foreign capital to finance the current account deficit and increased the country's international reserves.

the federal government changed the terms of the agreements, introducing mechanisms under which it retains a share of the states' revenues whenever they do not fulfill their obligations (Bevilaqua, 2002).

Due to the international debt crisis in the early 1980s, the Brazilian federal government had to limiting the access of the states to borrowing. However, this did not contribute to the improvement of fiscal outcomes of the states, so they were forced to continue depending on irregular federal transfers to finance the spending. Under the IMF supported program that required a reduction in domestic credit, the Central Bank introduced formal limits to the credit supply from private financial institutions to the state governments in 1983 (Bevilaqua, 2002).<sup>12</sup> As a result, by 1985, sub-national debt was reduced to 6.9 percent of GDP (Figure 3).

Figure 3. Brazil, Sub-national Revenues, Expenditures and Total Debt (percent of GDP)



<sup>12</sup> However, these limits applied only on new debt issuances, while the old debt was rolled-over, especially with the state-owned banks.

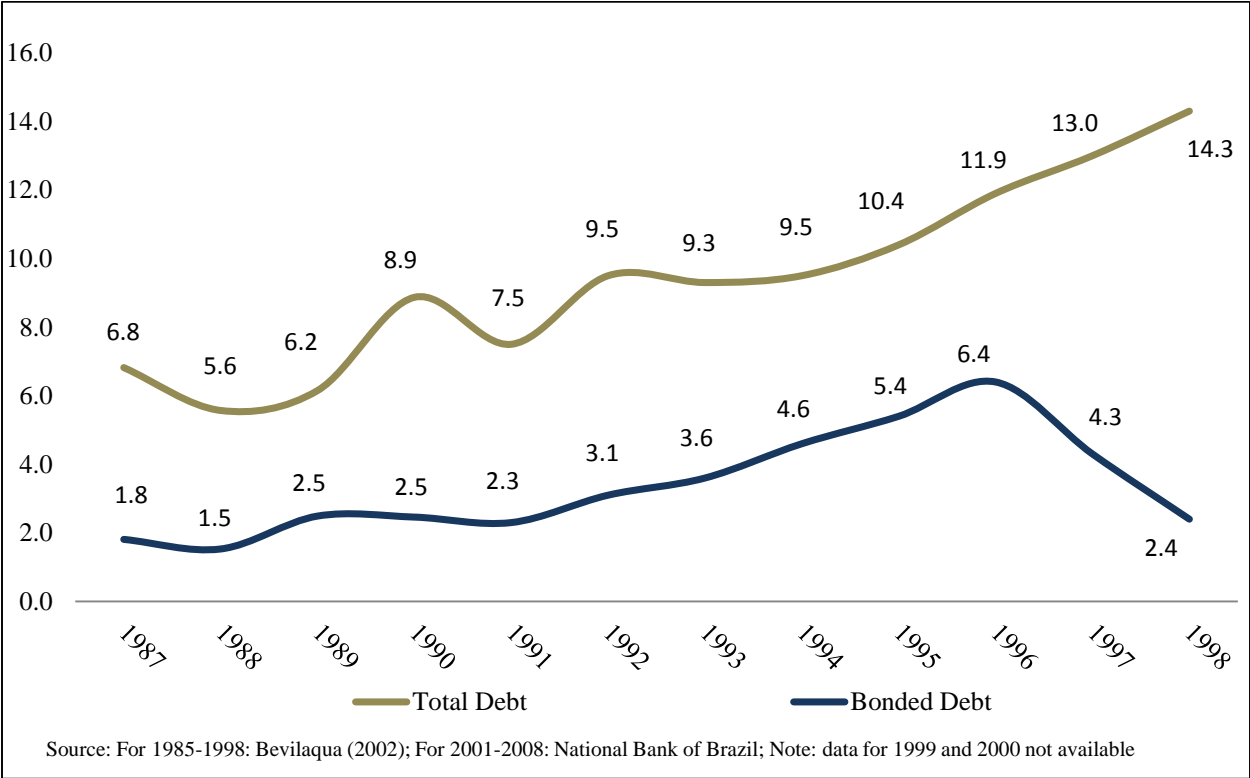
Furthermore, as the 1986 Cruzado Plan significantly reduced inflation, the states started experiencing a lot of budgetary pressure, as they could no longer depend on high inflation to limit the growth in real expenditures. Following the municipal elections in 1985 and the parliamentary elections in 1986, the 1988 Constitution was adopted and gave greater budgetary autonomy to the states. At the same time, their debts were revised and they received financial aid from the federal government. However, as the 1988 Constitution increased states' spending responsibilities while keeping revenues relatively constant, high inflation and strong control over state borrowing were necessary for maintaining their budgets in good health. However, continued loose restrictions on borrowing caused the share of the sub-national debt to GDP to significantly increase in the early 1990s. Trying to address the state debt problem, the federal government signed a law which gave the state government debt relief in December 1989, refinancing around R\$10.5 billion of debt, which was equivalent to around 20 percent of the 1989 states' revenues.

Period between the end of 1989 and the beginning of 1990 was characterized by intense macroeconomic instability in Brazil, reaching monthly inflation of 80 percent in February 1990. This led to the implementation of a stabilization program which sharply contracted economic activity and reduced inflation. Due to the lowered inflation, states again faced difficulties with controlling their real expenditures, but as well faced lower revenue collection due to the stagnation in economic activity. This forced them to demand another debt renegotiation with the federal government. However, since the stabilization program soon failed and inflation accelerated again, the debt renegotiations were not implemented. Moreover, during 1991 the additional policy measures helped the states with their finances, such as allowing a roll-over of state debt in the domestic financial markets, or creating mutual funds including sub-national

bonds in their portfolios. However, while bonds significantly supported financing of the state budgets, they also majorly (more than 70 percent) contributed to the increase in sub-national debt (Figure 4).

Between 1991 and 1993, sub-national debt increased from 7.5 to 9.3 percent of GDP. As it became concerning that majority of this increase was due to the bonded debt, it motivated an amendment on the 1988 Constitution, which forbade new issuance of state bonds until December 1999. This created more financing difficulties for the state governments, because of which they requested another debt renegotiation, leading to the 1993 bailout that refinanced around R\$39.4 billion of the state debt, but without including the bonds (Bevilaqua, 2002).

Figure 4. Brazil, Sub-national Total and Bonded Debt (percentage of GDP)



As it became challenging for the states to place their bonds in the financial market, the state-owned banks ended up having unmarketable bonds in their portfolios and faced the

liquidity problems. To prevent potential financial crisis, the federal government temporarily allowed the exchange of the unmarketable state bank bonds for central bank bonds. However, despite this bond exchange, two largest states, São Paulo and Rio de Janeiro, defaulted on loans to their state banks (Bevilaqua, 2002).

On July 1, 1984, Brazil introduced the Plano Real – a set of measures aiming to stabilize the economy, including the introduction of a new currency called the Real, and a series of contractionary fiscal and monetary policy measures. As a result, in the second half of 1994, the Brazilian economy stabilized and the inflation rate was under control, which, however, again imposed a challenge to the states to manage their budget financing.

The negative effect of the Plano Real on the states' finances was aggravated by a large increase in the interest rates, which was introduced as necessary for putting under control the rise in demand for borrowing. Moreover, as the interest rates became much higher than those at which the debts were contracted, capitalized interest on the state debts that was not renegotiated at the end of 1994 caused an explosive increase in outstanding debt contracted.<sup>13</sup> This resulted in the liquidity problems for the states, because of which they throughout 1995 resorted to short-term anticipations loans (AROs) and arrears, leading to a fiscal crisis by the end of the year (Bevilaqua, 2002).

Brazil passed the Fiscal Responsibility Law in 2000, which declared that state debt to the federal government would be deducted from the fiscal transfers. Furthermore, all sub-national debt issuances above a certain ceiling set by the Senate would need to be paid off in full and without including interest, to penalize both the borrowers and the lenders (Fölscher, 2007). In addition, there would be no provision of discretionary guarantees from the federal to the sub-

---

<sup>13</sup> Between 1994 and 1996, the sub-national debt increased from 9.5 to 11.9 percent of GDP, with a large proportion representing state bonds (Figure 4).



national governments, and sub-national governments would not be able to issue any new debts until they repaid any existing debt above the allowed ceiling. Additionally, the law specified the penalties for non-compliance with the Fiscal Responsibility Law (Bevilaqua, 2002).

The IMF (2009) reported that over a decade after passing the 2000 Fiscal Responsibility Law, Brazil had built a strong macroeconomic framework. Through a sustained fiscal discipline and implementation of the inflation targeting regime, Brazil reduced fiscal and external vulnerabilities and lowered public debt to GDP. Even though the economy was significantly affected by the latest global crisis, the authorities were able to adopt countercyclical measures due to the credible policy framework.

## CONCLUSION

Argentina and Brazil traditionally had high levels of sub-national autonomy. For mostly political reasons, imposing a hard budget constraint was impossible in both countries, resulting in a very large debt burden shifted from the sub-national to the federal government.

During the 1980 and 1990s, Brazil was, even more than Argentina, characterized by the lending from the federal to the sub-national governments, contributing to all three major debt crisis. In Argentina, on the other hand, most of the provincial debt was held by the financial sector, including the state banks, which allowed losses to be allocated between the states and creditors based on the contracts. Hence, Argentina used federal lending less than Brazil, and tended to liquidate “bad” provincial debts rather than refinancing them.

Brazil and Argentina also had different approaches in regulating new borrowing. While Brazil relied on ex-ante approaches in controlling sub-national borrowing issuances, this type of regulation proved not to be credible and effective, due to the involvement of the federal government. On the other hand, Argentina used more indirect controls on sub-national

borrowing. For example, domestic borrowing was not controlled but debt service was enforced through its deduction from the intergovernmental transfers, providing the sub-national governments more incentive not to borrow excessively.

The cases of Argentina and Brazil illustrate both the challenges and offer some possible solutions in setting up fiscal control in decentralized systems, particularly those with a history of ignoring the controls. They show that the quality of the sub-national macroeconomic and fiscal management depends on both the revenues and expenditures assigned to the sub-national governments and sub-national representation in the national political system.

### III. LITERATURE REVIEW

Those who advocate fiscal decentralization argue that, by increasing economic efficiency in public service provision, it contributes to the improvement in government's economic performance (Oates, 1972, 1993; Samuelson, 1954). In addition, it improves transparency of public service delivery and accountability in the decision-making (De Mello, 2004).

On the other hand, those against fiscal decentralization contend that due to often limited institutional and administrative capacity of sub-national governments, they may have coordination problems, which could negatively impact the implementation of fiscal reforms and the macroeconomic adjustment. Furthermore, in absence of accountability of sub-national governments, fiscal decentralization could increase corruption,<sup>14</sup> but also competition among sub-national governments.<sup>15</sup> Finally, due to political reasons, fiscal decentralization may impact central government's credibility in committing to a hard-budget constraint (Goodspeed, 2002).

There is a large literature investigating the economic benefits of fiscal decentralization. A majority of these studies focus on the effects of either revenue or expenditure decentralization on economic performance, with just few exemptions considering the relationship between sub-national borrowing autonomy and macroeconomic and fiscal sustainability (De Mello, 2001; Martell, 2008; Martinez-Vazquez & Boex, 2001; Rodden, 2002; Rodden & Wibbels, 2010).

---

<sup>14</sup> Corruption may be more common and widespread in sub-national than in central governments. Because of less developed institutions, sub-national government staff tends to have lower salaries and advancement opportunities, as well as are subject to often less sophisticated accountability mechanisms (Tanzi, 2002).

<sup>15</sup> Brennan and Buchanan (1980: p.184) contend that competition among governments in the context of the "inter-jurisdictional mobility of persons in pursuit of fiscal gains can offer partial or possibly complete substitutes for explicit fiscal constraints on the taxing power".

## FISCAL DECENTRALIZATION AND FISCAL SUSTAINABILITY AND MACROECONOMIC STABILITY

A large part of the recent literature on fiscal decentralization focuses on the macroeconomic problems arising from governments giving greater responsibilities to the sub-national governments. Results obtained by Prud'homme (1995), Hunter and Shah (1996), and Ter-Minassian (1997a, 1997b) suggest that fiscal decentralization may lead to sub-national fiscal indiscipline and may intensify fiscal problems at the central government level. Moreover, Conyers (1990) and Prud'homme (1995) argue that fiscal decentralization can also undermine economic efficiency because sub-national government officials often do not or cannot meet the needs and expectations of their voters.

The literature on the effects of fiscal decentralization on macroeconomic stability is, however, not conclusive. For example, Fornasari et al. (2000) find that an increase in sub-national spending leads to increases in national spending and deficits. On the other hand, Stein (1999) shows that, in Latin America, decentralization is not associated with higher deficits. Similarly, using a cross-section of 40 countries, Shah (2005) provides evidence that fiscal decentralization is associated with improved fiscal performance. Similar results can be found in Shome (2002) in the case of India<sup>16</sup> and Schaltegger and Feld (2009) and Freitag and Vatter (2008) for Switzerland. Freitag and Vatter (2008) conclude that fiscal decentralization has no effect on public debt in periods of prosperous economic development but does influence it in periods of economic stagnation, as decentralized cantons implement more contractionary fiscal policy than centralized Swiss member states.

---

<sup>16</sup> Except when transfers are excluded. The inability of states to fund their own-expenditure without central government transfers results in higher state-level deficits.

The literature also suggests that the effect of fiscal decentralization on macroeconomic stability depends on the level of economic development. Fukasaku and De Mello (1998) and De Mello (2000) find that in developing countries fiscal decentralization has negative impact on economic growth.<sup>17</sup> On the other hand, in the OECD countries expenditure decentralization can significantly reduce public indebtedness, while the impacts of decentralization of revenues and vertical fiscal imbalances are insignificant (Baskaran, 2009). Similarly, Neyapti (2010) finds that both expenditure and revenue decentralization reduce budget deficits in developed countries, while Martinez-Vazquez and McNab's (2006) findings suggest that fiscal decentralization promotes price stability. These findings are consistent with Bahl and Linn's (1992) and Tanzi's (2002) argument that only at relatively high level of economic developing, benefits of fiscal decentralization can be fully exploited.

However, some authors emphasize that even in the least decentralized systems, macroeconomic sustainability could be undermined by poor coordination between different levels of government. Tanzi (2000) and Dabla-Norris (2006) find that fiscal responsibility and hard-budget constraints can be challenged when (i) local governments have no expenditure and revenue autonomy, while highly dependent on transfers; (ii) sub-national borrowing is poorly regulated; (iii) roles of each level of government are not clear; and (iv) budget institutions are weak. Similarly, Rodden (2002) shows that when sub-national governments are highly dependent on transfers, then sub-national borrowing autonomy is associated with a large and persistent general government deficit.

---

<sup>17</sup> De Mello (2000) also recommends that for strengthening fiscal discipline, sub-national governments should have proper revenue sharing arrangement which would penalize unsustainable policies and reward prudent sub-national governments.

Increased decentralization of expenditure functions to sub-national governments has led in many countries to increased sub-national governments' responsibilities for delivering infrastructure services. In such circumstances, a controversial debate has developed about whether sub-national governments should be allowed, and if so, to what extent, to borrow in order to finance their infrastructure projects. A common view has been that, even if giving more borrowing autonomy to the sub-national governments might be justified, not imposing any limits may not be appropriate. When there are no limits on sub-national borrowing, central governments face the risk that sub-national governments may try passing the cost of borrowing to other sub-national governments or to next generations (Ahmad et al., 2005).

While some authors highlight the potential negative impact of sub-national borrowing on indebtedness and macroeconomic instability (Ter-Minassian, 1997a, 1997b), its proponents emphasize potential advantages of sub-national borrowing in capital markets, such as increased fiscal space for financing infrastructure spending.

#### MORAL HAZARD AND ADVERSE SELECTION

The need for sub-national borrowing controls results from the common pool problem and the implied soft budget constraint. The common pool problem arises from the separation of costs and benefits from public spending. If a certain capital investment predominantly benefits one jurisdiction but it is financed through a common pool, this jurisdiction would pay only a small fraction of the cost while enjoying a large fraction of the benefits. This would give incentive to other jurisdictions to compete for federal transfers to finance their investments out of a common pool (Hillman, 2009).

There are two categories of the soft budget problems - firstly, those created by the moral hazard (i.e. by hidden actions), and secondly, the problems created by the adverse selection (i.e. by hidden information). The problem of moral hazard occurs when “one party to a transaction may undertake certain actions that (a) affect the other party’s valuation of the transaction but that (b) the second party cannot monitor/enforce perfectly” (Kreps, 1990: p.577). On the other hand, the adverse selection problem is a principal-agent problem, where two parties to a transaction have different interests and asymmetric information, which could cause the imbalance of power between the parties and could alter the market outcome (Jensen & Meckling, 1976).

The moral hazard problem would not exist if central governments could credibly commit to no ex-post changes in the allocation of transfers, that is, to a no-bailout policy (Hernández-Trillo, et al., 2002). However, it is difficult to achieve such a commitment in the short run, especially if it involves a reduction in the provision of basic public services. Moreover, due to the spill-over effect, when a default by one sub-national government can increase the cost of borrowing for all others, then bailing out the defaulting government can be found beneficial (Noel, 2000; Wildasin, 1997).

Regardless of the purpose of borrowing and the type of credit system, credit markets will be in equilibrium when the supply for credits equals its demand, sending the price signals which affect the investors’ and borrowers’ willingness to participate in an exchange. When deciding whom to lend to, the investors primarily care for the borrower’s ability and commitment to repay the loan, with the cost of borrowing depending on borrower-specific characteristics affecting the risk of default (Martell, 2000).

## SUPPLY AND DEMAND FOR BORROWING

### The Supply Side – Capital Markets

There are two methods of sub-national borrowing – firstly, through loans from financial and other credit institutions; and secondly, through the capital market (by issuing securities and bonds). There has been a debate in the literature on whether loans or bonds are more appropriate for sub-national borrowing (Peterson, 2003). “Developing nations, however, have no reason a priori for one of these end points over the other. Bank lending to municipalities can operate side by side with a municipal bond market” (Peterson & Hammam, 1998: p.36).

Both loans and bonds have different strengths and weaknesses that can be evaluated according to the price of capital, maturities, and monitoring functions. Firstly, loan issuance is usually less costly than bond issuance, because of which larger sub-national governments are more likely to issue bonds, whereas smaller ones tend to prefer loans (Jackson, 2007). Secondly, unlike public banks, commercial banks rarely offer long term maturities, in which case bonds are a more likely option (Leigland, 1997; Peterson, 2003). Finally, issuers are monitored differently with loans and bonds, as bonds are more transparent, while loan monitoring is based on “relationship banking” (Peterson, 2003).

### The Demand Side - Creditworthiness

Regardless of whether a borrower chooses loans or bonds, their creditworthiness is likely to be important criteria for lenders in making investment decisions. Basically, creditworthiness refers to the borrower’s ability and willingness to repay the debt, which can, theoretically, be influenced by two groups of factors - economic and financial factors, on the one hand, and political and institutional factors, on the other (Peterson, 1998; Spahn, 1999).



In a market with asymmetric information, signaling of creditworthiness plays a very important role. In developed countries, signals of sub-national creditworthiness include borrower's debt, finances, administration, and economy (Cluff & Farnham, 1984; Fabozzi et al., 1995; Hausker, 1991). However, in developing countries additional factors may affect sub-national creditworthiness, including intergovernmental transfer structure, history of defaults, legal issues, economic conditions, outstanding debt, etc. Often creditworthiness of sub-national governments is influenced by factors beyond their control, such as legislatively limited ability of sub-national governments to set the tax base or the tax rate. Nevertheless, sub-national entities can still influence their creditworthiness by adopting certain behaviors improving fiscal discipline, such as financial reporting, disclosure, audit, debt limits, etc. (Peterson, 1998).

Additional forms of signaling, which the investors can factor into the assessment of the borrower's creditworthiness, are reputation and collateral, which may lower the cost of borrowing by reducing information asymmetries (Diamond, 1989; Thakor, 1991). Since a good reputation is built by timely debt-repayment behavior, the borrowers interested in building or maintaining a good reputation may have an incentive to avoid default (Martell, 2000). Chan and Kanatas (1985: p.93) find that with no moral hazard, "collateral can serve as a source of additional, indirect information in a rational expectations signaling context". Higher collateral may signal higher creditworthiness, correcting the information asymmetry.<sup>18</sup>

---

<sup>18</sup> However, the literature offers mixed evidence on the relationship between the level of collateral and the borrower's creditworthiness (see Martell (2000) for a summary of the literature).

## HOW TO REGULATE THE SUB-NATIONAL BORROWING?

Imposing borrowing controls at the sub-national level may be needed to preserve macroeconomic stability as well as to safeguard the sub-national public finances. There are different ways in which central governments can contribute to prudent borrowing and these alternatives have been much debated issue (Peterson & Hammam, 1998).

The literature on sub-national borrowing emphasizes the ability of higher levels of government to provide an implicit guarantee on the sub-national government debt as one of the main problems with borrowing at the sub-national level, being a classical moral hazard situation. Therefore, when devolving borrowing responsibility to lower levels of government, the question is whether such a risk can be successfully controlled by some kind of rule, or if the credit market alone can do the job. A fundamental decision that the central government has to make is whether to provide a sovereign guarantee or not, as it implies accepting the responsibility of dealing with potential fiscal crises resulting from sub-national over-borrowing. This decision is an important part of each country's legal framework, and federal governments have adopted different approaches to dealing with challenges of decentralized decision-making (Liu, 2007).

Literature on the effects of sub-national borrowing regulations on macroeconomic stability can be divided into two categories. On the one side, qualitative reviews base their conclusions and recommendations on reviewing and discussing institutional arrangements and macroeconomic performance in different countries. On the other hand, empirical studies test their hypothesis using appropriate econometric methodology. Empirical studies can be further divided into single- and cross-country studies.

## Qualitative Reviews

Based on the experience of Indonesia, Mexico, Philippines, Poland, and South Africa, Martell and Guess (2006) find a good legal framework as the most important in limiting the risk of sub-national over-borrowing and macro-economic instability. They advise that a good framework should at least deal with the following three challenges. Firstly, it must not prohibit sub-national borrowing. Secondly, it should provide predictability, clarity and confidence in sub-national borrowing. Finally, it should prevent over-borrowing and provide guidance on how to deal with financial crises.

Martinez-Vazquez and Boex (2001) discuss some approaches that could bring discipline and responsibility to sub-national government borrowing. One way assumes a reliance on the self-enforcing mechanism of the financial markets for prudent financial behavior through higher borrowing costs charged to irresponsible borrowers. However, important requirement for this approach to be effectively implemented is having developed capital markets, and institutions. Another way includes reliance on federal government to set and enforce limits on sub-national borrowing.

Based on reviews of several case studies, Ter-Minassian and Craig (1997) classify sub-national borrowing regulations into four broad categories and conclude that sole reliance on market based regulations is not likely to be effective. They suggest that fiscal rules for controlling sub-national debt seem to be preferable to administrative controls in terms of transparency and certainty. However, a cooperative type of regulation could be a promising way to control sub-national borrowing, as it assumes active involvement of sub-national governments in formulating and implementing medium-term fiscal adjustment programs, and encouraging budgetary responsibility.

Based on the experience from five EMU member countries,<sup>19</sup> Balassone et al. (2002) conclude that the effectiveness of fiscal rules has been weakened due to asymmetry. More precisely, while compliance to the rules depends on all levels of government, as they apply to general government balances, it is the central government that the EMU institutions hold accountable. This asymmetry weakens the position of the central government relative to the sub-national governments in terms of responsibility for compliance with the rules.

Similarly, after reviewing several case studies, Rodden and Eskeland (2003) conclude that effective control of sub-national borrowing requires either strong hierarchical oversight or strong market mechanisms. On the other hand, Kennedy and Robbins (2003) review several case studies from the industrial world and conclude that the evidence is not conclusive. Fiscal rules may be helpful in achieving fiscal sustainability and may even be necessary in certain countries, but they are clearly not necessary in all countries.

In overall, the hypothesis that institutional constraints can limit government spending and maintain macroeconomic stability has limited and not fully conclusive empirical support. While cross-country evidence suggests that the effectiveness of constraints heavily depends on the type of control being imposed and the circumstances in the country in question (Plekhanov & Singh, 2007), the evidence from country-level studies conducted in the United States and Europe is mixed. For the case of the United States, Abrams and Dougan (1986) conclude that restrictions on borrowing and spending do not influence state budget outcomes, while some other authors offer evidence that, on the contrary, institutional restrictions do matter (Alt & Lowry, 1994; Poterba, 1994, 1995).

---

<sup>19</sup> Austria, Belgium, Germany, Italy and Spain

## Empirical Single Country Studies

Based on the experience of state borrowing in the United States, Alt and Lowry (1994) point to the importance of balanced budget state laws, while Poterba (1994, 1995) provide further confirmation of the role of balanced budget laws and constitutional limitations on borrowing and indebtedness. In fact, most authors conclude that the U.S. states with stronger rules run smaller deficits, receive higher bond ratings, pay lower premiums, and adjust to shocks more quickly (Alesina & Bayoumi, 1996; Poterba, 1994; Poterba & Rueben, 1999; Poterba & Von Hagen, 1999). 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 seem to be effective in limiting the volume of borrowing, they do not seem to significantly influence the sub-national governments' decision regarding the use of tax-exempt bonds versus other sources of borrowing. Similarly, Clingermayer and Wood (1995) provide weak evidence that tax and expenditure limitations may increase state indebtedness, while constitutional debt limitations have no effect upon slowing the growth of state debt. However, important deficiency of these studies is their applied methodology as they fail to address potential reverse causality between chosen fiscal rules and budget deficits, suggesting that the relationship between them may reflect the fact that both variables are jointly explained by an omitted variable.

As in case of the United States, empirical results for European countries are also not conclusive. On the one hand, Derycke and Gilbert (1985) provide support for the hypothesis that central government macroeconomic policies do affect local government borrowing decisions in France. However, Dufrénot et al. (2010) find that French regions have quite heterogeneous borrowing behavior despite a common accountability constraint that forces them to balance their budgets and borrow only to finance investment expenditure (the “golden rule”). They conclude

that the “golden rule” is not effective in regulating French regions’ borrowing because it can be seen as a “soft” rule when the regions receive transfers from the central government and may thus expect a fiscal rescue to be automatic. On the other hand, Cabasés et al. (2007) provide support to the effectiveness of institutional borrowing restrictions in introducing financial discipline in the borrowing policies adopted by local governments in Spain. Furthermore, Claeys et al. (2008) find quite different sub-national fiscal behavior in the United States and Germany. While in the United States, both the federal and state governments try to keep debt under control, in Germany, lower government levels do not consolidate at all, with all of the fiscal adjustment occurs through the central government debt. Hence, in Germany the application of fiscal rules is not strict because of inability of the central government to enforce the debt stabilization on the sub-national level.

Regarding effectiveness of fiscal rules, Martell (2008) finds that in Brazil, while fiscal constraints were very effective in controlling government expenditures, long-term discipline is maintained through the rule-based, but not the market-based control. Furthermore, current institutional arrangements penalize those who violate fiscal discipline, but do not reward good performers. Similarly, Braun (2006) finds that fiscal rules, while successful in some other countries, have not worked in Argentina in mitigating deficit biases because of a serious common pool problem.

#### Empirical Cross-Country Studies

Using cross-country data between 1985 and 1987, Von Hagen and Eichengreen (1996) find that that the introduction of sub-national borrowing constraints in the European Union increases sub-national indebtedness. However, this result should be taken with caution given their very simple empirical analysis which controls only for GDP and is based on a very small sample of only 36

observations. Furthermore, based on a panel of 31 developed and developing countries, Fornasari, et al. (2000) find that constraining sub-national borrowing<sup>20</sup> does not seem to have any consistent effect on sub-national fiscal deficits. On the other hand, Alesina et al. (1999) investigate the effect of fiscal rules limiting debt levels and fiscal deficits in Latin American countries and find a negative correlation. However, the latter two studies do not account for potential reverse causality between the chosen regulation and fiscal outcomes. Moreover, they do not manage to compare the effectiveness of different rules/regulations.

Rodden (2002) uses panel data on 33 countries and concludes that the largest deficits are run by sub-national governments that rely heavily on federal transfers and at the same time are free to borrow. Hence, the study provides support to the conjecture that the sub-national borrowing should be controlled, at least in countries with high vertical fiscal imbalances. Major contribution of this study is that it proposes an index summarizing different characteristics of sub-national borrowing autonomy. However, this advantage is at the same time a disadvantage – by using an index of borrowing autonomy, this methodology is unable to suggest how sub-national borrowing control should be implemented.

Moreover, based on a sample of 15 federations, Rodden and Wibbels (2002) find that higher expenditure decentralization is associated with smaller overall deficits, especially when the states have wide-ranging autonomy over taxation. They conclude that, when states are mostly dependent on intergovernmental transfers, fiscal decentralization puts an upward pressure on deficits, while when they are dependent on own-source revenues and borrowing, it positively impacts fiscal performance. However, even though this study provides support for allowing

---

<sup>20</sup> Measured by a dummy equal to 1 if Ter-Minassian and Craig (1997) indicates that the country either completely prohibits sub-national borrowing or imposes a non-discretionary rule to constrain it ex ante.

borrowing at the sub-national level, it does not investigate further whether this positive effect is conditional on how borrowing is regulated.

In contrast, in their recent study, Rodden and Wibbels (2010) find that expenditures are less income elastic when sub-national governments have more borrowing autonomy than when they do not. In most federations, the more restricted an access to credit markets, the more pro-cyclical fiscal policy is. Counter-cyclical fiscal policy is more likely in systems where sub-national authorities have unrestricted access to credit markets (e.g., Canada), less likely where either budget rules (e.g., USA, Germany) or central authorities (e.g., Australia, India) impose constraints to the access to credit markets, and least likely where the access is irregular (e.g., Brazil, Argentina). These results are, however, based on a sample of only seven federations.

Plekhanov and Singh (2007) correct for this disadvantage by observing separately the four broad regulations defined by Ter-Minassian and Craig (1997) and their effects on sub-national fiscal balance. They find that no single framework seems to be superior under all circumstances and that appropriateness of any given regulation depends on the vertical fiscal imbalance, bailout expectations and the quality of reporting. However, there are two reasons why the results of this study should be taken with caution. First, there is potential misspecification problem due to the lack of an assumption of dynamics of sub-national budget balance, causing the effect of its past value(s) to be included in the error term and potentially resulting in endogeneity and autocorrelation. Second, this study restricts the analysis to the effects of regulations on only sub-national fiscal balances when actually central and general government budget balance may be more affected. This is especially important because in many cases the sub-national governments are required to maintain balanced budgets.



Using a sample of seventeen OECD countries, Thornton and Mati (2008) find that changes in fiscal balances of the sub-national and central governments are highly positively correlated, especially when fiscal relations are managed by rules. The second best institutional framework seems to be administrative controls. The authors find debt levels to be significantly positively correlated with changes in the central government's primary balance as well. However, this study as well suffers from serious methodological issues. More precisely, not only are the dynamics in the fiscal balance not taken into account, but endogeneity in sub-national borrowing regulations does not seem to be addressed.

In the case of the European Union, Afonso and Hauptmeier (2009) find that the existence of general and central government fiscal rules positively contribute to a higher responsiveness of primary surpluses to government indebtedness. Interestingly, this effect does not exist in case of sub-national fiscal rules. Similarly, Ayuso-i-Casals et al. (2007) find a positive relationship between numerical fiscal rules and lower deficits. Moreover, Debrun and Kumar (2007), and Debrun et al. (2008) report that stricter and broader fiscal rules are associated with higher cyclically adjusted primary balances.

Overall, the literature does not offer a definite answer on whether borrowing at the sub-national level should be allowed, and if so, how it should be regulated. One issue, however, that many point out as very important is the distinction between borrowing for capital investments (the "golden rule") and for covering operating expenses. The most important arguments for sub-national borrowing are "inter-temporal equity", optimal allocation of resources, lower operation costs, stabilization of required budget resources, relatively higher benefits of enhanced sub-national economic development than the cost of borrowing, and the high cost of long-term projects. Hence, there is a consensus among scholars that the primary objective of sub-national

borrowing should be to increase infrastructure service delivery (Freire & Petersen, 2004; Leigland, 1997; Peterson & Hammam, 1998). Sub-national borrowing is argued to contribute to more efficient infrastructure service delivery and improved local governance, in terms of transparency, accountability, and financial management (Freire & Petersen, 2004).

## CONCLUSION

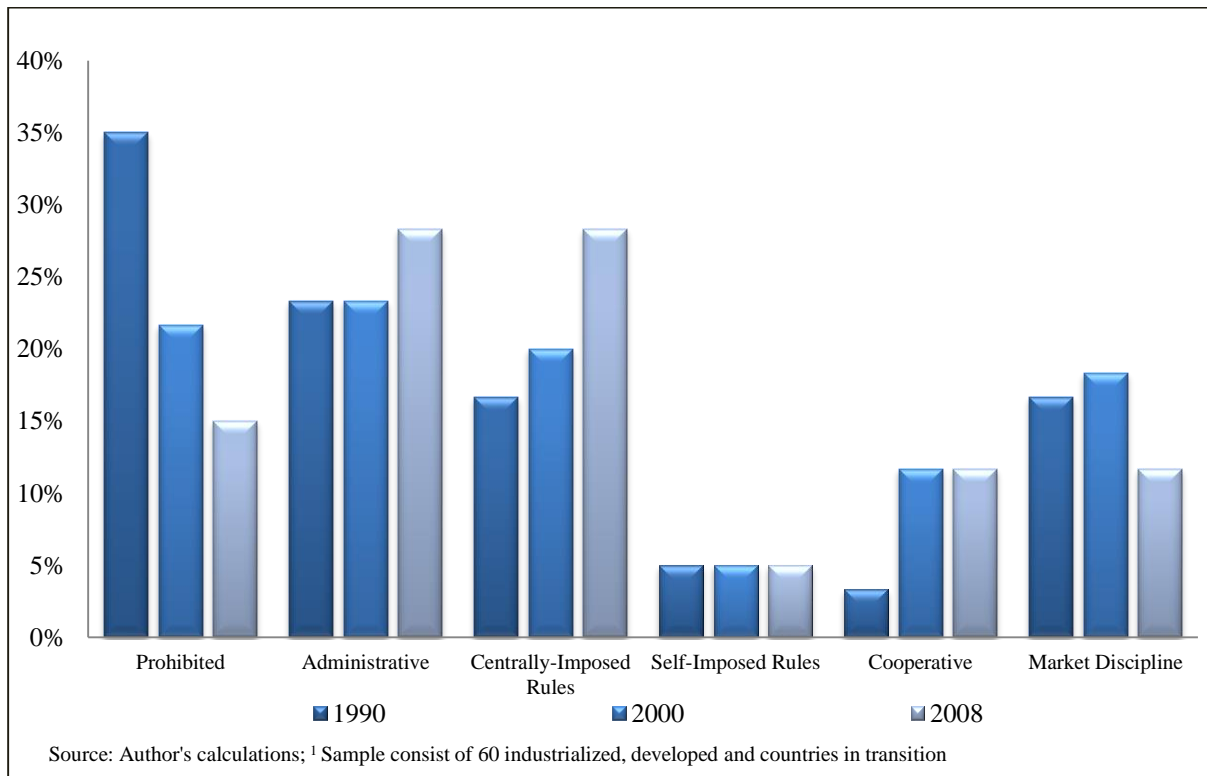
This chapter has reviewed the literature on the effects of fiscal decentralization on macroeconomic stability and found the inconclusive results. While some authors find positive effects of fiscal decentralization on national spending, deficit and debt, the others find the opposite. The literature also suggests that the effect of fiscal decentralization on macroeconomic stability depends on the level of economic development.

Similarly, when it comes to sub-national borrowing, the empirical literature is inconclusive on whether sub-national governments should be allowed to borrow in the private capital markets, and if so, how their borrowing should be regulated. The need for sub-national borrowing control results from the common pool problem and the implied soft budget constraint. If central governments could credibly commit to a no bailout policy, the moral hazard problem would not exist. There is, however, consensus among the authors on the importance of restricting sub-national borrowing to financing only capital investments (the “golden rule”).

#### IV. SUB-NATIONAL BORROWING REGULATIONS

As those who disagree with fiscal decentralization emphasize, giving more responsibilities to sub-national governments may endanger their fiscal sustainability and macroeconomic stability, suggesting that to maintain sustainability borrowing controls at the sub-national level are required. The literature on sub-national borrowing emphasizes higher government levels' provision of an implicit guarantee to sub-national government debt as one of the main problems with borrowing at the sub-national level, causing a classical moral hazard situation. There are different ways in which a national government can contribute to prudent borrowing and these alternatives have been much debated.

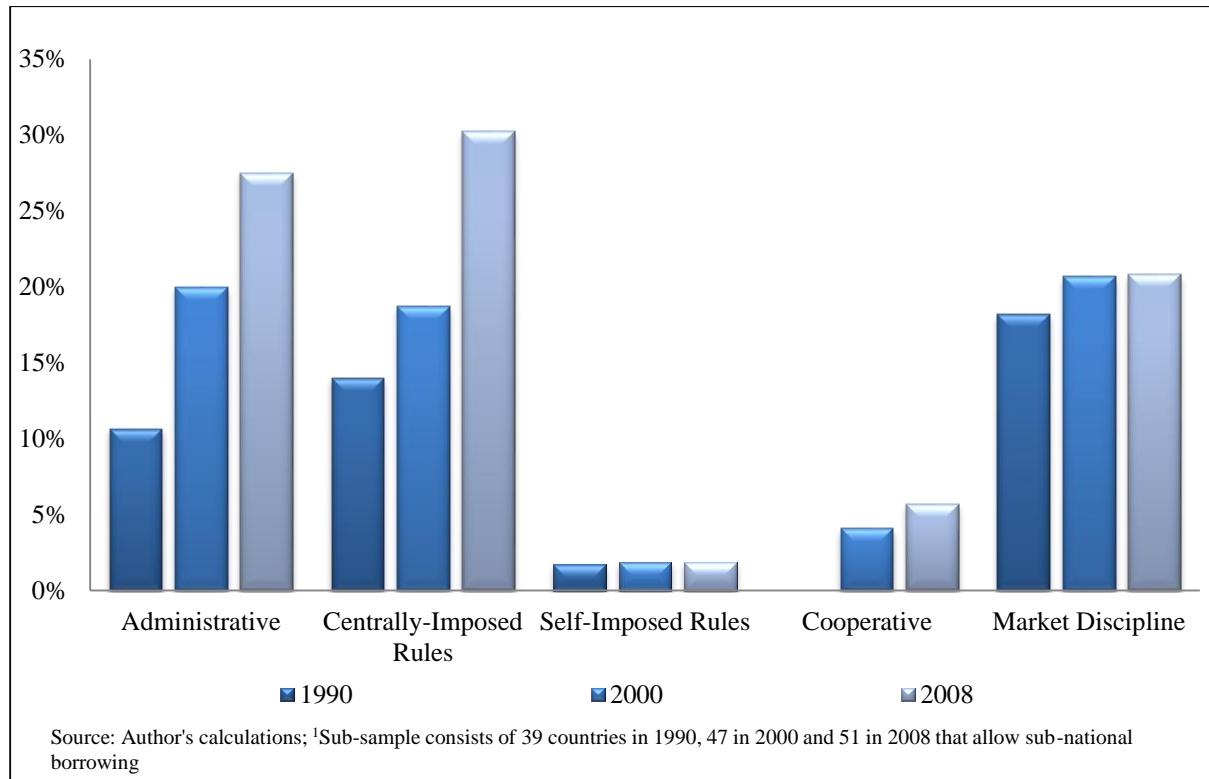
Figure 5. Broad Types of Ex-ante Sub-national Borrowing Regulations (relative frequency in the sample)



As Figure 5 presents, most of the countries that introduced borrowing at the sub-national level after 1990, preferred centrally-imposed rules or direct control by the central government as the dominant type of regulation. Furthermore, there has been a relative decrease in sole reliance on financial markets in regulating sub-national borrowing, which may be explained by experience gained from recent crises in which sub-national borrowing played major role. Moreover, in the last two decades, there has been an increased trend of imposing legal sanctions for non-compliance, mostly in case when sub-national borrowing is dominantly regulated by centrally imposed rules (Figure 6). This trend of imposing legal sanctions for non-compliance is mostly due to those countries that have introduced borrowing at the sub-national level during this period, rather than to the changes in those that have already been present in the sub-national capital market (Figure 7).

Most countries manage and supervise sub-national borrowing and debt by implementing ex-ante and/or ex-post borrowing regulations. Ex-ante regulations can consist of more or less direct control by the central government, of fiscal rules determined in the constitution or organic laws, or of reliance on the financial markets and their mechanisms. On the other hand, ex-post regulations consist of sanctions for non-compliance to the rules or for imprudent behavior. Webb (2004) contends that both ex-ante and ex-post regulations should be practiced simultaneously, and should consider both the borrowers and the lenders. Reliance on only ex-ante controls gives both the borrowers and the lenders incentive for irresponsible behavior since it bears no consequences. On the other hand, reliance on only ex-post regulations may give space to large sub-national governments to over-borrow and build up debts so large that the central government cannot enforce them to bear the consequences, given their importance in the national economy.

Figure 6. Sanctions for Non-compliance by Type of Ex-post Sub-national Borrowing Regulations (relative frequency in the sub-sample)



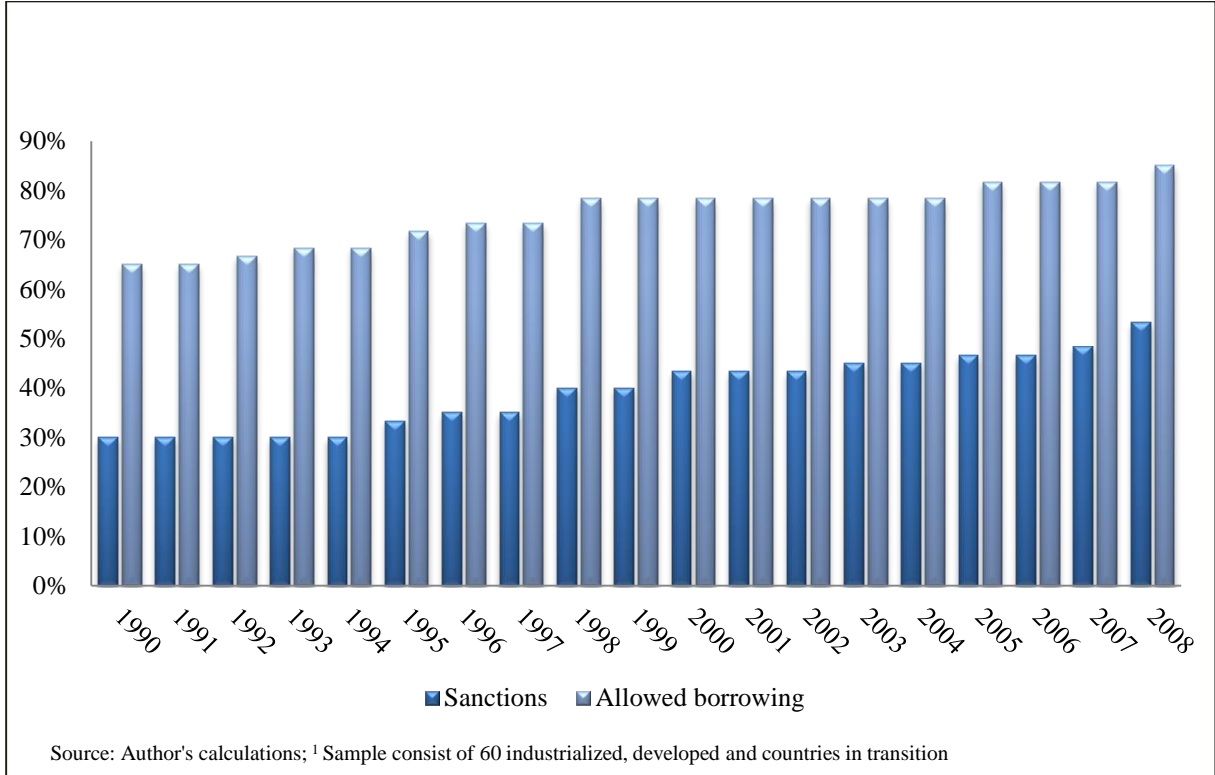
This chapter reviews the four main institutional settings that have been used to regulate the operations of sub-national credit markets. They represent the ex-ante regulations and sanctions for non-compliance, as an ex-post regulation of sub-national borrowing. The ex-ante regulations reviewed in this chapter include four broad types defined by Ter-Minassian and Craig (1997), namely, market discipline, fiscal rules, administrative and cooperative regulation.

#### THE EX-ANTE REGULATIONS

Ex-ante regulations consist of ex-ante control and monitoring of sub-national borrowing and fiscal performance. These regulations specify the purpose, types, and procedures of sub-national borrowing. Liu and Waibel (2006) summarize the key elements of ex-ante regulations commonly used in practice. The first is allowing borrowing only for financing long-term capital

investments, which is also known as the “golden rule”. The second type of the ex-ante regulations set limits on key fiscal variables, such as the primary and/or fiscal deficit, debt service ratio, etc. Finally, some frameworks include requirements for the sub-national governments to establish a medium-term fiscal framework and a transparent budgetary process. To improve fiscal transparency, more and more countries have introduced credit rating systems for sub-national governments, as an element of the regulatory framework for sub-national borrowing.

Figure 7. Allowing Borrowing at the Sub-national Level and Imposing Legal Sanctions for Non-compliance (relative frequency in the sample)



### Market Discipline

In some countries, the government relies solely on the capital markets to regulate sub-national borrowing. Market discipline means that the financial markets are capable of sending appropriate signals to prevent a borrower from entering the “unsustainable area”, and borrowing is limited by

lenders' willingness to invest. Credit agencies, such as Standard and Poor's, Moody's, and Fitch, provide both the lenders and the borrowers in the market with information about the risk of default. There are, however, certain conditions that need to be satisfied for the private financial markets to be an effective control instrument for sub-national borrowing. These include: (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 a 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 (Lane, 1993).

In this sort of setting, sub-national governments generally have direct access to the 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. For example, provinces in Canada may borrow for any purpose, whenever, wherever, and however they wish. There are neither internal nor external federal controls over provincial borrowing, and they do not even need to provide any information on their borrowing to the federal government (Bird & Tassonyi, 2001). Unlike provinces, municipalities face a very explicit hard budget constraint. Local borrowing requires prior provincial approval and is severely limited. Similarly to Canadian Provinces, Finish and Swedish municipalities do not need authorization from higher authorities to raise loans and can borrow from both domestic and foreign sources without any special conditions (Council of Europe, 1996b, 2009).

Market discipline is only effective if the capital market is free and open. Restricted access to foreign capital markets limits the available options and creates a suboptimal financial sector portfolio (Giugale et al., 2000). There has been an increasing trend of allowing sub-national borrowing in foreign capital markets over the last two decades, but mostly only with an approval

by the central government authority (Figure 8). Furthermore, availability of information and full transparency on outstanding debt and capacity to pay are essential to market discipline.

However, obtaining reliable financial information, especially from the sub-national governments, often requires significant effort. Moreover, not all the sub-national governments follow a standardized accounting plan, hold uniform registers of their assets and liabilities, or publish information on debt and capacity to pay. In addition, hidden extra-budgetary funds weaken transparency. Additionally, moral hazard undermines the effectiveness of market discipline in checking sub-national governments' excessive indebtedness. Bailouts encourage the expectation of future rescues and moral hazard type behavior of both the borrowers and the lenders. Finally, market signals, such as interest rates, can affect borrowers' financial behavior in choosing more solvent fiscal policies. However, the borrowers must be sensitive to the market signals for market discipline to be effective, that is, the decisions about borrowing should change depending on the interest rate.

However, in many parts of the world, capital markets at the local level are inadequately developed to be able to provide efficient discipline to sub-national governments. In such circumstances, credit rating agencies at the sub-national level are becoming increasingly important to evaluate the performance of intergovernmental systems. In this same context, some sub-national governments have adopted fiscal responsibility rules (that are self-imposed) trying to improve their credit ratings in the market. Examples of these trends are seen 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 Fiscal Responsibility Laws (Webb, 2004).



As mentioned above, the Canadian government relies solely on market discipline in controlling sub-national indebtedness. Credit rating companies evaluate sub-national creditworthiness. However, even Canada's fully-developed financial markets have not been fully able to control excessive indebtedness of the sub-national governments. In fact, in the mid-1990s, sub-national debt reached 23 percent of GDP (Bird & Tassonyi, 2001), prompting the provinces to adopt fiscal adjustments programs. Brazil and Argentina, without meeting all necessary market conditions, did in fact rely on some sort of market discipline approach in the 1980s, which had very unfortunate consequences. In Brazil, sub-national debt jumped from 1 percent of GDP in the early 1970s, to 20 percent in the mid-1990s, with five large federal bailout interventions (three for states and two for municipalities) (Bevilaqua, 2002).

Market based sub-national borrowing regulations can take different forms. Dillinger (2003) compares the United States' and the European model for market based mechanism and concludes that while the United States' model relies primarily on municipal bonds, the European model relies dominantly on specialized banks to finance sub-national borrowing. However, municipal bonds are becoming more and more popular in Europe recently. The largest owners of municipal bonds in the United States are individual investors, mutual and money market funds, and the commercial banks. After being issued, municipal bonds can be sold in the secondary market, and are considered relatively safe from default, despite some opposite examples in the recent period. Some of the specialized banks in Europe are owned by the municipalities (e.g., Finland and Sweden), while others are founded by the national governments and have later been privatized (e.g., Dexia in France).

## Rule-Based Approach

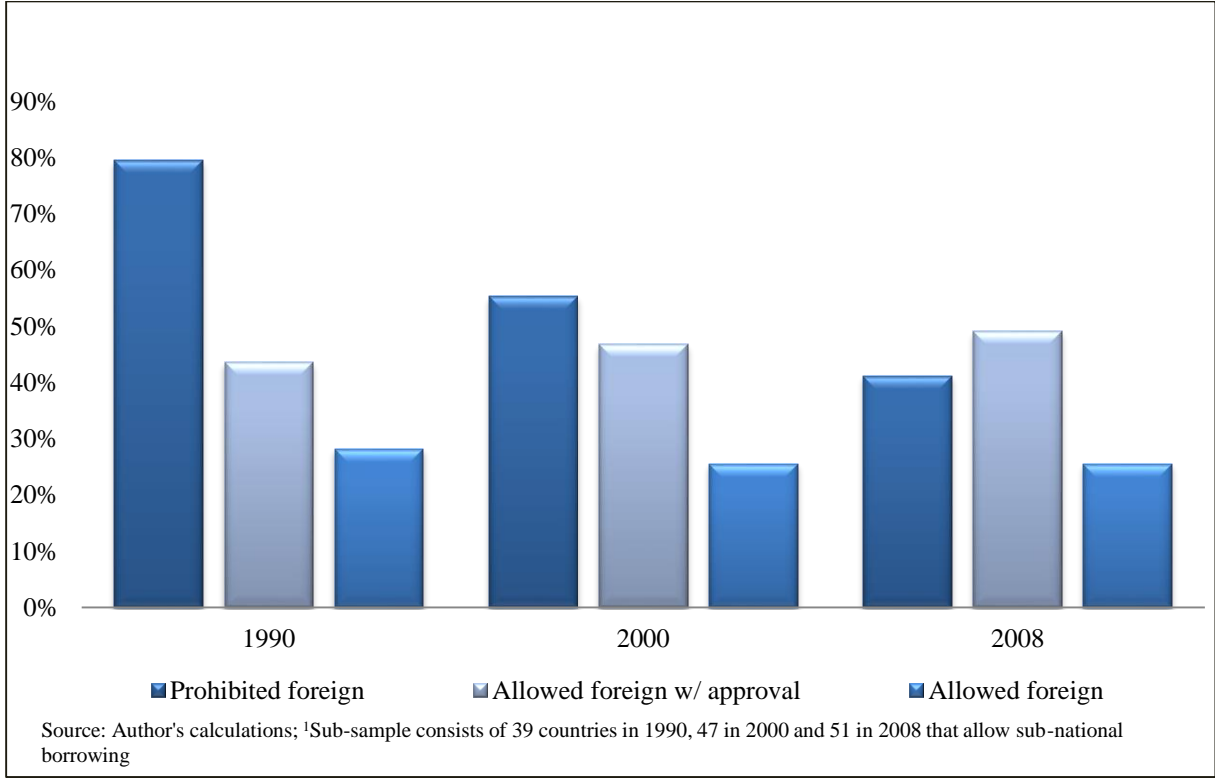
Rule-based regulations consist of fiscal rules imposed by the central government and specified in the constitution or in the organic laws. Such rules introduce a constraint on fiscal choices by sub-national governments in order to guarantee that fiscal outcomes will remain predictable and robust regardless of the government in charge. Rules may take different forms: ceilings on debt or total borrowing, deficit targets, maximum expenditure rules, the “golden rule” (proceeds from borrowing must be spent exclusively on capital projects), or rules related to debt repayment capacity.

Borrowing and debt ceilings represent the borrower’s upper legal limits of total indebtedness and are generally simple and easy to monitor. A deficit target has the advantage of simplicity and of being easily understood by the wider public, but it may be unsuccessful in preventing excessive debt accumulation because of the off-budget items. The most frequent deficit target rules are those targeting the overall budget deficit (e.g., Austria, Belgium, Spain, and most U.S. states) or the operating deficit (e.g., Norway). However, deficit target rules can also be met at higher levels of revenues and expenditures, which may have macroeconomic implications.

Expenditure rules set the limits on the expenditure level, and are conceptually simple, easy to monitor, and can be most directly controlled. However, an expenditure limit can be more difficult to implement at the sub-national level than a deficit target and may not necessarily be able to prevent debt accumulation, since spending could be pushed below the line. Furthermore, the “golden rule”, limiting the sub-national governments’ borrowing to finance capital investment only, mostly satisfies the intergenerational equity justification for borrowing. However, borrowing for infrastructure does not guarantee by itself the 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” (e.g., the United Kingdom, Germany, Spain, and most states in the U.S.). Finally, rules related to the capacity to repay debt attempt to stimulate the workings of the market discipline approach by relating the limits on indebtedness to expected debt service on the debt (e.g., Colombia and Hungary in the 1990s). These rules, however, might not be as effective in controlling debt accumulation if financial conditions are manipulated.

Figure 8. Allowing Sub-national Borrowing in Foreign Capital Markets (relative frequency in the sub-sample)



Fiscal rules have the advantage of being generally transparent, more effective in addressing long-term sustainability and intergenerational equity, and relatively easy to monitor. They can, however, be counterproductive if poorly designed, or not adequately enforced. Most countries using the rule-based approach use a variety of rules, some of which are redundant.

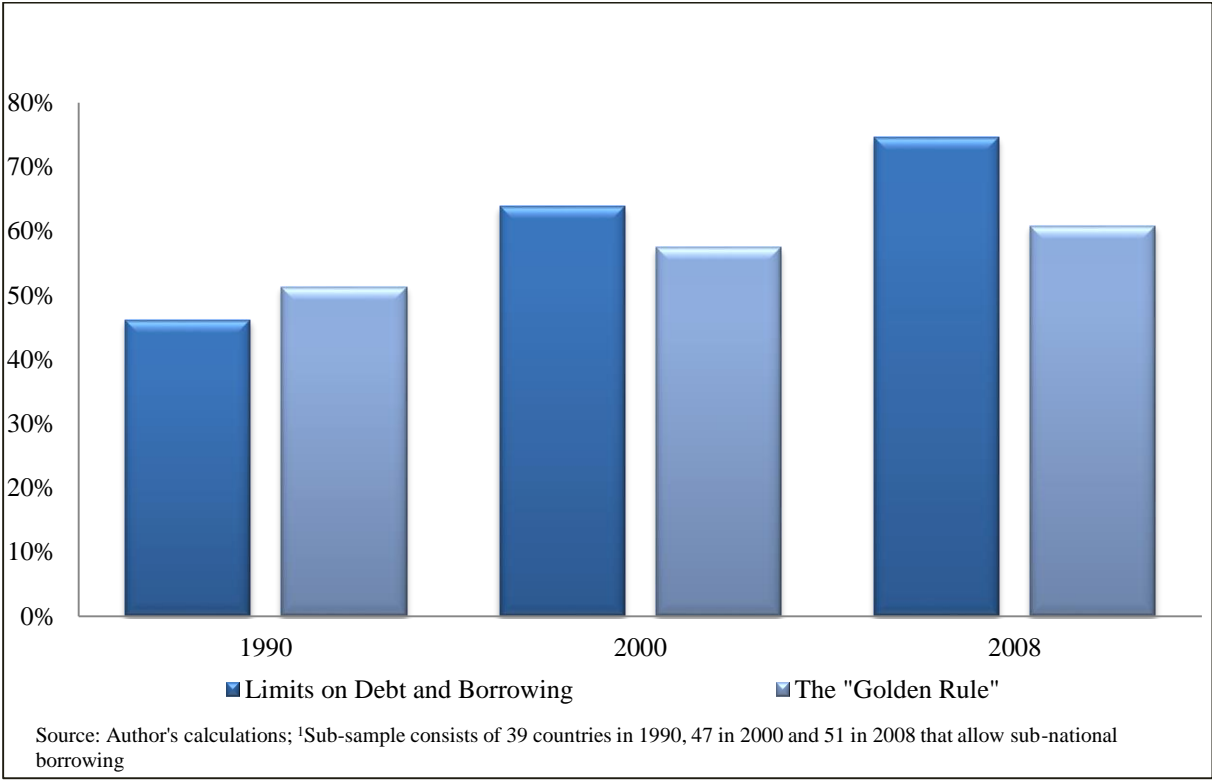
Main disadvantage of the rule-based approach is the trade-off between ensuring compliance and preserving flexibility. Strict fiscal rules leave little room for adjustments in case of unexpected economic downturns, while more flexible fiscal rules lack credibility and may fail to impose sufficient discipline. In practice, the efficacy of fiscal rules for sub-national governments primarily depends on the ability to monitor the debt. There has been particularly increased trend to impose limits on sub-national debt and borrowing during the last two decades (Figure 9). The use of the “golden rule” has also increased, but not by as much.

All but one state in the United States (Vermont) has a balanced budget requirement. Budget rules vary significantly across the U.S. states, mostly applying only to the operating budget (general fund). In addition, as of 2008, 30 states also operate under tax or expenditure limitations (Waisanen, 2008). Several studies investigate the effectiveness of sub-national government rules in the context of the U.S. states. Most authors conclude that rules do enforce some budget discipline on the U.S. states, in terms of lower deficits and quicker reaction to negative fiscal shocks (Poterba, 1994; Alesina & Bayoumi, 1996; Poterba & Von Hagen, 1999; Poterba & Rueben, 1999).

In the European Union, within the Stabilization and Growth Pact, limiting the overall level of public debt as well as annual total budget deficits, raises the question about whether the debt limit should be shared among the levels of government. In most countries it is assumed that the central government should be responsible for the overall limit of public debt. Public debt is much lower at the sub-national compared to the central government level, being just above 8 percent of total debt in Germany to around 19 percent in Switzerland (Swianiewicz, 2004). In most European Union countries the ratio of the sub-national debt to GDP is pretty low, on average around 5 percent. The only “outliers” are the Netherlands and Spain with over 8 percent

of the sub-national debt to GDP. In Belgium, only the central government is responsible for complying with the European Union fiscal rules, but with the agreements set between the central and the sub-central levels of government, the commitments for complying with these constraints is shared among all levels of government.

Figure 9. Imposing Limits on Borrowing and Debt and the “Golden Rule” (relative frequency in the sub-sample)



Switzerland’s approach to the sub-national borrowing regulation is an example of self-imposed fiscal rules. 26 Swiss cantons apply different regulations which are set in each Canton’s law. In many cantons, borrowing is allowed only for financing capital expenditures, and if the local and/or cantonal government has the financial capacity to pay the interest on debt as well as the amortization out of the current budget. Dafflon (2002a) discusses the sub-national borrowing regulation practice in the Fribourg canton where for each project that cannot be financed from the current revenues, then the borrowing for its financing requires the cantonal approval.

## Administrative Approach

The administrative approach is completely the opposite from the market discipline approach, giving the central government direct control over sub-national borrowing. It may take different forms, such as setting an annual or even more frequent limits on the overall sub-national government debt; prohibiting external (foreign) borrowing; reviewing and approving individual borrowing operations (including approval of the terms and conditions); or centralizing all government borrowing with on-lending to the sub-national governments. The approval of each borrowing issuance requires an evaluation of the financial terms and conditions under which each operation is contracted. The administrative approach is more frequently used by unitary countries and less by (federal type countries.)

Direct involvement of the federal government in micromanaging each credit operation at the sub-national government level represents one of the disadvantages of this approach, since it is the opposite of the fiscal decentralization idea. Moreover, this approach may unnecessarily increase federal bureaucracy and cause undesirable inefficiencies in the financial system, and may even be incompatible with a country's Constitution if it allows the sub-national government free access to the capital market. However, a major disadvantage of this approach is the moral hazard resulting from the fact that the central government may find it difficult to refuse to financially support the lower levels of the 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 the external debt policy. Second, the central government's control may increase the sub-national borrower's credibility, given that the foreign lenders often require a central government guarantee, and it may result in better terms and conditions received in the foreign financial markets.

Countries like Denmark, Greece, Ireland, Mexico, and the United Kingdom practice the administrative control approach in regulating sub-national borrowing. 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 in a currency other than sterling. In Spain, for example, foreign debt and bond issuances by the sub-national governments are subject to the approval of the Ministry of Finance. During the 1980s, Australia centralized regulation of sub-national borrowing through the Loan Council, but this direct control system did not turn out to be effective, and now the sub-national governments are free to access the capital markets directly. The functions of the Loan Council were restructured in the mid-1990s, and excessive indebtedness is now cooperatively controlled (Craig, 1997; Dillinger, 2003; Koutsogeorgopoulou, 2007).

Denmark provides an interesting example of the administrative approach to sub-national borrowing regulation. In general, sub-national borrowing in Denmark is prohibited, but in some cases this rule is waived. Permission for borrowing issuance, for which the municipalities apply individually, is granted if the overall borrowing ceiling has not been exceeded and if the municipality's debt does not exceed 30% of total municipality's expenditures. The borrowing and debt ceilings are negotiated annually with local government associations. Furthermore, the general rule is that, if borrowing is permitted, both current and capital budgets need to be balanced. Nevertheless, during the 1990s between 40% and 80% of Danish municipalities'

deficits) were financed through borrowing, resulting in local debt of 4.5% of GDP in 1998 (Jorgen & Pedersen, 2002). Similarly, the United Kingdom applies an administrative approach to sub-national borrowing regulations, but in the British case the borrowing limits differ among sub-national governments (Watts, 2002). Limits are allocated to the local governments depending on their specific needs for housing, education, etc. Allocations are increased or decreased based on the efficiency and effectiveness of the local governments and can be adjusted for special needs (Dafflon, 2002b).

#### Cooperative Approach

Under this approach, the sub-national borrowing controls are designed through a negotiation process between the federal/central and the lower levels of government. The sub-national governments are actively involved in reaching an agreement on overall general government deficit targets, on the main revenue and expenditure items, as well as on the limits on financing of the 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 and Growth Pact were implemented in 1999 (Thöni, Garbislander, & Haas, 2002) to ensure lowering and maintaining the overall deficit below 3 percent of GDP. Similar arrangements exist in Spain (Laborda et al., 2006). In Belgium, sub-national borrowing is supervised by a High Finance Council (HFC), which is comprised of 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 the Australian states.



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 the exchange of information across various government levels, as well as in raising awareness of the macroeconomic implications of their budgetary choices. However, in order to be effective, this approach requires the central government to be strong and able to effectively guide the intergovernmental negotiations, which in many emerging markets may not be the case (Joumard & Kongsrud, 2003). The main weakness of this approach is that, because it combines components of other three approaches, when it is poorly implemented it reproduces the flaws of other approaches, instead of their advantages (Ahmad, et al., 2005).

As already mentioned above, since the Loan Council's functions were restructured in the mid-1990s, sub-national borrowing in Australia has been cooperatively controlled. Jurisdictions are required to submit their total financial requirements for the upcoming year to the Loan Council with no requirement for submitting specific project details. Then the Loan Council evaluates these nominations with regard to the jurisdictions' fiscal position, the infrastructure needs and the macroeconomic implications of borrowing. In the event when the Loan Council has concerns about certain nominations, it has the right to request the jurisdiction to justify the nomination, and if needed, it can amend its fiscal strategy. So far, the restructured Loan Council, complemented by the financial markets and rating agencies, has been successful in controlling sub-national fiscal behavior (Craig, 1997; Koutsogeorgopoulou, 2007; Webb, 2002).

A key role in managing sub-national borrowing in Belgium is played by the "Public Sector Borrowing requirements" in the High Finance Council (HFC). The HFC is composed of academics, members of the National Bank of Belgium and the representatives of all levels of governments. The committee monitors and analyzes the borrowing requirements of all levels of

government at regular intervals and, based on a concept of sustainability, formulates recommendations about the medium and long-term budgetary targets for the different government levels. Based on the HFC's recommendations, the agreements between the central government and the regions and the communities are formulated, covering a period of five to six years and committing the sub-national governments to meeting specific annual budgetary targets in terms of their borrowing requirements. In order to ensure that public finances are consistent with the budgetary targets, municipalities are subject to the "golden rule" under which deficits are only allowed for investment. On the recommendation of the HFC, the central government can limit the borrowing capacity of a non-compliant region or community to prevent endangering economic stability or the external balance. So far, however, the HFC has not considered it necessary to use this sanction on any of the regions or communities (OECD, 2007).

According to Liebig, et al. (2008), the sub-national borrowing regulation in South Africa is a combination of the cooperative and the market based approach. The cooperative component originates in the South African Constitution where Article 3 requires a "co-operative government". Furthermore, different spheres of the government control each other in terms of who borrows how much. On the other hand, the South African legal setting for sub-national borrowing is also partly market-based, since the sub-national entities can generally borrow as much as they want. The municipal councils authorize borrowing issuances and there are no country-wide debt limits.

#### EX-POST REGULATION

As already pointed out, the effectiveness of ex-ante regulations is limited without an ex-post mechanism for dealing with sub-national insolvency. Even though ex-ante regulations are very important for minimizing the risk of defaults, they cannot prevent them in all cases. Sub-national

insolvency may occur because of sub-national fiscal and debt mismanagement but also because of external shocks.

Ex-post control mechanisms consist of a set of predetermined rules for allocating the default risk. They provide a basis for both borrowers' and lenders' expectation that in case of insolvency, they both would share the burden. Properly designed ex-post regulations enforce the hard budget constraint on sub-national governments.

Countries generally apply two main approaches in ex-post regulation of the sub-national borrowing, namely the judicial and the administrative approach. The judicial approach involves the courts which make key decisions and give guidance on the restructuring process. The advantage of the judicial approach is that it neutralizes political pressure. However, the ability of courts to impose fiscal adjustments on sub-national governments is very limited. The administrative approach, however, often allows political intervention of the higher levels of government in resolving the sub-national insolvency.

Depending on the factors, such as history, political and economic structure, etc. countries apply various approaches for ex-post regulation of the sub-national borrowing. For example, Hungary and Brazil apply the administrative approach, while South Africa and the United States prefer a combination of the judicial and the administrative approaches. Moreover, there is a uniform approach across states in the United States for dealing with municipal distress.

Any ex-post control mechanism consists of three central elements. The first is the definition of insolvency that acts as a procedural trigger. Different countries define insolvency. While Hungary and the United States define insolvency as inability to pay debt, South Africa uses one definition for serious financial problems and another for persistent violation of financial commitments. The second element is the debtor's fiscal adjustment to bring in line spending with

revenues as well as borrowing with capacity to service debt. Even when the sub-national governments have significant autonomy in controlling expenditures and raising revenues, fiscal adjustment often requires difficult political choices of reducing spending and raising revenues. Finally, the third one includes negotiations between the debtor and creditor to restructure debt obligations. In case of the administrative approach, the higher government level tends to restructure sub-national debt into longer-term debt instruments, which was the case in Brazil in 1997. However, the debt discharge is typically limited to the judicial approach (Liu, 2008).

### CONCLUSION

As shown in this chapter, there is a wide variety of both ex-ante and ex-post sub-national borrowing regulations that countries implement. The regulations reflect the level of development of the financial markets, the political power of different levels of government, and macroeconomic and fiscal conditions. Each type of sub-national borrowing regulation has both advantages and disadvantages, which determine how suitable each is for a particular country's circumstances. Reliance on only ex-ante controls gives both borrowers and lenders the incentive for irresponsible behavior since they bear none of the consequences. On the other hand, reliance on only ex-post regulation may give space to large sub-national governments to over-borrow and build up such large debts that the central government cannot enforce them to bear the consequences given their importance in the national economy. Finally, as a country's circumstances change over time, the country may change its preferred mechanism to control sub-national behavior in financial markets.

## V. THEORETICAL ANALYSIS

The fundamental research question this study investigates is: how does sub-national borrowing affect fiscal sustainability? The analytical framework developed in this chapter builds on a general model traditionally used in the literature on fiscal sustainability. This chapter is organized as follows. First, a general model of fiscal sustainability is described and the hypothesis of this study is developed. Next, assumptions on fundamental sub-national budget components and on the institutional framework are set and discussed. Finally, the effects of more revenue autonomy and borrowing regulations on fiscal sustainability are analyzed.

### SUB-NATIONAL GOVERNMENT BUDGET CONSTRAINT

The basic assumption used in the traditional methodology on debt sustainability: the sub-national government is committed to the goal of repaying its debt. Sub-national government tries to smooth its expenditures because it has aversion towards outcomes that could force it into very low levels of expenditures. In this case, sustainable debt has to be consistent with the government's goal not to experience sudden, excessive fall in expenditures. Hence, if a sub-national government wants to rule out any excessively low levels of expenditures, the budget constraint implies that debt must not exceed the level that can be serviced if revenues remain at their lowest level for a long period of time. This means that the sub-national government has to be credibly committed to be able to repay its debt in "any situation." Therefore, credible commitment refers not only to government's "willingness to pay", but much more importantly, its "ability to pay" its debt.

Credible commitment to repay debt requires the sub-national government to impose on itself a debt limit by which it cannot borrow more than the amount of debt it could service in the worst-case scenario (fiscal crisis). In determining this upper limit for borrowing, the government

has to take into account all the policy variables that determine the dynamics of the primary balance, as well as borrowing costs and economic growth. On the first day of fiscal year  $t$ , sub-national government  $j$  faces projected revenues  $R_t$ , expected non-interest expenditures  $E_t$ , and interest expenditures  $i_t B_t$ , where  $i_t$  is net real interest rate in year  $t$ , and  $B_t$  is the level of outstanding debt at the beginning of fiscal year  $t$ . Since sub-national government  $j$  is allowed to borrow in the capital market, it plans to finance projected fiscal deficit in fiscal year  $t$  by issuing debt. Hence, the budget balance<sup>21</sup> in year  $t$  is expressed as

$$B_{t+1} - B_t = i_t B_t - (R_t - E_t) \quad (5.1)$$

where  $B_{t+1}$  is stock of debt at the beginning of fiscal year  $t + 1$ , and  $(B_{t+1} - B_t)$  represents net debt issuance during fiscal year  $t$ .  $(R_t - E_t)$  represents the primary balance and includes all flows that affect the debt level including those that are officially accounted for “bellow the line” (e.g., privatization revenues). Sub-national government  $j$  is allowed to issue debt only to finance capital investments, implying that the primary balance cannot be negative. Equation (5.1) says that the sub-national government’s net debt issuance during fiscal year  $t$  is used to finance its fiscal deficit in that year.

Incorporating gross regional domestic product in equation (5.1) allows presenting it in terms of ratios to gross regional domestic product. After rearranging, it can be written as

$$\gamma_{t+1} \mathcal{B}_{t+1} = r_t \mathcal{B}_t - (\mathcal{R}_t - E_t) \quad (5.2)$$

---

<sup>21</sup> The model as well can include a seigniorage revenue component  $(M_t - M_{t-1})$  to implicitly include the central bank into public sector, but for the purpose of this study, concerned with sub-national finance, this element is not relevant.

where  $\gamma_{t+1}$  is the gross regional domestic product growth rate<sup>22</sup> in year  $t + 1$ .  $\mathcal{B}_t$  is stock of debt at the beginning of year  $t$  as a share of gross regional domestic product in that year, while  $\mathcal{B}_{t+1}$  is stock of debt at the beginning of year  $t + 1$  as a share of year  $t + 1$  gross regional domestic product. Furthermore,  $r_t = (1 + i_t)$  is gross real interest rate in year  $t$ ,  $\mathcal{R}_t$  is the ratio of total sub-national government revenue to gross regional domestic product, and  $E_t$  is the ratio of non-interest expenditures to gross regional domestic product.

Equation (5.2) says that all the changes in the sub-national government debt during year  $t$ , including new issuance and paid installments during the year, must relate to all flows of government receipts and payments in the same year.

The budget constraint inflows from year to year, expressed in equation(5.2), can be used to derive the lifetime budget constraint, which plays a key role in assessing fiscal sustainability.

The following assumptions are useful for deriving the lifetime budget constraint:

1. Time is discrete;
2. Debt matures in one year;
3. Debt is expressed in real terms;
4. Debt issued at year  $t - 1$  pays a real interest rate  $r_{t-1}$ ; and
5. “no-Ponzi-game” condition applies,  $\lim_{j \rightarrow \infty} \prod_{k=0}^j \frac{\gamma_{t+k} \mathcal{B}_{t+k}}{r_{t+k}} = 0$ .

The “no-Ponzi-game” condition states that the debt-output (debt to output or debt/output?) ratio cannot grow faster than growth-adjusted gross interest rate in the long run, that is

---

<sup>22</sup>  $\gamma_{t+k} = \frac{Y_{t+k}}{Y_{t+k-1}}$

$$\lim_{j \rightarrow \infty} \prod_{k=0}^j \frac{\gamma_{t+k} \mathcal{B}_{t+j}}{r_{t+k}} = 0 \quad (5.3)$$

Basically, this condition states that at any date  $t$  the discounted value of the stock of public debt  $t + j$  periods into the future should vanish as  $j$  goes to infinity, or, in other words, at the end of time, total debt must be repaid.

After rearranging, (5.2) can be written as

$$\mathcal{B}_t = \frac{\gamma_{t+1} \mathcal{B}_{t+1}}{r_t} + \frac{\mathcal{R}_t - E_t}{r_t} \quad (5.4)$$

Updating (5.4) to year  $t + 1$  and substituting out  $\mathcal{B}_{t+1}$  in the right hand side of (5.4) gives

$$\mathcal{B}_t = \frac{\gamma_{t+1} \gamma_{t+2} \mathcal{B}_{t+2}}{r_{t+1} r_t} + \frac{\gamma_{t+1} (\mathcal{R}_t - E_t)}{r_t} + \frac{\gamma_{t+1} \gamma_{t+2} (\mathcal{R}_{t+1} - E_{t+1})}{r_{t+1} r_t} \quad (5.5)$$

Repeating this procedure  $(j - 1)$  times to recursively substitute out  $\mathcal{B}_{t+1}, \mathcal{B}_{t+2}, \dots$

$\mathcal{B}_{t+j-1}$ , we finally obtain

$$\mathcal{B}_t = \prod_{k=0}^j \frac{\gamma_{t+k} \mathcal{B}_{t+j}}{r_{t+k}} + \sum_{k=0}^j \frac{\prod_{i=1}^j \gamma_{t+i}}{\prod_{i=0}^j r_{t-1}^{t+i-1}} (\mathcal{R}_{t+k} - E_{t+k}) \quad (5.6)$$

Applying assumption (5.3) into (5.6) leads to the government lifetime budget constraint

$$\mathcal{B}_t = \sum_{k=0}^j \frac{\prod_{i=1}^j \gamma_{t+i}}{\prod_{i=0}^j r_{t-1}^{t+i-1}} (\mathcal{R}_{t+k} - E_{t+k}) \quad (5.7)$$

Basically, equation (5.7) says that the current level of sub-national outstanding debt should be equal to the present value of all its primary balances until the end of time.



The most basic tool used in fiscal sustainability analysis actually uses a steady state version of the lifetime budget constraint. To arrive at it, it is assumed that revenues and expenditures, both as a fraction of output, are constant at  $\mathcal{R}$  and  $E$ , respectively, real output grows at constant rate  $\gamma$ , and the real gross interest rate is a constant  $r$ . Applying these assumptions in (5.7), the steady-state of lifetime budget constraint is

$$\mathcal{B}_t = \sum_{k=0}^j \frac{\gamma^k}{r^{k+1}} (\mathcal{R} - E) \quad (5.8)$$

The intuition behind the lifetime budget constraint (5.8) is that the present value of the primary balance, as a share of output, is equal to the interest and principal on the outstanding debt to output ratio.

Furthermore, it is easy to show that,<sup>23</sup>

$$\lim_{j \rightarrow \infty} \sum_{k=0}^j \frac{\gamma^k}{r^{k+1}} = \frac{1}{(r - \gamma)} \quad (5.9)$$

the steady-state debt-output ratio satisfies the following condition

---


$$\begin{aligned} {}^{23} \sum_{k=0}^j \frac{\gamma^k}{r^{k+1}} &= \frac{1}{r} + \frac{1}{r} \frac{\gamma}{r} + \dots + \frac{1}{r} \left(\frac{\gamma}{r}\right)^j \\ \sum_{k=0}^j \frac{\gamma^k}{r^{k+1}} &= \frac{\frac{1}{r} \left(1 - \left(\frac{\gamma}{r}\right)^{j+1}\right)}{1 - \frac{\gamma}{r}} \text{ if } \frac{\gamma}{r} \neq 1 \\ \lim_{j \rightarrow \infty} \sum_{k=0}^j \frac{\gamma^k}{r^{k+1}} &= \lim_{j \rightarrow \infty} \frac{\frac{1}{r}}{1 - \frac{\gamma}{r}} - \lim_{j \rightarrow \infty} \frac{\frac{1}{r} \left(\frac{\gamma}{r}\right)^{j+1}}{1 - \frac{\gamma}{r}} \\ \lim_{j \rightarrow \infty} \frac{\frac{1}{r} \left(\frac{\gamma}{r}\right)^{j+1}}{1 - \frac{\gamma}{r}} &= 0 \text{ since } \left(\frac{\gamma}{r}\right)^j \rightarrow 0 \text{ when } \left|\frac{\gamma}{r}\right| < 0 \\ \Rightarrow \lim_{j \rightarrow \infty} \sum_{k=0}^j \frac{\gamma^k}{r^{k+1}} &= \lim_{j \rightarrow \infty} \frac{\frac{1}{r}}{1 - \frac{\gamma}{r}} = \frac{1}{(r - \gamma)} \end{aligned}$$

$$B = \frac{\mathcal{R} - E}{r - \gamma} \quad (5.10)$$

Condition (5.10) indicates the growth-adjusted ratio of the annual value of the primary balance to the gross regional domestic product that is required for the debt to gross regional domestic product ratio to stabilize at a target level.

However, the debt level set by this rule is static and does not consider uncertainty and dynamics in all the terms in the right hand side of equation. Therefore, if the debt-to-output limit ( $\phi$ ) is determined by the primary balance level that occurs in a fiscal crisis, which is the difference between the lowest possible revenue realization-to-output ( $\underline{\mathcal{R}}$ ) and the credibly announced lowest expenditures-to-output level ( $\underline{E}$ ), then any debt-to-output ratio greater than( $\phi$ ) can endanger fiscal sustainability and lead to fiscal crisis.

That is, the debt limit is

$$B_{t+1} \leq \phi = \frac{\underline{\mathcal{R}} - \underline{E}}{r - \gamma} \quad (5.11)$$

In other words, expression (5.11) says that fiscal policy is considered sustainable if the current level of debt is not higher than the growth-adjusted ratio of the annual primary balance that may occur in a fiscal crisis. That is, current debt should not exceed the level that can be financed in a fiscal crisis.

However, sub-national borrowing is regulated differently in different countries and with different measures of enforcement, all of which can certainly have an effect on sub-national borrowing behavior, but not all of which can guarantee fiscal sustainability. Furthermore, the sub-national revenue structure also differs - in some countries lower levels of government are

more dependent on transfers from the central government, whereas in others, they rely more on own resources. It is very important to have in mind that different sources of revenue give governments different incentives, affecting their behavior in terms of revenue effort and spending responsibility. Therefore, it would seem necessary to incorporate the institutional framework defining borrowing, on the one hand, and the primary balance, on the other, in order to investigate how the borrowing limit may change in different circumstances.

By incorporating the institutional framework surrounding sub-national borrowing we develop three general conjectures: The debt limit would be expected to be greater for governments that have

- a) more stable revenues, including more revenue autonomy (discretion over either choosing the revenue instruments, and/or base and rates) and less dependence on financing from the central governments. Transfers, in particular, may lead to a positive incentive to spending without generally stimulating revenue collections;
- b) more flexibility to adjust expenditures;
- c) higher output growth rates and lower real interest rates.

Showing under what conditions these three conjectures hold true will provide the basic framework for testing the main hypothesis that is the focus of this study:

*H: If sub-national borrowing is numerically limited and restricted to financing capital investments and the sub-national governments are provided with some measure of revenue autonomy, sub-national borrowing should not endanger fiscal sustainability.*

Before proceeding to investigate these three conjectures above, it is helpful to make the following set of assumptions for defining the primary balance components and borrowing.

ASSUMPTIONS ON THE FUNDAMENTAL SUB-NATIONAL BUDGET COMPONENTS  
AND ON THE INSTITUTIONAL FRAMEWORK

Before listing the set of assumptions applying to the components of the budget constraint, it is important to disaggregate the primary balance into all the fundamental components that are of main interest for the purpose of this analysis.

First, the primary balance  $\mathcal{S}_t$  includes all flows of revenues  $\mathcal{R}_t$  minus noninterest expenditures  $E_t$ ,

$$\mathcal{S}_t = \mathcal{R}_t - E_t \tag{5.12}$$

Sub-national governments have three major sources of revenues ( $\mathcal{R}$ ), namely own revenues ( $\mathcal{OR}$ ), shared revenues ( $\mathcal{SR}$ ), and transfers ( $\mathcal{T}$ ). Furthermore, transfers are (typically) divided into: unconditional transfers ( $\mathcal{T}_u$ ), conditional transfers for capital purposes ( $\mathcal{T}_{c\mathcal{K}}$ ), and other conditional transfers ( $\mathcal{T}_c$ ).

Hence, equation (5.12) can be rewritten as

$$\mathcal{S}_t = \mathcal{OR}_t + \mathcal{SR}_t + \mathcal{T}_{u,t} + \mathcal{T}_{c\mathcal{K},t} + \mathcal{T}_{c,t} - E_t \tag{5.13}$$

Furthermore, both conditional transfers for capital purposes and other conditional transfers can each be divided into two groups depending on whether they have no or some level of *fungibility* ( $x$ ), where ( $x \in [0,1]$ ). Therefore, ( $x\mathcal{T}_{c\mathcal{K}}$ ) and ( $x\mathcal{T}_c$ ) would represent the fungible share of conditional transfers for capital purposes and other conditional transfers, respectively. A greater than zero fungibility exists when the sub-national government is already financing, up to a certain level, certain expenditure functions for which the transfer was issued. Hence, in this case, the transfers may or may not be fully used for that stated function. For example, if the particular expenditure function is financed by own sources in an amount greater than the amount

of the transfer, the sub-national government may decide to increase the financing of the purpose in question by either the full amount of the transfer or less than the full amount, or may not change the level of financing at all and reallocate the resources for some other purposes. Obviously, conditional transfers with a fungibility effect are more likely to happen in wealthier sub-national governments and those enjoying more revenue autonomy.

The following sections describe the important assumptions concerning the fundamental components of the primary balance.

### Sub-National Own-Source Revenues

Sub-national own-source revenues are primarily determined by the level of revenue autonomy ( $\rho$ ), including ability to choose instruments, to set and/or change tax base and/or tax rates, and ability to administer taxes (or any combination of these four).<sup>24</sup> Greater revenue power is assumed to have a positive effect on potential own revenue collection.

Furthermore, an important source of sub-national revenues may be shared revenues ( $\mathcal{SR}$ ). Shared revenues usually represent a fixed share ( $\theta$ ), set by the central government, of revenues collected within a sub-national government boundary that is returned by the central government. This is known as revenue sharing on a derivation basis. Given their predictability, size, and the low political costs to sub-national governments, they may lead to reduced sub-national effort in collecting their own revenues.

---

<sup>24</sup> OECD (1999) classifies the sub-national control over own revenue sources into the following categories, by decreasing order: a) sub-national government sets tax rate and tax base; b) sub-national government sets tax rate only; c) sub-national government sets tax base only, d) tax sharing arrangements; d.1) sub-national government determines revenue-split; d.2) revenue-split can only be changed with consent of sub-national government; d.3) revenue-split fixed in legislation, may unilaterally be changed by central government; d.4) revenue-split determined by central government as part of the annual budget process; e) central government sets rate and base of sub-national government tax. In cases (a) - (c), and (d.1) - (d.2) the sub-national government has total or a significant control over its taxes. In the remaining cases, the sub-national tax autonomy is limited or non-existent.

Finally, the third important part of sub-national revenues is intergovernmental transfers.<sup>25</sup> Dependence on transfers from the central government, in general, generates a disincentive effect on sub-national own revenue collection. Sub-national governments may choose to reallocate their financing portfolio toward politically least cost sources; i.e., transfers. However, this effect may be different with different types of transfers.

First, unconditional transfers are generally used for fiscal equalization purposes among sub-national governments. This latter means that not all the sub-national governments necessarily receive the unconditional transfers. In some cases, sub-national governments have to make a negative transfer, as in the case of Robin Hood systems of equalization. In the case of unconditional transfers ( $\mathcal{T}_U$ ), the substitution effect from own-revenues to transfers to finance expenditures is probably the most common given the fact that unconditional transfers do not impose any conditions on recipients about the use of funds. Hence, this type of transfers is very likely to be used for financing current expenditures and at the same time have a disincentive effect on own revenue effort. Furthermore, unconditional transfers are often decided each year or determined by formula. If the unconditional transfers are allocated by a formula which includes sub-national revenue effort as one of the factors, then the unconditional transfers may in fact increase own-revenue collection. Therefore, the effect of the unconditional transfers on own-revenues collection is ambiguous.

Second, all conditional transfers, both for capital purposes ( $\mathcal{T}_{\mathcal{C}\mathcal{K}}$ ) and other conditional transfers ( $\mathcal{T}_{\mathcal{C}}$ ), may discourage sub-national revenue effort. However, in the case of matching conditional transfers this effect tends to be less pronounced. The negative effect decreases with the proportion ( $m \geq 0$ ) with which the sub-national government has to meet the matching

---

<sup>25</sup> More often than not, revenue classifications look at the different forms of revenue sharing as just being another form of transfers.

transfer requirements<sup>26</sup> and, as discussed above, increases with the level of fungibility effect of these transfers ( $x$ ). Larger fungibility effects may discourage own revenue collection because the government officials may decide to use the released resources to buy votes by lowering own revenue collections.

To summarize, based on the previous discussion, own revenues can be expressed as the following<sup>27</sup> twice differentiable function

$$OR = f(\rho, \theta, \mathcal{T}_u, \mathcal{T}_{c\mathcal{K}}(m, x), \mathcal{T}_c(m, x)) \quad (5.14)$$

with the following assumptions

$$\mathcal{A}1: f^\rho \geq 0$$

$$\mathcal{A}2: f^{\mathcal{T}_u} \leq 0; (f^{\mathcal{T}_{c\mathcal{K}}}, f^{\mathcal{T}_c}) \begin{cases} \leq 0, & \text{if } m = 0 \\ \geq 0, & \text{if } m > 0 \end{cases}, (f^{\mathcal{T}_{c\mathcal{K}}}, f^{\mathcal{T}_c}) \begin{cases} = 0, & \text{if } x = 0 \\ < 0, & \text{if } x > 0 \end{cases}$$

### Intergovernmental Transfers

In general, the allocation of intergovernmental transfers depends on the level of sub-national expenditure needs that cannot be financed by their own revenues, or the so called vertical imbalance. These functions include either capital or current expenditures, and may depend on factors like level of urbanization, education, age dependency, etc. These effects, for simplicity,

---

<sup>26</sup> Or in other words, the positive relationship between conditional transfers and sub-national revenue effort is a positive function of the proportion with which the sub-national government enters in financing particular expenditure function.

<sup>27</sup> Intergovernmental transfers may also be a function of sub-national own revenues ( $OR$ ). This is, for example, the case with some equalization transfers that are improperly designed. Equalization transfers should be based on the sub-national potential revenues, rather than the actual revenues. Basing equalization transfers on actual revenues would “punish” those sub-national governments exercising higher revenue efforts. Another reason is that actual revenues may mislead the approximation of revenue capacity if the sub-national governments vary with respect to revenue effort. However, it often happens that regardless of these concerns, in the absence of the necessary data, equalization transfers may still be based on the actual revenues (Boex & Martinez-Vazquez, 2007). For simplicity purposes, it is assumed here that the transfers are not a function of the sub-national own revenues.

can be narrowed down to a common determinant, population ( $\mathcal{N}$ ). Hence, transfers, on the one hand, depend on the level of expenditure decentralization ( $\varepsilon$ ), and on the other hand, on expenditure needs, which are assumed here to be determined by population ( $\mathcal{N}$ ). This relationship will tend to vary across different types of transfers. For example, greater expenditure responsibilities (without changing revenue autonomy) may increase the vertical and horizontal fiscal gaps, implying greater need for unconditional transfers. On the other hand, population growth may have a greater effect on the importance of capital transfers or conditional matching transfers.

Transfers can be classified in several ways. Basically, they can be of two forms, namely, revenue sharing and grants. Revenue sharing represents a fixed share of given revenue sources that are allocated to the sub-national governments based on (1) the revenue accruing within each jurisdiction (also called the derivation principle) or (2) other criteria, typically population, expenditure needs, and/or tax capacity (Shah, 1994). Grants are financial resources flowing from one government (grantor) to another government (recipient). If the allocation of revenue sharing resources is not based on the origin, then there is very little practical difference between the revenue sharing and grants.

Another typology of grants is related to the degree of autonomy of the sub-national governments in using the transfers. Unconditional (or general purpose transfers) are provided as general budget support, with no strings attached to their use. On the other hand, the conditional transfers provide help for particular services and define exactly how they are used. Between these extremes are the block grants, which allow the recipient discretion to allocate the funds within a defined functional area. For the purpose of this study, transfers will be distinguished between only unconditional and conditional transfers, as done in Bahl and Linn (1992).



Unconditional transfers are typically related the revenue effort of the sub-national government. They are commonly allocated according to a formula with the main purpose to provide sub-national governments with a stable source of revenue. When the purpose of the unconditional grants is predominantly to provide resources to underdeveloped or fiscally needy sub-national governments, the unconditional transfers are equivalent to equalization transfers (Martinez-Vazquez & Boex, 2005).

Conditional transfers may incorporate matching requirements by the sub-national government to finance a specified percentage of expenditures using their own resources. Matching requirements can be either open ended, in which case the central government matches whatever level of resources the sub-national government provides, or closed ended, meaning that the central government matches the sub-national government's funds only up to a predetermined limit. For the purpose of this study, two categories of conditional transfers are assumed, namely, conditional transfers for capital purposes and other conditional transfers.

Unconditional transfers may be a function of sub-national own-revenues ( $\mathcal{OR}$ ), which may happen in case when equalization transfers are based on the sub-national potential revenues, rather than the actual revenues. In this case, sub-national governments with higher revenue efforts are "punished" by a lower level of transfers. For the purpose of this study, transfers are not considered to be a function of own-revenues.

The effect of greater revenue autonomy ( $\rho$ ) given to sub-national governments on the level of intergovernmental transfers is ambiguous. In general, it is expected that giving more revenue autonomy to sub-national governments would reduce their dependence on financing from the central government budget. This would be the case especially if the majority of

unconditional transfers are discretionary, which exacerbate the soft budget constraint. However, that may not always be the case. Greater revenue autonomy may at the same time increase regional disparities, leading to a greater need for equalization transfers. Moreover, if greater revenue autonomy has a positive effect on sub-national revenue effort, and if the revenue effort is one of the determinants for transfer allocation, then more revenue autonomy may have a positive effect on the level of transfers. Therefore, the final effect of revenue autonomy on intergovernmental transfers would depend on the structure of transfers. Moreover, greater revenue autonomy could also influence the transfer structure itself, where, conditional transfers would be less common, while relative share of the unconditional transfers would be increased.

Therefore, transfers can be defined with the following functions

$$\mathcal{T} = t(\varepsilon, \mathcal{N}, \rho) \tag{5.15a}$$

$$\mathcal{T}_u = u(\varepsilon, \mathcal{N}, \rho) \tag{5.15b}$$

$$\mathcal{T}_{c\mathcal{K}} = v(\varepsilon, \mathcal{N}, \rho) \tag{5.15c}$$

$$\mathcal{T}_c = w(\varepsilon, \mathcal{N}, \rho) \tag{5.15d}$$

and the following assumption

$$\mathcal{A3}: t^\rho \lesseqgtr 0, u^\rho \lesseqgtr 0, v^\rho \leq 0; w^\rho \leq 0$$

### Sub-National (Non-Interest) Expenditures

The assignment of expenditure responsibilities has been considered as the first and fundamental step in the design of fiscal decentralization (Martinez-Vazquez, 1999). It is argued that the design of other components of fiscal decentralization such as revenue assignment,

intergovernmental transfers and sub-national borrowing, in the absence of clear expenditure assignment would be like putting the cart before the horse (Bahl & Wallich, 1995). This is exactly what happened with some Latin American countries during 1990s which made the mistake of assigning revenues to sub-national governments before clearly assigning expenditure responsibilities. Successful functioning of a decentralized government system requires a clear assignment of expenditure responsibilities because failure to do so may lead to instability in intergovernmental relations and to the inefficient provision of public services.

According to the subsidiarity principle, expenditure responsibilities are assigned to the lowest level that can provide it efficiently. Some expenditure responsibilities are always assigned to the central government because, due to economies of scale, assigning them to lower levels would be inefficient. Such expenditure responsibilities include national defense and monetary policy. On the other hand, some expenditure functions, such as education, sewerage, provision of drinking water, etc., are considered to be most efficiently provided by sub-national governments.

The principal of efficiency demands that the assignment of expenditure responsibilities results in an efficient allocation of resources. In other words, public services with wider benefits should not be assigned to smaller government units, and vice versa, public services with smaller benefits should not be assigned to larger government units. In both cases the likely result is the under-provision of services and inefficient allocation of resources because when there is a larger distance between policy-makers and the people, the former are less informed about people's references and needs. Hence, efficiency in the provision of public service is achieved if benefits from consuming the public service are linked to the costs of their provision (fees, service charges and local taxes).

The lack of clarity in the definition of sub-national expenditure responsibilities leads to poorly designed revenue assignment. Decentralization of the revenue assignment based on expenditure responsibilities is desired so that sub-national governments do not have to solely rely on intergovernmental transfers to finance their expenditures. Linking the sub-national revenues with expenditures is important for preserving the incentive for providing public services in a cost-effective manner (Shah, 1995). Significant reliance on intergovernmental transfers to finance sub-national expenditures breaks the revenue-expenditure linkage, and can adversely affect sub-national fiscal management.

The expenditure level primarily depends on expenditure assignments to sub-national governments ( $\epsilon$ ). The greater are sub-national expenditure responsibilities, the greater is the overall level of expenditures. This applies to both capital and non-interest current expenditures. Furthermore, the level at which assigned functions are provided further depends on sub-national needs for services. In general, population ( $N$ ) can be assumed to be the basic determinant of all public service needs.<sup>28</sup>

Finally, both the level and structure of sub-national expenditures is likely to be affected by the transfer system ( $\mathcal{T}$ ). It is commonly found that transfers, in general, generate the so-called flypaper effect on sub-national government spending.<sup>29</sup> This effect is more or less strong depending on the type of transfer. In case of unconditional transfers ( $\mathcal{T}_U$ ), this effect is likely the smallest because this kind of transfer can be most easily used for rebates to local taxpayers through reduced taxes. On the other hand, the “flypaper effect” is more likely to occur in the case

---

<sup>28</sup> Of course, there are other determinants of needs, such as cost differences for providing services, or special needs of population subgroups, such as young population, the elderly, etc. to simplify the analysis, those other determinants are assumed away.

<sup>29</sup> The “flypaper effect” postulates that once the sub-national government receives the transfer, it is more likely it will spend it than return it to the tax payers (“money sticks where it hits”)(Hines Jr & Thaler, 1995).

of conditional transfers, especially if they are matching ( $m > 0$ ). As a consequence of matching conditional transfers, expenditures are more likely to increase. Furthermore, when it comes to the fungibility of transfers and its effect on sub-national expenditures, it is expected that either there is no effect or that effect is positive but sufficiently small.

Summarizing the discussion above, sub-national expenditures can be represented by the following function

$$E = h(\varepsilon, \mathcal{N}, \mathcal{T}(m, x)) \quad (5.16)$$

and we make the following assumptions:

$$\mathcal{A4}: h^{\mathcal{T}u} = 0$$

$$\mathcal{A5}: h^m \geq 0; h^x \geq 0$$

### Sub-National Primary Balance

The effect of a primary balance on the debt limit  $\phi$  is realized through three channels, namely sub-national revenues, non-interest expenditures, and sub-national borrowing regulations  $\mu$ . The first two have already been explained in the previous three sections, while this section explains the third channel.

Certain forms of borrowing controls or regulations determine the borrowing limit via budget balance. These include fiscal rules such as deficit targets, expenditure rules, borrowing limits related to the current deficit of the sub-national government budget; limits on debt service as a percent of current revenues, etc. These rules force sub-national governments to achieve and maintain a certain level of budget balance, implying that the budget balance is an increasing function of borrowing controls  $\mu$ . For convenience,  $\varepsilon$  is assumed to be continuous on  $\mu$ .

In other words,

$$\mathcal{S} = s(\mu) \tag{5.17}$$

and

$$\mathcal{A6}: s^\mu \geq 0$$

### Sub-National Borrowing and the Real Interest Rate

Sub-national borrowing is an increasing function of capital investments for which the sub-national government has expenditure responsibility ( $\varepsilon$ ), such as the building and maintenance of roads and highways, schools, industrial parks, or other infrastructure. As explained in sections 2 and 3 of this chapter, capital expenditures are determined by various factors, but again we will assume that the basic determinant that drives the need for particular assigned functions is population ( $\mathcal{N}$ ).

Furthermore, sub-national borrowing depends positively on sub-national borrowing capacity, including own-source revenues ( $\mathcal{OR}$ ), shared revenues ( $\mathcal{SR}$ ) and intergovernmental transfers ( $\mathcal{T}$ ). These latter are the case to the extent that some of the transfer funds can be diverted to service outstanding debt. Own revenues and shared revenues are important determinants of borrowing, contributing to greater sub-national creditworthiness. Creditors generally look at the sub-national government's ability to pay, which is demonstrated by the availability of these revenue sources. Improved credit ratings in turn reduce the cost of borrowing, thus leading to greater volume of borrowing.

Furthermore, different types of intergovernmental transfers have different effects on borrowing capacity and borrowing behavior. Unconditional transfers ( $\mathcal{T}_U$ ) are a significant determinant of borrowing capacity, given that, because the funds are not conditioned for any

specific use, the sub-national government can use them to service the outstanding debt. Hence, they may contribute to an improvement in creditworthiness, to a lowering of borrowing costs, and through that, to greater borrowing. However, given that these transfers are unconditional, they can be used to finance capital investments as well, reducing the demand for borrowing through that channel.

Conditional transfers for capital purposes ( $\mathcal{J}_{c\mathcal{X}}$ ) are provided by the central government for financing specific capital investments, leading through this channel to, other things equal, lower borrowing demand. However, in the case of matching transfers, they may induce an increase in borrowing. This positive effect of conditional transfers for capital purposes on borrowing depends on the proportion the sub-national government is supposed to co-finance the capital investments ( $m$ ). Furthermore, if conditional transfers for capital purposes exhibit fungibility effect ( $x$ ) greater than zero, sub-national governments may use “released” funds to pay the interest or the principal on outstanding debt, which reduces the level of indebtedness and, in turn, borrowing costs, possibly leading to new borrowing. However, these released funds may also be used to finance capital investments, then having a negative effect on borrowing. Therefore, the fungibility ( $x$ ) of conditional transfers for capital purposes may have either a positive effect on borrowing through the interest rate ( $r$ ) (which will be more extensively discussed below), or a negative effect (the direct effect on demand for borrowing).

Finally, other conditional transfers ( $\mathcal{J}_c$ ), by their nature, do not have a direct effect on borrowing since their purpose is not to finance capital investments. However, through fungibility these transfers may also affect borrowing indirectly. This holds even if these transfers are matching, implying that regardless of how large  $m$  is, that would not affect borrowing demand. However, as in the case of conditional transfers for capital purposes, they may have an effect on

borrowing, depending on the fungibility of these transfers ( $x$ ). If the fungibility effect is greater than zero, then the released resources could be used for paying interest or debt principal, or even for financing capital investments. Hence, if they have the fungibility effect these transfers may well have an effect on borrowing. This effect would be either direct and negative, or indirect and positive (through reduced borrowing costs).

Moreover, sub-national borrowing is a negative function of the interest rate ( $r$ ). The interest rate is the cost of each unit of borrowing and is negatively correlated with sub-national capacity to service debt. The greater is sub-national capacity to service debt, the greater is its creditworthiness, leading to a lower risk of default and a lower cost of borrowing. However, not all revenue components have an equal effect on interest rate. Sub-national capacity to service debt will depend on the revenue assignment and the transfer system, on the one hand, and the stability of alternative revenue sources, on the other.

In general, greater dependence on sources from the central government ( $\mathcal{T}$ ) reduces sub-national creditworthiness, especially when the transfers are subject to central government discretion, meaning they can be changed drastically from one year to another, depending on the pressures on the national budget. When sub-national budgets are highly dependent on transfers from the central government, especially when transfer arrangements are unstable, it is very difficult to predict their ability to repay debt. This uncertainty about future revenue levels translates into credit risk. The risk is even greater if sub-national authorities have limited power to raise taxes or fees at their own initiative.

Furthermore, any sub-national government's fiscal risk is increased due to debt spillovers from other sub-national governments. More precisely, one sub-national government's inability to repay its debt affects others' income through decreased credit ratings, and possibly lower



economic activity, which would worsen their fiscal situation and translate into worsen fiscal standings. Lower central government revenue is likely to cause a reduction in transfers to lower levels of government, which increases the probability that other sub-national governments will have difficulty meeting their debt obligations as well. Hence, an excessive increase in one sub-national government's debt, and even more its default, is likely to lead to a reduction in the creditworthiness of others and to increase their borrowing costs.

However, as elaborated above, depending on the stability of the transfer arrangement ( $\tau$ ), that is, whether transfers are determined at the discretion of the central government, or by a defined formula, some types of transfers provide funds that are more or less subject to sub-national discretion. These funds can be used to service outstanding debt, reducing its level and contributing positively to sub-national ability to issue new debt under favorable terms. As discussed above, this is especially the case with unconditional transfers ( $\mathcal{T}_U$ ). Therefore, the stability of transfer arrangement ( $\tau$ ) and their structure are important factors affecting sub-national borrowing interest rates through the transfer system.

Moreover, different own revenue instruments themselves are not equally stable. If the sub-national government has the power to choose the instruments, that is, to decide which revenue categories to use, it can reduce the volatility of its own revenues without giving up long term growth in revenues. Therefore, through own revenues, the interest rate is a function of the level of own revenues itself ( $\mathcal{OR}$ ) and sub-national revenue autonomy ( $\rho$ ). With respect to the stability of revenues, although shared revenues ( $\mathcal{SR}$ ) are not sub-national own revenues, they may be stable sources when they are allocated by a formula that determines the share ( $\theta$ ) and is established in the law. In this case they may contribute to lower borrowing costs.

Furthermore, sub-national borrowing is subject to regulations and monitoring ( $\mu$ ). Different countries use different frameworks to keep sub-national borrowing under control, and often use more than just one type of framework to achieve this goal. These frameworks, which were reviewed in Chapter IV, range from direct controls by the central government to allowing sub-national governments to borrow in the private capital markets where financial market imposes conditions sub-national government are required to meet in order to be able to borrow under favorable terms. Regardless of which exact framework a country applies, they all have the purpose of preventing sub-national borrowing from endangering the macroeconomic stability of the country. Therefore, if borrowing is allowed at the sub-national level, regulations are intended to restrain it and hold it below the level that would happen if there are no restrictions whatsoever.

Finally, besides ability to pay off debt, creditworthiness is defined by the sub-national fiscal balance ( $\mathcal{S}$ ) and level of outstanding debt ( $\mathcal{D}$ ) as well. A higher fiscal balance gives lenders a signal that the borrower is able to finance its spending from available revenue sources, reducing the risk of default and the borrowing cost ( $r$ ). On the other hand, a higher level of outstanding debt ( $\mathcal{D}$ ) negatively affects creditworthiness, suggesting a borrower's tendency to overspend and increasing the default risk and the borrowing cost ( $r$ ). For simplicity, it is assumed that ( $\mathcal{D}$ ) is a decreasing function of borrowing regulations ( $\mu$ ).

Taking into account all the points from the previous discussion, the level of sub-national borrowing can be expressed as the following function:

$$\mathcal{B} = z(\varepsilon, \mathcal{J}_U, \mathcal{J}_{CX}(m, x), \mathcal{J}_C(x), \mu, r(\mathcal{S}, \mathcal{D}, \mathcal{J}_U, \mathcal{J}_{XC}(x), \mathcal{J}_C(x), \tau, \mathcal{OR}, \theta, \rho)) \quad (5.18)$$

with the following assumptions

$$\mathcal{A}7: z^{\mathcal{T}u} \leq 0; z^{\mathcal{T}cx} \begin{cases} = 0, \text{ if } x = 0 \text{ and/or } m = 0 \\ < 0, \text{ if } x > 0 \\ > 0, \text{ if } m > 0 \end{cases}; z^{\mathcal{T}c} \begin{cases} = 0, \text{ if } x = 0 \\ < 0, \text{ if } x > 0 \end{cases}$$

$$\mathcal{A}8: z^r \leq 0$$

$$\mathcal{A}9: z^\mu \leq 0$$

$$\mathcal{A}10: r^S \leq 0; r^D \geq 0; r^{OR} \leq 0$$

$$\mathcal{A}11: r^\rho \leq 0; ; r^\theta \leq 0; r^\tau \leq 0$$

$$\mathcal{A}12: r^T \geq 0; r^{\mathcal{T}u} \leq 0; (r^{\mathcal{T}cx}, r^{\mathcal{T}c}) \begin{cases} = 0, \text{ if } x = 0 \\ < 0, \text{ if } x > 0 \end{cases}$$

$$\mathcal{A}13: D^\mu \leq 0$$

### Gross Regional Domestic Product Growth Rate

The hypothesis this study attempts to prove proposes that if sub-national borrowing is numerically limited and allowed to be issued only for financing capital investments and sub-national governments are provided with some measure of revenue autonomy, then the primary balance should remain sustainable. In other words, when borrowing is used only for productive purposes, it may contribute, through improved infrastructure, to a growth rate of gross regional domestic product and should not lead to an increase in the primary balance deficit that would lead to fiscal crises. However, if the growth rate of gross regional domestic product is a function of many factors other than just sub-national borrowing, and often those other factors may have a predominant effect. Hence, for the purpose of this analysis, the growth rate of gross regional domestic product ( $\gamma$ ) is assumed to be exogenous and given.

## DEBT LIMIT AND FISCAL DECENTRALIZATION

The focus of this section is testing the main hypothesis of this study, that is, that sub-national borrowing, numerically limited and restricted to financing capital investments only, in addition to providing a certain measure of revenue autonomy. It requires investigating the response of the debt limit ( $\phi$ ) in equation (5.11) to the dynamics in its components with respect to variables of interest, namely, revenue autonomy ( $\rho$ ) and borrowing regulations ( $\mu$ ).

The debt limit ( $\phi$ ) represents the maximum level of current debt that the sub-national government can finance in fiscal crises, that is, with lowest possible realization of revenues and the credibly announced lowest expenditures. In order to be able to increase borrowing without risking a crisis, the sub-national government's objective is to maximize the debt limit ( $\phi$ ). In other words, the sub-national government's objective is that in case of a fiscal crisis, the lowest possible revenue collection and the credibly announced lowest expenditures are as high as possible. As already discussed, the debt limit ( $\phi$ ) may be increased in at least one of the following three ways, holding everything else constant:

- a) With more stable revenues, including more revenue autonomy (discretion over either choosing the revenue instruments, and/or bases and rates) and less dependence on financing from the central governments. Transfers, in particular, may provide a positive incentive to spending without generally stimulating revenue collections;
- b) With more flexibility to adjust expenditures;
- c) With higher output growth rates and lower real interest rates.

However, having in mind that sub-national borrowing played a major role in some of the recent crises, it is very important to include sub-national borrowing regulation as one of the main factors that could prevent sub-national debt to exceed the debt limit ( $\phi$ ).

After incorporating all necessary assumptions in equation (5.11), testing the main hypothesis of this study that sub-national borrowing, numerically limited sub-national borrowing that is restricted to finance capital investment, when sub-national governments are provided with a certain measure of revenue autonomy, requires investigating how the debt limit, presented with equation (5.19), changes with respect to variables of interest, namely, revenue autonomy ( $\rho$ ) and borrowing regulations ( $\mu$ ).

$$\phi = \frac{\mathcal{R} - E}{r - \gamma} = \frac{s\left(\left(\mathcal{f}(\cdot) + t(\cdot) - h(\cdot)\right), \mu\right)}{r(\cdot) - \gamma} \quad (5.19)$$

where

$$\mathcal{f} = \mathcal{f}(\rho, t(\cdot), m, x)$$

$$t = t(\varepsilon, \mathcal{N}, \rho)$$

$$h = h(\varepsilon, \mathcal{N}, t(\cdot), m, x)$$

$$r = r(s(\mathcal{R}, E, \mu), \mathcal{D}(\mu), t(\cdot), x, \tau, \mathcal{f}(\cdot), \theta, \rho)$$

and

$\rho \equiv$  Revenue autonomy;

$\varepsilon \equiv$  Expenditure autonomy;

$\theta \equiv$  Share of revenue kept by the sub-national government in the revenue-sharing scheme;

$\mu \equiv$  Borrowing regulation and monitoring;

$\tau \equiv$  Degree of government discretion in the transfer system;

$m \equiv$  Proportion of the cost with which the sub-national government “matches” a conditional intergovernmental transfer in financing particular purpose;

$x \equiv$  Fungibility of intergovernmental transfers;

$\mathcal{N} \equiv$  Demand for public goods provision by the sub-national government, proxied by the population size

$\mathcal{D} \equiv$  Level of outstanding debt

#### Debt Limit Response to an Increase in Revenue Autonomy

Investigating how the debt limit ( $\phi$ ) reacts to an increase in sub-national revenue autonomy requires finding the partial derivative of equation (5.19) with respect to revenue autonomy ( $\rho$ ), which results in the following expression

$$\phi^\rho = \frac{(r - \gamma)(\mathfrak{A}) - (\mathcal{R} - E)(\mathfrak{B})}{(r - \gamma)^2} \quad (5.20)$$

where

$$(\mathfrak{A}) \equiv f^\rho + t^\rho + f^{J_u} u^\rho + f^{J_{c\kappa}} v^\rho + f^{J_c} w^\rho - h^J t^\rho$$

$$(\mathfrak{B}) \equiv r^{J_u} u^\rho + r^{J_{c\kappa}} v^\rho + r^{J_c} w^\rho + r^{OR}(\mathfrak{A}) + r^\rho$$

To determine the direction of the debt limit response to a change in revenue autonomy, we investigate the sign of the components in (5.20):

A. *The response of primary budget balance to a change in revenue autonomy* ( $\mathfrak{A}$ ):

$$(\mathfrak{A}) \equiv f^\rho + t^\rho + f^{T_u} u^\rho + f^{T_{c\kappa}} v^\rho + f^{T_c} w^\rho - h^T t^\rho$$

From assumption  $\mathcal{A}1$  it implies that  $f^\rho \geq 0$ .

Next, assumption  $\mathcal{A}2$  implies that  $f^{T_u} \lesseqgtr 0$ , which means that the effect of the unconditional transfers on own-revenue collection depends on the type of unconditional transfers. Some unconditional transfers may have a disincentive effect on sub-national revenue effort and through it on revenue collection because they can easily be used for rebates to the taxpayers through reduced taxes. However, if the unconditional transfers are allocated based on a formula that, among other factors, includes sub-national revenue effort, then the unconditional transfers may in fact have positive effect on own-revenue collection. Furthermore, based on the assumption  $\mathcal{A}3$ ,  $u^\rho \lesseqgtr 0$ . As already discussed, greater revenue autonomy given to sub-national governments may lead to an increase in unconditional transfers due to potential greater regional disparities. Moreover, unconditional transfers may increase as a result of greater revenue autonomy when they are designed to reward those sub-national governments with a higher revenue effort. However, greater revenue effort may reduce unconditional transfers if they are mostly discretionary and made to sub-national government to bail them out in case of their insolvency. Hence,  $f^{T_u} u^\rho \lesseqgtr 0$ , depending on whether sub-national governments are “rewarded” or not for their greater revenue efforts through unconditional transfers.

Furthermore, according to the same assumptions, greater sub-national revenue autonomy is expected to reduce the share of conditional transfers in total, i.e.,  $v^\rho \leq 0$  and  $w^\rho \leq 0$ . On the other hand, the signs of terms  $f^{T_{c\kappa}}$  and  $f^{T_c}$  depend on

- whether the transfers are matching. If yes ( $m > 0$ ), both terms may be positive, whereas if not ( $m = 0$ ), both terms may be negative; and
- whether the transfers have the fungibility effect. If yes ( $x > 0$ ), then  $f^{Tcxc}$  and/or  $f^{Tc}$  may likely be negative, whereas if not ( $x = 0$ ), they would be equal to zero.

This implies that if the conditional transfers are mostly matching and have low or no fungibility, terms  $f^{Tcxc}$  and  $f^{Tc}$  are likely to be positive, implying  $f^{Tcxc} \nu^\rho \leq 0$  and  $f^{Tc} \omega^\rho \leq 0$ .

Next, greater revenue autonomy given to the sub-national governments should reduce their dependence on financing from the central government budget. This may be even more the case if the majority of transfers are those that exacerbate a soft budget constraint. However, if a significant share of transfers consists of unconditional transfers that are allocated by a formula that takes into account sub-national revenue effort, then greater revenue autonomy may also increase regional disparities, leading to greater need for unconditional transfers. Depending on the change of unconditional transfers, and assuming no change in conditional transfers, total transfers may increase or not change. Hence, the final effect is ambiguous. That is,  $t^\rho \lesseqgtr 0$  (Assumption  $\mathcal{A}3$ ).

Finally, the sign of term  $h^T t^\rho$  depends on the transfer structure as well. Firstly, as just discussed,  $t^\rho \lesseqgtr 0$ . Next, if increased revenue autonomy would cause a change in the transfer structure, the sign of the term  $h^T$  would mostly depend on this change. As already discussed, unconditional transfers have the least pronounced “flypaper effect”. If greater revenue autonomy causes the transfer structure to change in a way that the unconditional transfers allocated by a predetermined formula become more common, as opposed to other types of transfers, then  $h^T$  is



either equal to zero or positive but sufficiently small. Hence, the sign of  $h^J t^\rho$  mostly depends on a change in the transfer structure.

To conclude, the response of the primary budget balance to a change in sub-national revenue autonomy depends primarily on the effect of revenue autonomy on the change in the transfer structure. If transfers are designed in a way that they promote sub-national revenue effort and do not have the “flypaper effect”, then the response in primary budget balances to a change in revenue autonomy should be positive. Unconditional transfers at the same time have the smallest “flypaper effect” and, if allocated by a predetermined formula that “rewards” greater revenue effort, may increase the revenue effort. Conditional matching grants may have positive effect on revenue effort as well, especially if  $m$  is large.

$$(\mathfrak{A}) \equiv f^\rho + t^\rho + f^{Ju} u^\rho + f^{Jc\kappa} v^\rho + f^{Jc} w^\rho - h^J t^\rho \lesseqgtr 0$$

*B. Response of the gross interest rate to a change in the sub-national revenue autonomy* ( $\mathfrak{B}$ ):

$$(\mathfrak{B}) \equiv r^{Ju} u^\rho + r^{Jc\kappa} v^\rho + r^{Jc} w^\rho + r^{OR}(\mathfrak{A}) + r^\rho$$

As already discussed above,  $u^\rho \lesseqgtr 0$ ,  $v^\rho \leq 0$  and  $w^\rho \leq 0$ .

Next, assumption  $\mathcal{A}12$  implies that  $r^{Ju} \leq 0$ . Moreover, the terms  $r^{Jc\kappa}$  and  $r^{Jc}$  are either negative (if there is some fungibility effect), or are equal to zero (if there is no fungibility effect). Hence,  $r^{Jc\kappa} v^\rho \geq 0$  and  $r^{Jc} w^\rho \geq 0$ . Furthermore, assumptions  $\mathcal{A}10$  and  $\mathcal{A}11$  imply  $r^\rho \leq 0$  and  $r^{OR} \leq 0$ .

Therefore, as in case of the primary balance, a change in the gross interest rate with respect to revenue autonomy depends on the transfer structure. If the transfers are designed to

increase sub-national incentives for higher revenue effort, then the gross interest rate is expected to be reduced with more sub-national revenue autonomy, that is

$$(\mathfrak{B}) \equiv r^{\mathcal{T}u} u^{\rho} + r^{\mathcal{T}c\mathcal{K}} v^{\rho} + r^{\mathcal{T}c} w^{\rho} + r^{OR}(\mathfrak{A}) + r^{\rho} \leq 0$$

C. *The response in the output growth rate to a change in the sub-national revenue autonomy*

( $\mathfrak{C}$ ):

$$(\mathfrak{C}) \equiv \gamma^{\mathfrak{B}} \left( z^{\mathcal{T}u} u^{\rho} + z^{\mathcal{T}c\mathcal{K}} v^{\rho} + z^{\mathcal{T}c} w^{\rho} + z^r (\mathfrak{B}) \right)$$

Summarizing the results obtained for ( $\mathfrak{A}$ ) and ( $\mathfrak{B}$ ), and assuming that the sub-national government runs a primary surplus,  $(\mathcal{R} - E) > 0$  (i.e., borrowing is not allowed for deficit financing), and convergence condition is satisfied,  $(r - \gamma) > 0$ , it can be concluded that

$$\phi^{\rho} \geq 0 \quad (5.20)$$

In other words,

➤ *The fiscally sustainable debt limit increases with more revenue autonomy if the transfer structure gives more incentive to higher revenue effort. This suggests that the transfer structure in which unconditional transfer allocated by a predetermined formula that rewards revenue effort, and matching conditional transfers with significantly large ( $m$ ) may be preferable over other transfers.*

#### Debt Limit Response to a Change in Borrowing Regulations

Investigating the effect of borrowing regulations on the sustainable debt limit requires calculating the partial derivative of equation (5.19) with respect to  $\mu$ , resulting in the following expression:

$$\phi^{\mu} = \frac{\mathcal{S}^{\mu}(r - \gamma) - (\mathcal{R} - E)(r^{\mathcal{S}} \mathcal{S}^{\mu} + r^{\mathcal{D}} \mathcal{D}^{\mu})}{(r - \gamma)^2} \quad (5.21)$$

Following assumption  $\mathcal{A}6$ ,  $\mathcal{S}^\mu \geq 0$ , this component represents the effect of regulations based on the fiscal rules that “target” budget balance and its components, including the revenue rules, expenditure rules, deficit rules, and the “golden rule”.<sup>30</sup>

Next, components  $r^{\mathcal{S}}\mathcal{S}^\mu$  and  $r^{\mathcal{D}}\mathcal{D}^\mu$  represent the effect of regulations by the financial markets and fiscal rules, but affecting primary balance through the cost of borrowing. In other words, fiscal rules, including the revenue rules, expenditure rules, deficit rules, the “golden rule”, and the limit on debt affect sub-national government creditworthiness and credit ratings and, through borrowing costs, fiscal performance. According to assumptions  $\mathcal{A}6$ ,  $\mathcal{A}10$ , and  $\mathcal{A}13$ ,  $r^{\mathcal{S}}\mathcal{S}^\mu \leq 0$  and  $r^{\mathcal{D}}\mathcal{D}^\mu \leq 0$ .

It can, therefore be concluded that

$$\phi^\mu \geq 0 \quad (5.21')$$

In other words, assuming that the convergence condition is satisfied,  $(r - \gamma) > 0$ , and assuming that the sub-national government runs a primary surplus,  $(\mathcal{R} - E) > 0$  (i.e., borrowing is not allowed for deficit financing),

➤ *The fiscally sustainable debt limit increases with borrowing regulations which target fiscal performance, sub-national creditworthiness, and borrowing cost (e.g., fiscal rules and market-based regulations).*

## CONCLUSION

This chapter investigated how fiscally sustainable debt limits change with higher revenue autonomy given to sub-national governments and with different types of sub-national borrowing

---

<sup>30</sup> According to the “golden rule”, current spending can only be financed with current revenues. Hence, over the cycle, the current budget (i.e., net of investment) must balance or be brought into surplus.

regulations. Fiscally sustainable debt limits result from the lifetime budget constraint and represents the maximum level of debt a sub-national government can finance from its revenues. In other words, fiscal policy is considered sustainable if the present value of future primary balances equals the current level of debt. This limit is assumed to be higher with more revenue and expenditure autonomy, lower interest rate (resulting from better sub-national creditworthiness) and higher output growth rate (as a result of the productive use of borrowing).

Results obtained in this chapter provide support to the hypothesis that regulated sub-national borrowing with more revenue autonomy, when borrowing can be issued only to finance capital investments (i.e., the “golden rule”) should not endanger fiscal sustainability. More precisely, the following two conclusions are made with respect to the effect of sub-national revenue autonomy and borrowing regulations on sustainable debt limits.

1. Higher revenue autonomy has a positive effect on the fiscally sustainable debt limit if sub-national governments rely more on transfers that promote sub-national revenue effort; and
2. Sub-national borrowing regulations that focus on improving creditworthiness and reducing borrowing costs through improving fiscal performance, including the “golden rule”, have an increasing effect on fiscally sustainable debt limit.

These results suggest that both sub-national financing and borrowing regulations should be designed in a way to give incentives to sub-national governments to be fiscally responsible. On the one hand, more reliance on own-source revenues and more autonomy over these sources, and, on the other, less reliance on transfers, especially those that reduce sub-national revenue efforts and increase spending, improve fiscal performance. Furthermore, sub-national borrowing regulations that primarily affect fiscal responsibility rather than focusing on limiting borrowing

either through the ceilings or approvals, positively affect fiscal sustainability. The latter conclusion suggests that regulations based on fiscal rules and market base regulations should be the most efficient types of regulations, while the administrative regulation is the least. As described in the previous chapter, the cooperative type of regulation includes many components of the other three types, and if it is properly implemented, it should show their best characteristics. In other words, if cooperatively made decisions about borrowing issuance are not made based on discretion but on rules, they should be as efficient as fiscal rules.

## VI. EMPIRICAL ANALYSIS

This chapter empirically tests the hypotheses set out in chapter V. It evaluates the determinants of choosing particular forms of sub-national borrowing regulations and tests whether sub-national borrowing affects a country's fiscal performance. Of particular interest is whether sub-national borrowing restricted to financing capital investments and supported by a higher level of sub-national revenue autonomy has a significant positive effect on national fiscal sustainability. From a policy viewpoint, this is the most advisable policy to follow. The question is whether it makes a difference in the real world.

This chapter is organized as follows. First, we explain the design of sub-national borrowing regulation variables. Second, we describe the methodologies for testing the effects of sub-national borrowing regulation on fiscal sustainability and for evaluating the determinants of sub-national borrowing regulation, and discuss dependent and independent variables. Third, we present and discuss results of the analyses of the determinants and of the effects of regulations. Finally, the chapter concludes with a summary of the results.

### SUB-NATIONAL BORROWING REGULATIONS

The analysis in this chapter is based on data for 57 developed, developing and transition countries, between 1990 and 2008. The data on the main variables of interest, sub-national borrowing regulations, are based on information collected by the author from various sources, such as laws, country reports, and individual country or regional studies.<sup>31</sup> This information considers whether borrowing is allowed at the sub-national level, and if so, how it is regulated and controlled.

---

<sup>31</sup> See the Appendix for details for sources by country.

Countries usually implement a combination of different types of regulations in an attempt to control sub-national borrowing and improve sub-national creditworthiness. For the purpose of this study, information about sub-national borrowing regulation that has been implemented refers to the dominant regulation in a particular country and year. Based on this information, countries are classified into the following six broad categories, with the following basic criteria:

1. *Prohibited*: Sub-national governments are not allowed to borrow in private capital markets;
2. *Administrative*: Each borrowing issuance requires an approval from the central government authority;
3. *Cooperative*: A decision on each borrowing issuance is cooperatively made by members of a body (e.g., a council, committee) that consists of representatives of all government units;
4. *Centrally-imposed rules*: Regulation is based on fiscal rules (e.g., deficit targets, maximum expenditure rules, or rules related to debt payment capacity) imposed by the central government that are clearly specified in the constitution or organic laws;
5. *Self-imposed rules*: Sub-national borrowing is regulated by fiscal rules that sub-national governments imposed on themselves to improve their creditworthiness;
6. *Market-based*: Only financial markets regulate borrowing at the sub-national level.

Besides the six categories described above, the following three qualitative indicators of sub-national borrowing regulations are observed separately:

1. Restricting sub-national borrowing for solely financing capital investments (i.e., the “golden rule”);
2. Imposing *ceilings on debt or total borrowing*;

3. Ability to *borrow in foreign capital markets*. This indicator consists of two categories: a) not allowed to borrow in the foreign market; b) allowed to borrow with or without an approval from the central government authority.

Therefore, if ceilings on debt or total borrowing and/or the “golden rule” are the only fiscal rules that regulate sub-national borrowing, then regulation was classified as marked based. Moreover, because the effectiveness of fiscal rules significantly depends on legal sanctions for non-compliance, this indicator is observed as well. Countries implement three types of legal sanctions for non-compliance, namely administrative, political and financial sanctions. However, for the purpose of this study, we do not separately identify the types of sanctions.

Table 1. Sub-National Borrowing Regulations, Sample Structure<sup>1</sup>

	Number of observations	% of Total	Number of Countries
Prohibited	143	18%	16
Administrative	154	19%	17
Cooperative	116	14%	7
Centrally-imposed rules	190	23%	19
Self-imposed rules	45	6%	3
Market-based	159	20%	11
Total	807	100%	73 <sup>2</sup>
The "golden rule"	356	44%	28
Limit on debt or borrowing	427	53%	37
Foreign: allowed	219	27%	13
Foreign: with approval	257	32%	23

<sup>1</sup> Period: 1990-2008, 57 countries, data based on an unbalanced panel

<sup>2</sup> Does not add up to 57 because some countries changed dominant borrowing regulation during the sample period

Table 1 presents our sample structure in terms of sub-national borrowing regulation, based on an unbalanced sample of 57 countries, during the period 1990-2008. As can be observed, there were 16 changes of dominant sub-national borrowing regulations during the



observation period.<sup>32</sup> Furthermore, 28 countries in the sample restricted borrowing for financing only capital investments at some point during the observation period, while 37 countries imposed limits on debt and borrowing.

## METHODOLOGY

### Effect of Sub-National Borrowing On Fiscal Sustainability

As discussed in chapter V, fiscal sustainability has become one of the most widely used terms in the assessment of fiscal policy. However, what fiscal sustainability actually means is hardly ever explained. For the purpose of this study, fiscal sustainability is defined in the following way - fiscal policy is called sustainable if the present value of future primary balances equals the current level of debt. If this condition is met, the government avoids excessive debt accumulation, and is able to roll over its debt and there is no risk of insolvency (Burnside, 2005).

In order to estimate the effects of sub-national borrowing and regulations on fiscal sustainability, we evaluate the relationship between sub-national outstanding debt and borrowing regulations, on the one hand, and the primary fiscal balance, on the other hand. The primary balance is observed at both general and sub-national government levels. The reason for choosing the general government primary balance is the following. When the central government faces sub-national fiscal imbalances, it can react in one of the following three ways. First, the central government can decide to cover the sub-national fiscal imbalances (i.e., a bailout). Second, it can re-design the tax and/or transfer system through which the sub-national government would receive a larger portion of the overall revenues collected. Finally, the central government can ignore the sub-national fiscal imbalances. Regardless of which option the central government will choose, the overall national fiscal balance is likely to deteriorate. However, to obtain a better

---

<sup>32</sup> Note that 15 countries have changed regime once, and one (Bulgaria) has changed it twice. See the Appendix for more details on changes in regulations.

picture about which of these three scenarios is more likely to take place, the same model will be estimated with the sub-national primary balance as the dependent variable. By doing so, we will be able to investigate whether sub-national and general government policies are coordinated and whether there is a difference in the effectiveness of the sub-national borrowing regulations in the sub-national and the general government framework. In addition, the analysis with the sub-national primary balance as the dependent variable will serve as a robustness check of our results.

Regardless of whether the general or sub-national government primary balance is observed, it is almost certain that the current period primary balance depends on its level(s) in the previous year(s), and a set of variables representing the supply and demand for borrowing, as well as the institutional setup in the country. Therefore, the objective model to be tested has the following form:

$$y_{it} = \alpha y_{it-1} + \beta B_{it} + \gamma R_{m,it} + \theta R_{f,it} + \varphi F_{it} + \delta X_{it} + v_i + \varepsilon_{it} \quad (6.1)$$

In equation (6.1),  $y_{it}$  represents the ratio of the primary fiscal balance to GDP in country  $i$  in year  $t$ ,  $i = 1, \dots, n, t = 1, \dots, T$ , while  $y_{it-1}$  represents its value in year  $t - 1$ . Next,  $B_{it}$  represents the level of outstanding debt at the sub-national level in country  $i$  in year  $t$ .  $R_{m,it}$  represents a vector of dummy variables representing six broad types of regulation of sub-national borrowing in county  $i$  in year  $t$ , ( $m = 1, \dots, 6$ ). Vector  $R_{f,it}$  includes dummy variables representing the presence of the “golden rule”, limits on sub-national borrowing, allowing borrowing in the foreign market, and the existence of sanctions for non-compliance, ( $f = 1, \dots, 4$ ). Furthermore,  $F_{it}$  represents a vector of measures of fiscal decentralization, including the share of intergovernmental transfers in total sub-national revenues, a dummy variable that takes the value 1 if the transfer allocation is based on a “stable” formula, the share

of sub-national expenditures in total general government expenditures, and a dummy that takes a value of 1 if the sub-national authority is able to set and/or change rates for income, business or consumption taxes. Next,  $X_{it}$  represents a vector of other control variables generally thought to affect primary fiscal balances, including: urbanization, population growth, age dependency, government stability, government fractionalization, corruption index, central bank independence, bailout history, GDP per capita, inflation rate, and the central government budget balance (for the sub-national government regressions). Finally,  $v_i$  stands for unobserved country fixed effects. A discussion of the variables of interest and control variables is provided in the following section of this chapter.

However, first we need to address several econometric problems that may arise while estimating equation (6.1):

1. The borrowing regulation variables in  $R_{m,it}$  are assumed to be endogenous. This is because causality may run in both directions – from the primary balance to the decision how to regulate borrowing and vice versa – these regressors may be correlated with the error term;
2. Time-invariant country characteristics (fixed effects), such as geography and demographics, may be correlated with the explanatory variables. The fixed effects are contained in the error term  $u_{it}$  in equation (6.1), which consists of the unobserved country-specific effects,  $v_i$ , and the observation-specific errors,  $e_{it}$ ,  $u_{it} = v_i + e_{it}$ ;
3. The presence of the lagged dependent variable  $y_{it-1}$  is likely to give rise to autocorrelation;
4. The panel dataset has a short time dimension ( $T = 19$ ) and a larger country dimension ( $N = 57$ ). This causes a potential problem because when the time dimension is short, the

correlation of the lagged dependent variable with the error term, and hence the dynamic panel bias, may be significant. In this case, applying a straightforward fixed effects estimator is not appropriate (Roodman, 2006).

The endogeneity problem (problem 1) arises due to a concern that there may be a reverse causality issue between the sub-national primary balance, and through it, the general government primary balance, and the choice of sub-national borrowing regulations. Countries with less disciplined sub-national governments may choose stricter regulations, while countries with more disciplined sub-national governments may rely more on market-based regulations. This problem is partly alleviated by the fact that most countries chose sub-national borrowing regulations before the observed period in this study, suggesting that the average sub-national fiscal balance could not directly affect the choice. However, because current average sub-national fiscal balances tend to correlate with past averages, the endogeneity concern still exists.

To address problem 1, one would usually choose an instrumental variables approach. However, because the potentially endogenous variables in  $R_{m,it}$  are a set of mutually exclusive dummy variables, the first stage in the instrumental variable regression is modified to incorporate a multinomial logit model instead of the usual linear regression. The multinomial logit methodology, which allows estimating probabilities with which a country chooses a particular type of regulation, is discussed in section 6.2.2 below.

To address the problems 2, 3, and 4, we will use the GMM estimator (Arellano & Bond, 1991), which was first proposed by (Holtz-Eakin, Newey, & Rosen, 1988). The difference GMM estimator uses first differences to transform equation (6.1) into

$$\Delta y_{it} = \alpha \Delta y_{it-1} + \beta \Delta B_{it} + \gamma \Delta R_{m,it} + \theta \Delta R_{f,it} + \varphi \Delta F_{it} + \delta \Delta X_{it} + \Delta v_i + \Delta \varepsilon_{it} \quad (6.2)$$

Because fixed country-specific effects do not vary over time, they disappear by this transformation, solving problem (2). That is,

$$\Delta u_{it} = \Delta v_i + \Delta \varepsilon_{it} \quad (6.3)$$

or

$$u_{it} - u_{it-1} = v_i - v_i + \varepsilon_{it} - \varepsilon_{it-1} \quad (6.3)$$

$$u_{it} - u_{it-1} = \varepsilon_{it} - \varepsilon_{it-1} \quad (6.4)$$

Next, the autocorrelation (problem 3) is addressed by “instrumenting” first-differenced lagged dependent variable with its past levels. However, when series are very persistent, lagged levels are weak instruments for first differences (Blundell & Bond, 1998). According to Arellano and Bover (1995), efficiency can be increased by adding the original equation in levels to the system. If the first differences in the explanatory variables are not correlated with the individual effects, lagged values of the first differences can then be used as instruments in the equation in levels. Lagged differences of the dependent variable may also be valid instruments for the level equation.

Following the above considerations, Blundell and Bond’s (1998) methodology is applied and equation (6.1) is estimated using the “system” GMM estimator. The system GMM estimator uses the level equations to obtain a system of two equations – one differenced and one in levels. This additional equation enables additional instruments to be obtained. Therefore, variables in the level equations are instrumented with their own first difference, which tends to increase efficiency (Roodman, 2006). In order to satisfy the assumption of no correlation across individuals in the idiosyncratic disturbances, it is important to include time dummies into the regression, which makes this assumption more likely to hold (Roodman, 2006).

Finally, the Arellano – Bond estimator is designed for small-T large-N panels (problem 4). In large-T panels, a shock to the country-specific fixed effect, which appears in the error term, declines with time. Similarly, the correlation of the lagged dependent variable with the error term is insignificant (Roodman, 2006). On the other hand, if N is small, the cluster-robust standard errors and the Arellano-Bond autocorrelation test may be unreliable. In these cases, one does not necessarily have to use the Arellano – Bond estimator.

Furthermore, in evaluating the effect of sub-national government debt and borrowing regulations on fiscal sustainability, duration analysis is applied to estimate the marginal effects on duration of fiscally sustainable primary balances. This methodology allows evaluation of by how much would the median duration of fiscally sustainable primary balance change as a result of changes in the independent variables.

Two alternative approaches can be followed to assess the determinants of fiscal sustainability using duration analysis; namely, the gradient and the level approach (Adam & Bevan, 2003). Under the gradient approach, fiscal adjustment ends when a country fails to keep reducing the deficit by a certain threshold amount each year. Under the level approach, the end of a fiscal consolidation episode is reached when the deficit is above a certain deficit threshold. In this study the level approach is employed, with two alternative thresholds used for defining fiscal consolidation; namely,

*the primary balance to GDP  $\geq 0\%$  and the primary balance to GDP  $\geq -3\%$ .*

Furthermore, based on the primary balance to GDP ratio, a dummy variable called “Failure” is generated, which takes the value zero when the primary balance to GDP is greater or equal to the predetermined threshold (i.e., years of fiscal consolidation), and takes the value one when is lower than the threshold (i.e., 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 the sample used in this study, the minimum number of years that a consolidation lasts is one year, and the maximum is nineteen years.

Table A.5 presents the descriptive statistics for failure and duration by threshold. As the table shows, the number of failures under the “*stronger*” definition of the threshold (*primary balance to GDP*  $\geq 0\%$ ) is larger than under the -3 percent threshold. Furthermore, under the “*stronger*” definition, the average probability of ending the fiscal consolidation is higher (20 versus 6.7 percent for general government, and 23.9 versus 8.1 percent for sub-national primary balance). Moreover, the average duration is lower for the zero than for the -3 percent threshold (5.4 versus 7.2 years for both general and sub-national primary balance).

When using duration analysis, non-parametric and parametric analysis can be applied. Non-parametric analysis basically investigates 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<sup>33</sup> ( $T$ ) is greater or equal to  $t$ , and is defined as

$$S(t) = \Pr(T \geq t) = 1 - F(t) \quad (6.5)$$

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; is defined as

---

<sup>33</sup>  $T$  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.

$$h(t) = \Pr(T = t/T \geq t) \quad (6.6)$$

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

$$h(t, X) = h_0(t) \cdot g(\mathcal{W}) \quad (6.7)$$

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

$$h(t, X) = h_0(t) \cdot \exp(\mathcal{W}'\beta) \quad (6.8)$$

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.

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). This violates the independence of failure-times assumption required in traditional duration analysis. If more than one spell is observed for a country, it is realistic to



assume that these spells are not independent. Thus, the likelihood function based on model (6.6) is misspecified for multiple spells since it does not account for intra-country correlation of the spells observed on the same country.

Following Lin and 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. The obtained variance and covariance estimates can be then modified to account for the dependences. More precisely, given that the estimated variance-covariance matrix obtained as the inverse of the information matrix does not take into account the additional correlation in the data, (Lin & Wei, 1989) propose a modification of the following form:

$$V = I^{-1}(\hat{\beta})G'(\hat{\beta})G(\hat{\beta})I^{-1}(\hat{\beta}) \quad (6.9)$$

where  $G(\hat{\beta})$  is a  $m \times p$  matrix of the group efficient score residuals ( $m$  is the number of clusters ( $G_1, G_2, \dots, G_m$ ), while  $p$  is the number of time-dependent covariates).

The variables included in matrix  $\mathcal{W}$  in equation (6.8) are: the number of previous failures; the initial budget balance; the size of the fiscal adjustment; and all variables used to estimate equation (6.1), excluding lagged value of the primary balance.

#### *Sub-national Borrowing and Fiscal Sustainability: Variables*

This section provides a discussion on variables used to estimate equations (6.1) and (6.8). The description of variables is provided in Table A.2 while in this section we discuss on their expected effect on fiscal performance and fiscal sustainability. All variables used for estimating both equations (6.1) and (6.8) are divided in four groups; namely, sub-national borrowing and regulations, fiscal decentralization, the demand for borrowing, and institutional, political and

macroeconomic variables. In addition, three more variables are used for estimating equation (6.8); namely, number of previous failures, initial budget balance, and size of the fiscal adjustment, which will be discussed more below.

- *Sub-national Borrowing and Regulations:*

*Sub-national outstanding debt* may have both positive and negative effects on the fiscal balance. On the one hand, borrowing in private credit markets requires borrower's creditworthiness for better terms of borrowing (i.e., lower interest rate). Therefore, there may be a positive relationship between debt and fiscal balance, due to sub-national governments' attempt to improve their fiscal performance for reducing their cost of borrowing. Furthermore, if past debt was issued for productive purposes, high outstanding debt today may be positively correlated with higher current revenue collection from investment projects financed by the debt. Third, if borrowing is not prohibited through refinancing, debt can be issued for financing debt, reducing the budget deficit. On the other hand, higher debt may be correlated with higher spending, leading to a higher budget deficit. Hence, the effect of sub-national debt on fiscal balance is ambiguous.

Previously described *broad types of sub-national borrowing regulations* differ from each other with respect to the level of borrowing autonomy that sub-national governments have, administrative being the most centralized<sup>34</sup> and market-based regulations the most decentralized. No one level of borrowing autonomy is appropriate for all cases, but rather it depends on the particular circumstances of the country. Hence, one cannot make any certain predictions about which one among broad types of regulations is more efficient in regulating the effect of sub-national borrowing on fiscal performance.

---

<sup>34</sup> Not including prohibited borrowing at the sub-national level.

*The “golden rule”* is expected to have a positive effect on the primary fiscal balance through more than one channel. First, prohibiting borrowing for financing current fiscal deficits positively affects sub-national fiscal responsibility. Second, borrowing for capital investments potentially has a positive effect on increasing the sub-national revenue base in the long run and, through it, potentially higher revenue collection. Economic growth theory emphasizes the importance of capital accumulation in the attainment of economic growth. The higher the stock of capital the higher the level of the economic output will be in the long-run. Governments invest in physical infrastructure in order to increase the productive capacity of the economy. Government spending on public infrastructure reduces transactions cost for businesses and signals commitment of the government to ensure profitability for prospective investors. Therefore, a positive relationship between borrowing for investment financing and fiscal discipline is expected.

Imposing *limits on debt and borrowing* is expected to reduce the probability of overspending and may have a positive effect on the fiscal balance. Limits on the level of debt and debt servicing capacity are important because even if borrowing is issued only to finance capital investments. Excessive debt can endanger fiscal sustainability because the debt service would overburden current expenditures, having long-term consequences on sub-national credit ratings. For example, in the 1840s, eight American states defaulted on their debts and they still continued paying a premium in the 1990s (English, 1996).

*Borrowing in the foreign market:* If borrowing is largely domestic, this may lead to lower investment because of less loanable funds available, and thus, to lower output and consumption in the long-run (Stiglitz, 2000). However, central governments often use the following arguments in favor of prohibiting external borrowing. First, allowing the sub-national

governments to individually access the international capital markets may be less efficient and may result in less favorable borrowing terms than when it is coordinated by the center. Second, there is always the possibility of a spillover effect in which the default of any one sub-national government would affect the creditworthiness and risk rating of others as well as of the central government. Third, international lenders usually require a central government guarantee (Giugale et al., 2000)

***Sanctions for non-compliance:*** The existence of either fiscal rules in general or rules as to the purpose of borrowing, does not necessarily have to be efficient if there are no legal sanctions for debtors' non-compliance.

- ***Fiscal Decentralization:***

The literature on fiscal decentralization does not provide conclusive evidence on its effect on fiscal performance. On the one hand, Shah (2005) finds that fiscal decentralization is associated with improved fiscal performance and better functioning of the internal common market. Fiscal decentralization may also promote price stability, especially in higher-income countries (Martinez-Vazquez & McNab, 2006). On the other hand, Prud'homme (1995) 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. Fiscal decentralization can, therefore, lead to worse fiscal outcomes. Similarly, Plekhanov and Singh (2007) indicate that it may also reflect the central government's attempt to shift part of the fiscal burden onto sub-national governments. Hence, the effect of fiscal decentralization on fiscal balance is ambiguous.

***Intergovernmental transfers (IGT):*** The literature provides evidence that more dependence on financing from the central government is positively correlated with sub-national fiscal indiscipline and higher spending (e.g., de Mello, 2000)

***Transfer formula:*** The greater predictability of unconditional transfers may affect the cost of borrowing through more than one channel. First, unconditional transfers can be used to pay debt installments or interest, reducing the level of outstanding debt and likely positively affecting terms for new debt issuance. Second, predictable revenues suggest that the borrower will be better able to repay debt, which is very important to lenders and may reduce the cost of borrowing through lower interest rates on new debt issuance.

***Tax autonomy:*** 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. Moreover, sub-national governments can use their discretionary tax autonomy to pay their debts. This variable is, therefore, expected to be positively correlated with fiscal performance.

***Sub-national government expenditures*** contribute to an increase in overall government expenditures, *ceteris paribus*. However, decentralization of spending increases efficiency because local governments have better local information and hence can better match policies with the preferences of citizens, which may lead to a reduction in expenditures (Samuelson, 1954; Oates, 1972, 1993). Moreover, taxpayers are more willing to cooperate with accountable local governments, leading to larger revenue collection (Wasylenko, 1987). According to the latter two arguments, one would expect a positive effect of expenditure decentralization on overall fiscal balance. However, expenditures decentralization may (also) have negative effect on the fiscal balance. For example, local governments may lack economies of scale in the provision of

public goods; information and coordination costs may be higher for local governments because of lack of institutional and administrative capacity (Bardhan & Mookherjee, 1998; Blanchard & Shleifer, 2001). Furthermore, the central government may be unable to credibly commit to a hard-budget constraint (no bailout of the local government) due to political concerns, leading to even larger spending (Goodspeed, 2002).

- *Demand for Borrowing:*

**Urbanization** affects the fiscal balance through both revenues and expenditures. On the revenue side, because of the higher population density in urban areas, monitoring of tax compliance may become less expensive, implying higher overall tax compliance. However, because people live close to their neighbors in urban settings, informal transactions become more feasible which in turn may tend to reduce tax collections (Kau & Rubin, 1981). On the expenditures side, higher urbanization may affect demand for more government spending. Therefore, the effect of urbanization on fiscal deficit is ambiguous.

**Population growth:** similar to urbanization, higher population growth induces more demand for public services and larger government spending. However, larger population growth may as well represent an increase in the revenue base, likely leading to larger revenue collection. Moreover, increasing population density from higher population growth implies a higher cost of publicly provided goods due to congestion (Fenge & Meier, 2002). However, for some public goods, such as sewers, the costs can fall with increasing population density (Haug, 2004).

**Age dependency:** De Mello (2001) finds a positive relationship between the dependency ratio and the long-run welfare-related liabilities of the public sector, which puts pressure on sub-national governments by increasing the need for public borrowing and may negatively affect fiscal outcomes.

**GDP per capita:** High GDP per capita accounts for larger demand for public services and spending due to higher incomes. This variable is expected to account for better fiscal performance of developed countries as well. The expectation is that spending levels will rise with increasing levels of economic development (Wagner's law) so more functions would be assigned to the sub-national governments, which may lead to greater demand for borrowing if their own-source revenues are not sufficient. At the same time, a higher level of development is correlated with a greater capacity to pay and collect taxes (Bahl, 1971; Chelliah, 1971; Bird et al., 2005), especially if debt is issued for productive expenditures.

- ***Institutional, Political, and Macroeconomic Variables:***

**Government stability** is an assessment both of the government's ability to carry out its declared programs, and its ability to stay in office. More stable governments are expected to more likely impose harder budget constraints on all levels of government and may improve fiscal outcomes.

**Government fractionalization** is expected to negatively affect fiscal performance. Roubini and Sachs (1989) find the lack of political cohesion to be highly related with budget deficits. Similarly, Rodden (2002) finds that political cohesion contributes to total public sector fiscal outcome.

Perceived **corruption** is assumed to be associated with weak government institutions and, therefore, lower fiscal discipline and a higher probability of an end of a consolidation episode.

**Central bank independence (CBI):** The theoretical literature (Masciandaro & Tabellini, 1987; Castellani & Debrun, 2001; Montiel, 2003) shows that CBI should affect the design of fiscal policy, i.e., a greater degree of independence influences the central government toward fiscal discipline. The adoption of an independent central bank deprives the government from

using the inflation tax and so constitutes a strong signal for fiscal discipline. However, empirical studies provide inconclusive results. Sikken and Haan (1998) address this issue for developing countries and find no relationship between CBI and the level of budget deficits.

**Bailout history** is likely to be highly correlated with current bailout expectations and can be used as an instrument for bailout expectations. Pettersson-Lidbom and Dahlberg (2005) find strong evidence that bailout expectations have a large and significant impact on local government debt. On average, a local government increases its debt by 30 percent if it is certain of being bailed out as compared to when it is certain of not being bailed out.

**Inflation** gives an incentive to the government to collect seignorage revenue, which in turn negatively affects fiscal performance. However, according to (Mankiw, 1987) inflation is an important source of revenue - as debt and interest rates are measured in nominal terms (i.e., interest rates are not indexed to the inflation rate), and so generating inflation depreciates the real value of intern public debt and interest payments. On the other hand, governments find it difficult to fully recognize the need to restrain expenditures in real terms during periods of inflation.

**Central government budget balance:** Rodden (2002) argues that sub-national government fiscal performance may be positively correlated with long-term central government fiscal performance. Plekhanov and Singh (2007) 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 balances. Third, the central government fiscal balance partly absorbs the effects of fiscal crises that affect the fiscal performance.



Finally, we expect that EU countries that adopted the *stability and growth pact* (SGP) should be more fiscally responsible and that may have better fiscal performance.

- *The following three variables also are used in the duration analysis:*

*Number of previous failures* 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.

*Initial budget balance* takes into account the fact that initial fiscal consolidations influence policymakers in deciding how much adjustment is needed to stabilize 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 levels. Therefore, this variable is expected to increase the probability of ending a consolidation episode.

*The size of the fiscal adjustment* is measured as the 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.

In the next section we set up the methodology for evaluating the determinants and estimating probabilities of choosing one of six broad types of sub-national borrowing regulations previously discussed.

#### Determinants of Sub-National Borrowing Regulations

To evaluate the determinants of choosing a particular type of sub-national borrowing regulation, we use a multinomial logit model.

As already mentioned, vector  $R_{m,it}$  consists of  $m = 1, 2, \dots, 6$  borrowing regulation variables. Based on the vector  $R_{m,it}$ , variable  $R_{it}^*$  is designed in the following way:

$$R_{it}^* = \begin{cases} m_1, \text{ if } R_{1,it} = 1, (\text{prohibited borrowing}) \\ m_2, \text{ if } R_{2,it} = 1, (\text{administrative regulation}) \\ m_3, \text{ if } R_{3,it} = 1, (\text{cooperative regulation}) \\ m_4, \text{ if } R_{4,it} = 1, (\text{centrally imposed rules}) \\ m_5, \text{ if } R_{5,it} = 1, (\text{self imposed rules}) \\ m_6, \text{ if } R_{6,it} = 1, (\text{market based regulation}) \end{cases} \quad (6.10)$$

The probability of choosing any of categories  $m = 2, 3, \dots, 6$  is compared to the probability of choosing the reference category (prohibited borrowing). This requires the calculation of five equations, one for each category relative to the reference category.

Hence, if the first category is the reference one, then, for  $m = 2, 3, \dots, 6$ ,

$$\ln \frac{P(R_{it}^* = m)}{P(R_{it}^* = 1)} = \alpha_m + \sum_{k=1}^K \beta_{mk} W_{ik} = Z_{mi}, \quad m = 2, \dots, 6 \quad (6.11)$$

Therefore, for each choice, there will be five predicted log odds, one for each category relative to the reference category.<sup>35</sup>

Probabilities for  $m = 2, 3, \dots, 6$  are

$$P(R_{it}^* = m) = \frac{\exp(Z_{mi})}{1 + \sum_{m=2}^6 \exp(Z_{mi})}, \quad m = 2, \dots, 6 \quad (6.12)$$

While, for the reference category,  $m = 1$

$$P(R_{it}^* = 1) = \frac{1}{1 + \sum_{m=2}^6 \exp(Z_{mi})} \quad (6.13)$$

Hence, the model to be estimated is shown in equation (6.11), where  $X_{ik}$  is the vector of variables representing potential determinants of sub-national borrowing regulations, which are discussed in the following section.

---

<sup>35</sup> Note, when  $m = 1$ , then  $\ln(1) = 0 = Z_{11}$  and  $\exp(0) = 1$

### *Determinants of Sub-national Borrowing Regulations: Variables*

As addressed above, one of the problems with estimating equation (6.1) is the potential reverse causality between sub-national borrowing regulations and the fiscal balance. More precisely, because of the strong concern about the possible danger of sub-national borrowing for fiscal and macroeconomic stability, the decision of how to regulate borrowing at the sub-national level is expected to depend on the government's fiscal performance. It is assumed that countries with stronger macroeconomic stability are more likely to allow sub-national borrowing in the private credit market. Moreover, it is expected that the more stability at the macroeconomic level, the more likely a country would choose more decentralized types of sub-national borrowing regulations, such as market-based regulation or regulation based on fiscal rules.

In order to resolve the reverse causality issue, an exogenous instrument has to be found which is correlated with borrowing regulations but not with the fiscal balance. Having in mind the nature of all fiscal decentralization variables, it is very difficult to find an exogenous instrument that would allow obtaining an unbiased estimate of sub-national borrowing regulation on fiscal balance. Besides other factors, the ability of sub-national governments to access private financial markets significantly depends on the depth of the country's financial markets and the development of financial institutions. The depth of financial markets has an effect on how sub-national borrowing is regulated, but at the same time is not directly affected by the size of the fiscal deficit, thus representing a potentially good instrument for sub-national borrowing regulation.

The development of financial markets is expected to significantly affect sub-national borrowing autonomy. First, the supply of funds in the financial market affects the sub-national governments' ability to borrow, and second, the depth of the financial market is correlated with

the development of financial institutions. Hence, it is expected that countries with more developed financial markets are more likely to allow more borrowing autonomy to the sub-national governments. To measure the depth of financial markets, two variables are used, namely the liquid liabilities indicator and the index of financial freedom.

*The liquid liabilities* indicator represents the ratio of *liquid liabilities to GDP*, where liquid liabilities consist of currency held outside the banking system plus demand and interest bearing liabilities of banks and nonbank financial intermediaries. Thus, the liquid liabilities indicator is a typical measure of “financial depth”. The *index of financial freedom* is a measure of banking efficiency as well as a measure of independence from government control and interference in the financial sector. It is created based on five broad areas that are considered to assess an economy’s overall level of financial freedom that ensures easy and effective access to financing opportunities for people and businesses in the economy.<sup>36</sup> An overall score on a scale of 0 to 100 rate an economy’s financial freedom through deductions from the ideal score of 100.

The depth of the financial market represents the supply of borrowing. On the demand side, important variables that affect the decision as to how to regulate borrowing are the government primary balance, sub-national outstanding debt, expenditures and own revenues, sub-national tax autonomy, GDP per capita and population growth. Besides the supply and demand for borrowing, the decision as to how to regulate borrowing depends as well on political and institutional determinants, such as government stability, government fractionalization, and bailout history. The following discussion explains the rationale behind these determinants.

---

<sup>36</sup> These five areas are: the extent of government regulation of financial services; the degree of state intervention in banks and other financial firms through direct and indirect ownership; the extent of financial and capital market development; government influence on the allocation of credit, and openness to foreign competition (The Heritage Foundation, 2011).

Low *primary fiscal balances* and high *sub-national outstanding debt* may affect a government's decision to either prohibit borrowing at the sub-national level or to choose a more centralized type of regulations. Both general government and sub-national government primary balances are used to evaluate the determinants of sub-national borrowing regulation.

Next, sub-national governments' ability to borrow in private financial markets depends on their creditworthiness, which in turn, depends on different factors, including the sub-national governments' ability to repay debt. Sub-national governments with more own revenues are expected to have a greater ability to repay debt, everything else constant, especially if at the same time they have more tax autonomy, that is, ability to set and/or change tax rates for important tax instruments. Therefore, the share of *sub-national own tax revenues* in total sub-national revenues is included as a potential determinant of sub-national borrowing regulation. However, even though it is expected that more sub-national own revenues are positively correlated with creditworthiness, and through it, with sub-national borrowing regulation, higher sub-national own revenues at the same time may result in lower demand for borrowing. The central government may, for that reason, consider borrowing at the sub-national level as less necessary and may prefer to restrict it, if not prohibit it. Therefore, the expected sign on this variable is ambiguous. Moreover, *tax autonomy* is expected to have a positive effect on the probability of allowing borrowing at the sub-national level.

Higher *sub-national expenditures* may indicate larger sub-national expenditure needs and higher demand for financing and, therefore, may positively affect the decision to allow sub-national governments to borrow in the capital market.

*GDP per capita* and *population growth* represent indicators of demand for public services, suggesting that with their increase there may be a higher probability of allowing

borrowing at the sub-national level. Moreover, as discussed above, GDP per capita is supposed to account for better fiscal performance of developed countries and more developed financial markets.

More *stable governments* are expected to be more likely to impose harder budget constraints on all levels of government, suggesting a higher probability of choosing more decentralized sub-national borrowing regulation.

Taking into account the governments' ability to make decisions cooperatively, one would expect that countries with less *fractionalized governments* are more likely to have cooperatively regulated sub-national borrowing, or borrowing regulated by fiscal rules.

Finally, *bailout history* is likely to be highly correlated with current bailout expectations and can be used as an instrument for bailout expectations. It is expected that countries with a history of bailouts may be more likely to choose more centralized types of sub-national borrowing regulations.

## RESULTS

### Determinants of Sub-National Borrowing Regulations

As explained above in section 6.2.2, the first part of the empirical analysis includes estimating probabilities with which countries choose sub-national borrowing regulation types. For that purpose, multinomial logit regressions are utilized. Table 2 presents the relative risk ratios of choosing particular sub-national borrowing regulation for unit increase in independent variable.

Given that both general and sub-national government primary balances are observed as potential determinants of sub-national borrowing regulations, Table 2 presents the estimated relative risks for both options. However, based on the results in Table 2, no definite conclusions can be made about whether sub-national or general government primary balance is more relevant

in deciding on how to regulate sub-national borrowing. This is because of the way results are presented in Table 2 which can only suggest how much the determinants affect probability of choosing a particular borrowing regulation compared to a reference category. These results, however, cannot suggest anything about the decision between the non-reference categories.

As the results show, the liquid liabilities variable seems to be relatively significant in choosing cooperative regulation and regulation based on centrally-imposed rules, compared to administrative regulations. More precisely, a one percentage point increase in the share of liquid liabilities in GDP increases the probability of choosing cooperative regulation by 0.2 percentage points over choosing administrative regulations.

However, as mentioned above, from the results in Table 2 we cannot make a conclusion about the probabilities of choosing among the regulation types presented in the table. Because this analysis includes comparison among six categories, this way of presenting the relative risk ratios of choosing one category over the other is somewhat tricky and confusing. Therefore, it may be more useful for the purpose of analysis to present the results as in Table 3 and Table 4 where it is possible to compare the effects of independent variables on the relative risk of choosing one type of regulation over the other. For example, the effect of one percentage point increase in liquid liabilities to GDP ratio on the relative risk of regulating sub-national borrowing through centrally-imposed rules over administrative regulation equals between 0.06 and 0.10, depending on the specification. Similarly, the same effect for choosing centrally-imposed rules over market-based regulation is between 0.05 and 0.07, depending on the specification.

The results in Table 3 and Table 4 suggest that the depth of the financial market is particularly important for choosing cooperative regulations and regulations based on centrally and self-imposed rules, over the other types of regulation. Furthermore, countries with a higher

general government primary balance are most likely to choose administrative, self-imposed rules and market-based regulations over the other types. Moreover, countries with a higher sub-national primary balance are more likely to choose self-imposed rules and market-based regulations over the others, and are least likely to prohibit borrowing at the sub-national level. Finally, countries with higher sub-national outstanding debt seem to be more likely to choose self-imposed fiscal rules to regulate sub-national borrowing.

The results also suggest that higher-income countries tend to choose cooperative regulations and self-imposed fiscal rules over the others. Next, higher sub-national expenditures seem to lead to a higher probability of choosing administrative and cooperative regulations. Finally, countries in which sub-national governments have tax autonomy are more likely to choose more decentralized types of regulations; namely, self-imposed rules and market-based regulations.

Tables 6.4.A and 6.4.B present the probabilities of choosing a particular sub-national borrowing regulation by country compared with an average value of the independent variable. The difference between Table 5 and 6 is that the former presents results obtained from the specification including the general government primary balance while the latter uses the sub-national primary balance. First, the results show no significant differences in probabilities depending whether the general or the sub-national primary balance is included. Second, the results suggest that a developing country with an average share of liquid liabilities to GDP will be more likely to choose an administrative type of sub-national borrowing regulation or to prohibit sub-national borrowing. On the other hand, a developed country with an average share of liquid liabilities to GDP will be more likely to choose sub-national regulations based on centrally-imposed rules, market-based or cooperative regulation.



Table 2. Factor change in relative risk ratio of choosing sub-national borrowing regulation (for unit increase in independent variable)

	Specification 1*					Specification 2**				
	Prohibited	Cooperative	Central	Self Rule	Market	Prohibited	Cooperative	Central	Self Rule	Market
Liquid Liabilities	7.593 (6.328)	0.205* (0.671)	0.062*** (0.600)	0.351 (0.849)	0.950 (0.611)	0.008 (6.486)	0.365 (0.675)	0.096*** (0.586)	0.753 (0.848)	1.995 (0.606)
Financial	1.228* (0.090)	0.982 (0.010)	0.998 (0.008)	1.019 (0.016)	0.986 (0.009)	1.303* (0.121)	0.981 (0.010)	0.992 (0.008)	1.012 (0.017)	0.982* (0.009)
Primary Balance	0.000* (1.955)	0.000* (0.177)	13.576 (3.383)	42.452 (7.344)	0.305 (3.544)	4.542 (9.424)	1.401** (1.537)	2.501** (2.286)	2.301*** (1.237)	1.881*** (1.529)
Debt <sup>1</sup>	0.000 (.)	6.740*** (4.255)	8.110*** (4.068)	6.351*** (4.458)	7.021*** (4.080)	0.000 (.)	4.751*** (2.272)	4.801*** (2.053)	1.501*** (1.497)	1.621*** (1.094)
GDP per capita	0.761 (1.393)	2.514*** (0.163)	1.847*** (0.132)	3.350*** (0.215)	1.004 (0.136)	26.347 (1.980)	2.627*** (0.170)	1.818*** (0.135)	3.256*** (0.213)	1.006 (0.142)
Expenditures <sup>1</sup>	1.032 (5.309)	4.923 (2.928)	0.000*** (2.910)	0.000** (4.993)	0.000** (2.891)	1.012 (5.274)	1.905 (3.043)	0.000*** (0.945)	0.000** (0.309)	0.000*** (0.967)
Own Revenues <sup>1</sup>	5.532* (4.971)	0.000*** (1.865)	0.420 (1.604)	0.139 (2.531)	0.002*** (1.835)	1.473* (2.506)	0.001*** (0.868)	0.846 (1.536)	1.679 (2.632)	0.025* (0.808)
Tax Autonomy	0.000*** (1.663)	3.137** (0.409)	1.781 (0.385)	4.729* (0.632)	7.402*** (0.386)	0.000*** (1.384)	3.235** (0.439)	2.414* (0.412)	9.119*** (0.663)	11.980*** (0.419)
Stability	0.640 (0.473)	1.082 (0.094)	0.880 (0.080)	1.118 (0.150)	0.891 (0.085)	0.341* (0.524)	1.087 (0.094)	0.930 (0.082)	1.242 (0.152)	0.936 (0.088)
Fractionalization	3.153 (.)	2.338 (0.608)	6.279*** (0.509)	9.751* (0.900)	0.870 (0.554)	3.160 (.)	2.169 (0.612)	5.500*** (0.516)	7.292* (0.912)	0.750 (0.568)
Bailout	1.156 (3.658)	0.238*** (0.368)	0.973 (0.291)	0.026*** (0.624)	0.693 (0.316)	0.016 (1.579)	0.340** (0.368)	1.197 (0.293)	0.029*** (0.644)	0.824 (0.326)
Population	0.000 (2.209)	2.212 (2.113)	0.000*** (1.928)	2.487*** (3.149)	0.000** (1.800)	7.601 (7.727)	2.711 (2.602)	0.000*** (1.055)	1.246*** (1.988)	0.000*** (1.397)
Pseudo R-sq.	0.442					0.445				
Chi2	1212.833					1222.516				
P	0.000					0.000				

Coefficient represent factor changes in relative risk for unit increase in independent variable  $X = \exp(b)$ ; In parentheses:  $\exp(b)*SD(b)$ ; \*\*\* $p < .01$ ; \*\* $p < .05$ ; \* $p < .10$ ; Administrative regulation is the base category; \*Primary balance is general government (GG) primary balance; \*\*Primary balance is sub-national government (SNG) primary balance; <sup>1</sup>At sub-national government level

Table 3. Factor change in the odds - Specification with General Government (GG) Primary Balance

Category 1	Category 2	Liquid Liabilities		Financial Freedom		GG Primary Balance		SNG Debt		GDP Per Capita		SNG Expenditures	
		exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z
Prohibited	Cooperative	5.758	0.482	1.250	0.014	0.000	0.030	.	.	0.303	0.392	7.081	0.591
Prohibited	Central Rule	5.984	0.371	1.231	0.022	0.000	0.011	0.000	0.000	0.412	0.524	1.382	0.390
Prohibited	Self Rule	0.171	0.538	1.205	0.042	0.000	0.012	0.000	0.000	0.227	0.291	6.482	0.398
Prohibited	Market	8.518	0.645	1.245	0.016	0.000	0.016	0.000	0.000	0.758	0.842	5.432	0.444
Prohibited	Administrative	7.593	0.650	1.228	0.023	0.000	0.014	0.000	0.000	0.761	0.844	1.032	0.534
Cooperative	Prohibited	0.012	0.482	0.800	0.014	1.790	0.030	.	.	3.304	0.392	0.000	0.591
Cooperative	Central Rule	3.335	0.050	0.984	0.104	0.000	0.005	0.083	0.275	1.361	0.044	1.951	0.000
Cooperative	Self Rule	0.585	0.494	0.964	0.025	0.000	0.089	0.000	0.001	0.750	0.150	9.161	0.000
Cooperative	Market	0.216	0.010	0.996	0.686	0.000	0.062	0.010	0.030	2.503	0.000	7.671	0.000
Cooperative	Administrative	0.205	0.018	0.982	0.073	0.000	0.032	6.740	0.000	2.514	0.000	4.923	0.089
Central Rule	Prohibited	0.004	0.371	0.813	0.022	1.930	0.011	.	.	2.427	0.524	0.000	0.390
Central Rule	Cooperative	0.300	0.050	1.016	0.104	1.080	0.005	12.043	0.275	0.735	0.044	0.000	0.000
Central Rule	Self Rule	0.175	0.028	0.979	0.196	0.320	0.875	0.001	0.004	0.551	0.004	0.469	0.880
Central Rule	Market	0.065	0.000	1.012	0.166	44.563	0.258	0.116	0.149	1.839	0.000	0.004	0.044
Central Rule	Administrative	0.062	0.000	0.998	0.821	13.577	0.441	8.110	0.000	1.847	0.000	0.000	0.000
Self Rule	Prohibited	0.020	0.538	0.830	0.042	6.040	0.012	.	.	4.403	0.291	0.000	0.398
Self Rule	Cooperative	1.709	0.494	1.038	0.025	3.370	0.089	9.843	0.001	1.333	0.150	0.000	0.000
Self Rule	Central Rule	5.700	0.028	1.021	0.196	3.127	0.875	7.326	0.004	1.814	0.004	2.131	0.880
Self Rule	Market	0.369	0.182	1.034	0.042	13.343	0.488	9.397	0.037	3.336	0.000	0.008	0.333
Self Rule	Administrative	0.351	0.217	1.019	0.243	42.452	0.610	6.351	0.000	3.350	0.000	0.000	0.007
Market	Prohibited	0.054	0.645	0.803	0.016	4.340	0.016	.	.	1.320	0.842	0.000	0.444
Market	Cooperative	4.631	0.010	1.004	0.686	2.738	0.062	4.227	0.030	0.400	0.000	0.000	0.000
Market	Central Rule	5.444	0.000	0.988	0.166	0.022	0.258	8.654	0.149	0.544	0.000	4.431	0.044
Market	Self Rule	2.709	0.182	0.968	0.042	0.007	0.488	0.011	0.037	0.300	0.000	9.426	0.333
Market	Administrative	0.950	0.933	0.986	0.121	0.305	0.737	7.021	0.000	1.004	0.975	0.000	0.003
Administrative	Prohibited	0.057	0.650	0.814	0.023	1.420	0.014	.	.	1.314	0.844	0.000	0.534
Administrative	Cooperative	4.874	0.018	1.018	0.073	7.739	0.032	0.000	0.000	0.398	0.000	0.007	0.089
Administrative	Central Rule	6.255	0.000	1.002	0.821	0.074	0.441	0.000	0.000	0.541	0.000	1.351	0.000
Administrative	Self Rule	2.852	0.217	0.981	0.243	0.024	0.610	0.000	0.000	0.299	0.000	6.321	0.007
Administrative	Market	1.053	0.933	1.014	0.121	3.282	0.737	0.000	0.000	0.996	0.975	5.629	0.003

exp(b)=factor change in odds (relative risk) for unit increase in x; P>|z|=p-value for z-test of b=0; b=relative risk

Table 3. Factor change in the odds - Specification with General Government Primary Balance (cont'd)

Category 1	Category 2	SNG Own Revenues		Tax Autonomy		Government Stability		Government Fractionalization		Bailout		Population Growth	
		exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z
Prohibited	Cooperative	2.782	0.003	0.000	0.000	0.592	0.271	1.153	0.000	8.544	0.064	0.000	0.338
Prohibited	Central Rule	1.322	0.013	0.000	0.000	0.727	0.501	4.052	0.000	7.025	0.142	1.672	0.704
Prohibited	Self Rule	3.972	0.012	0.000	0.000	0.572	0.256	2.652	0.000	6.269	0.015	0.000	0.038
Prohibited	Market	3.022	0.005	0.000	0.000	0.718	0.485	2.915	0.000	4.855	0.118	1.872	0.938
Prohibited	Administrative	5.532	0.015	0.000	0.000	0.640	0.345	.	.	1.156	0.143	0.000	0.609
Cooperative	Prohibited	0.000	0.003	1.867	0.000	1.690	0.271	0.000	0.000	0.001	0.064	6.484	0.338
Cooperative	Central Rule	0.001	0.000	1.761	0.087	1.229	0.024	0.372	0.075	0.244	0.000	1.085	0.000
Cooperative	Self Rule	0.001	0.006	0.663	0.479	0.968	0.822	0.240	0.099	9.202	0.000	0.000	0.004
Cooperative	Market	0.109	0.181	0.424	0.010	1.213	0.037	2.688	0.082	0.343	0.004	8.434	0.000
Cooperative	Administrative	0.000	0.000	3.137	0.005	1.082	0.403	2.338	0.163	0.238	0.000	2.212	0.156
Central Rule	Prohibited	0.000	0.013	1.057	0.000	1.375	0.501	0.000	0.000	0.005	0.142	0.000	0.704
Central Rule	Cooperative	2.864	0.000	0.568	0.087	0.814	0.024	2.686	0.075	4.094	0.000	0.000	0.000
Central Rule	Self Rule	3.011	0.630	0.377	0.100	0.787	0.104	0.644	0.605	7.674	0.000	0.000	0.000
Central Rule	Market	2.303	0.000	0.241	0.000	0.987	0.871	7.221	0.000	1.405	0.277	0.000	0.140
Central Rule	Administrative	0.420	0.588	1.781	0.134	0.880	0.108	6.279	0.000	0.973	0.925	0.000	0.000
Self Rule	Prohibited	0.000	0.012	2.807	0.000	1.747	0.256	0.000	0.000	0.000	0.015	7.289	0.038
Self Rule	Cooperative	7.758	0.006	1.508	0.479	1.034	0.822	4.171	0.099	0.109	0.000	1.125	0.004
Self Rule	Central Rule	0.332	0.630	2.656	0.100	1.271	0.104	1.553	0.605	0.027	0.000	1.210	0.000
Self Rule	Market	6.160	0.064	0.639	0.449	1.254	0.122	9.212	0.005	0.037	0.000	9.479	0.000
Self Rule	Administrative	0.139	0.436	4.729	0.014	1.118	0.458	9.751	0.011	0.026	0.000	2.487	0.000
Market	Prohibited	0.000	0.005	4.387	0.000	1.393	0.485	0.000	0.000	0.003	0.118	0.001	0.938
Market	Cooperative	9.214	0.181	2.360	0.010	0.824	0.037	0.372	0.082	2.915	0.004	0.000	0.000
Market	Central Rule	0.004	0.000	4.157	0.000	1.013	0.871	0.139	0.000	0.712	0.277	1.281	0.140
Market	Self Rule	0.013	0.064	1.565	0.449	0.797	0.122	0.089	0.005	6.820	0.000	0.000	0.000
Market	Administrative	0.002	0.001	7.402	0.000	0.892	0.178	0.870	0.801	0.693	0.244	0.000	0.004
Administrative	Prohibited	0.000	0.015	5.927	0.000	1.563	0.345	.	.	0.005	0.143	2.932	0.609
Administrative	Cooperative	6.423	0.000	0.319	0.005	0.925	0.403	0.428	0.163	4.208	0.000	0.000	0.056
Administrative	Central Rule	2.384	0.588	0.562	0.134	1.137	0.108	0.159	0.000	1.028	0.925	4.894	0.000
Administrative	Self Rule	7.177	0.436	0.212	0.014	0.895	0.458	0.103	0.011	8.722	0.000	0.000	0.000
Administrative	Market	6.588	0.001	0.135	0.000	1.122	0.178	1.150	0.801	1.444	0.244	3.822	0.004

exp(b)=factor change in odds (relative risk) for unit increase in x; P>|z|=p-value for z-test of b=0; b=relative risk

Table 4. Factor change in the odds - Specification with Sub-National Government Primary Balance

Category 1	Category 2	Liquid Liabilities		Financial Freedom		SNG Primary Balance		SNG Debt		GDP Per Capita		SNG Expenditures	
		exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z
Prohibited	Cooperative	0.023	0.562	1.328	0.020	3.251	0.422	.	.	10.030	0.245	6.682	0.363
Prohibited	Central Rule	0.087	0.707	1.313	0.025	1.811	0.433	0.000	0.000	14.489	0.177	4.823	0.216
Prohibited	Self Rule	0.011	0.491	1.288	0.038	1.981	0.690	0.000	0.000	8.091	0.293	4.803	0.203
Prohibited	Market	0.004	0.400	1.327	0.020	2.411	0.626	0.000	0.000	26.187	0.099	3.023	0.236
Prohibited	Administrative	0.008	0.461	1.303	0.029	4.542	0.144	0.000	0.000	26.347	0.098	1.012	0.317
Cooperative	Prohibited	4.316	0.562	0.753	0.020	0.000	0.422	.	.	0.100	0.245	0.000	0.363
Cooperative	Central Rule	3.787	0.036	0.989	0.251	0.559	0.876	0.099	0.313	1.445	0.019	7.231	0.000
Cooperative	Self Rule	0.485	0.369	0.970	0.067	0.000	0.044	0.000	0.004	0.807	0.275	7.191	0.000
Cooperative	Market	0.183	0.006	1.000	0.995	0.000	0.007	0.029	0.106	2.611	0.000	4.521	0.000
Cooperative	Administrative	0.365	0.135	0.981	0.063	1.401	0.004	4.751	0.000	2.627	0.000	1.905	0.199
Central Rule	Prohibited	11.439	0.707	0.762	0.025	0.000	0.433	.	.	0.069	0.177	0.000	0.216
Central Rule	Cooperative	0.264	0.036	1.011	0.251	1.789	0.876	10.097	0.313	0.692	0.019	0.000	0.000
Central Rule	Self Rule	0.128	0.010	0.981	0.234	0.000	0.062	0.003	0.014	0.558	0.004	9.950	0.665
Central Rule	Market	0.048	0.000	1.011	0.189	0.000	0.016	0.296	0.420	1.807	0.000	0.063	0.311
Central Rule	Administrative	0.096	0.000	0.992	0.355	2.501	0.002	4.801	0.000	1.818	0.000	0.000	0.000
Self Rule	Prohibited	9.347	0.491	0.777	0.038	0.000	0.690	.	.	0.124	0.293	0.000	0.203
Self Rule	Cooperative	2.063	0.369	1.031	0.067	1.641	0.044	3.840	0.004	1.240	0.275	0.000	0.000
Self Rule	Central Rule	7.811	0.010	1.020	0.234	9.180	0.062	3.548	0.014	1.791	0.004	0.101	0.665
Self Rule	Market	0.377	0.197	1.031	0.062	12.202	0.674	2.785	0.042	3.237	0.000	0.006	0.333
Self Rule	Administrative	0.753	0.738	1.012	0.480	2.301	0.000	1.501	0.000	3.256	0.000	0.000	0.004
Market	Prohibited	6.825	0.400	0.753	0.020	0.000	0.626	.	.	0.038	0.099	0.000	0.236
Market	Cooperative	5.467	0.006	1.000	0.995	1.350	0.007	4.120	0.106	0.383	0.000	0.000	0.000
Market	Central Rule	20.704	0.000	0.989	0.189	7.253	0.016	3.379	0.420	0.553	0.000	5.984	0.311
Market	Self Rule	2.651	0.197	0.970	0.062	0.082	0.674	0.011	0.042	0.309	0.000	9.044	0.333
Market	Administrative	1.995	0.254	0.982	0.037	1.881	0.000	1.621	0.000	1.006	0.966	0.000	0.001
Administrative	Prohibited	8.691	0.461	0.768	0.029	0.000	0.144	.	.	0.038	0.098	0.000	0.317
Administrative	Cooperative	2.740	0.135	1.019	0.063	0.000	0.004	0.000	0.000	0.381	0.000	0.007	0.099
Administrative	Central Rule	10.376	0.000	1.008	0.355	0.000	0.002	0.000	0.000	0.550	0.000	4.791	0.000
Administrative	Self Rule	1.328	0.738	0.988	0.480	0.000	0.000	0.000	0.000	0.307	0.000	4.761	0.004
Administrative	Market	0.501	0.254	1.019	0.037	0.000	0.000	0.000	0.000	0.994	0.966	3.000	0.001

exp(b)=factor change in odds (relative risk) for unit increase in x; P>|z|=p-value for z-test of b=0; b=relative risk

Table 4. Factor change in the odds - Specification with Sub-National Government Primary Balance (cont'd)

Category 1	Category 2	SNG Own Revenues		Tax Autonomy		Government Stability		Government Fractionalization		Bailout		Population Growth	
		exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z	exp(b)	P> z
Prohibited	Cooperative	1.623	0.005	0.000	0.000	0.313	0.028	1.416	0.000	0.046	0.582	0.000	0.913
Prohibited	Central Rule	1.733	0.011	0.000	0.000	0.366	0.056	5.416	0.000	0.013	0.438	1.564	0.468
Prohibited	Self Rule	8.733	0.012	0.000	0.000	0.274	0.017	4.116	0.000	0.541	0.913	0.000	0.381
Prohibited	Market	5.933	0.007	0.000	0.000	0.364	0.055	4.016	0.000	0.019	0.478	4.234	0.550
Prohibited	Administrative	1.473	0.011	0.000	0.000	0.341	0.040	.	.	0.016	0.457	7.601	0.895
Cooperative	Prohibited	0.000	0.005	2.697	0.000	3.191	0.028	0.000	0.000	11.620	0.582	3.571	0.913
Cooperative	Central Rule	0.001	0.000	1.340	0.393	1.169	0.079	0.394	0.089	0.284	0.000	5.575	0.000
Cooperative	Self Rule	0.001	0.003	0.355	0.085	0.875	0.357	0.297	0.162	9.691	0.000	0.000	0.006
Cooperative	Market	0.037	0.057	0.270	0.000	1.161	0.097	2.891	0.062	0.413	0.018	1.514	0.000
Cooperative	Administrative	0.001	0.000	3.235	0.007	1.087	0.375	2.169	0.206	0.340	0.003	2.711	0.141
Central Rule	Prohibited	0.000	0.011	2.017	0.000	2.730	0.056	0.000	0.000	6.006	0.438	0.000	0.468
Central Rule	Cooperative	9.496	0.000	0.746	0.393	0.855	0.079	2.536	0.089	3.516	0.000	0.000	0.000
Central Rule	Self Rule	0.504	0.776	0.265	0.029	0.749	0.049	0.754	0.742	4.102	0.000	0.000	0.000
Central Rule	Market	4.231	0.018	0.202	0.000	0.993	0.934	7.331	0.000	1.453	0.236	0.000	0.344
Central Rule	Administrative	0.847	0.914	2.414	0.032	0.930	0.376	5.500	0.001	1.197	0.539	0.000	0.000
Self Rule	Prohibited	0.000	0.012	7.597	0.000	3.646	0.017	0.000	0.000	1.849	0.913	1.645	0.381
Self Rule	Cooperative	11.649	0.003	2.819	0.085	1.143	0.357	3.362	0.162	0.086	0.000	4.595	0.006
Self Rule	Central Rule	1.984	0.776	3.777	0.029	1.336	0.049	1.326	0.742	0.024	0.000	2.570	0.000
Self Rule	Market	7.899	0.085	0.761	0.652	1.327	0.052	9.719	0.008	0.035	0.000	6.939	0.000
Self Rule	Administrative	1.679	0.844	9.119	0.001	1.242	0.153	7.292	0.029	0.029	0.000	1.246	0.000
Market	Prohibited	0.000	0.007	9.977	0.000	2.748	0.055	0.000	0.000	5.298	0.478	0.000	0.550
Market	Cooperative	7.271	0.057	3.703	0.000	0.861	0.097	0.346	0.062	2.419	0.018	0.000	0.000
Market	Central Rule	0.029	0.018	4.963	0.000	1.007	0.934	0.136	0.000	0.688	0.236	3.691	0.344
Market	Self Rule	0.015	0.085	1.314	0.652	0.754	0.052	0.103	0.008	2.281	0.000	0.000	0.000
Market	Administrative	0.025	0.041	11.980	0.000	0.936	0.450	0.750	0.613	0.824	0.551	0.000	0.001
Administrative	Prohibited	0.000	0.011	8.327	0.000	2.936	0.040	.	.	6.506	0.457	0.000	0.895
Administrative	Cooperative	11.797	0.000	0.309	0.007	0.920	0.375	0.461	0.206	2.937	0.003	0.000	0.141
Administrative	Central Rule	1.181	0.914	0.414	0.032	1.076	0.376	0.182	0.001	0.836	0.539	2.054	0.000
Administrative	Self Rule	0.596	0.844	0.110	0.001	0.805	0.153	0.137	0.029	4.342	0.000	0.000	0.000
Administrative	Market	4.439	0.041	0.084	0.000	1.068	0.450	1.333	0.613	1.214	0.551	5.573	0.001

exp(b)=factor change in odds (relative risk) for unit increase in x; P>|z|=p-value for z-test of b=0; b=relative risk

Table 5. Probabilities of Choosing Sub-National Borrowing Regime at Average Values of Independent Variables, Developing versus Developed Countries, Specification with General Government Primary Balance

Variable	Sample	Prohibited	Administrative	Cooperative	Central Rule	Self Rule	Market
Liquid Liabilities	Developing	0.358	0.247	0.061	0.202	0.016	0.117
	Developed	0.000	0.178	0.229	0.269	0.082	0.241
	Total	0.170	0.210	0.149	0.237	0.051	0.182
Financial Freedom	Developing	0.378	0.241	0.046	0.199	0.020	0.115
	Developed	0.000	0.171	0.260	0.260	0.059	0.249
	Total	0.180	0.204	0.158	0.231	0.040	0.186
GG primary balance	Developing	0.401	0.227	0.045	0.195	0.020	0.112
	Developed	0.000	0.173	0.258	0.264	0.056	0.249
	Total	0.191	0.199	0.157	0.231	0.039	0.184
GDP Per Capita	Developing	0.402	0.219	0.041	0.228	0.013	0.096
	Developed	0.000	0.208	0.183	0.234	0.047	0.328
	Total	0.191	0.213	0.116	0.232	0.031	0.218
SNG Expenditures	Developing	0.404	0.265	0.058	0.176	0.012	0.085
	Developed	0.000	0.201	0.104	0.286	0.064	0.344
	Total	0.192	0.232	0.082	0.234	0.039	0.220
SNG Own Revenues	Developing	0.481	0.250	0.040	0.142	0.010	0.077
	Developed	0.002	0.229	0.091	0.275	0.058	0.345
	Total	0.240	0.239	0.065	0.209	0.034	0.212
Tax Autonomy	Developing	0.481	0.250	0.040	0.142	0.010	0.077
	Developed	0.002	0.229	0.091	0.275	0.058	0.345
	Total	0.240	0.239	0.065	0.209	0.034	0.212
Government Stability	Developing	0.519	0.231	0.036	0.133	0.009	0.072
	Developed	0.002	0.230	0.088	0.276	0.055	0.349
	Total	0.269	0.230	0.061	0.202	0.031	0.206
Government Fractionalization	Developing	0.550	0.224	0.034	0.108	0.007	0.076
	Developed	0.002	0.226	0.091	0.270	0.046	0.365
	Total	0.295	0.225	0.061	0.183	0.026	0.210
Bailout	Developing	0.550	0.224	0.034	0.108	0.007	0.076
	Developed	0.002	0.226	0.091	0.270	0.046	0.365
	Total	0.295	0.225	0.061	0.183	0.026	0.210
Population Growth	Developing	0.550	0.224	0.034	0.108	0.007	0.076
	Developed	0.002	0.226	0.091	0.270	0.046	0.365
	Total	0.295	0.225	0.061	0.183	0.026	0.210

Table 6. Probabilities of Choosing Sub-National Borrowing Regime at Average Values of Independent Variables, Developing versus Developed Countries, Specification with General Government Primary Balance

Variable	Sample	Prohibited	Administrative	Cooperative	Central Rule	Self Rule	Market
Liquid Liabilities	Developing	0.354	0.241	0.056	0.207	0.015	0.127
	Developed	0.000	0.185	0.226	0.272	0.080	0.236
	Total	0.168	0.212	0.145	0.241	0.049	0.184
Financial Freedom	Developing	0.368	0.234	0.050	0.205	0.018	0.124
	Developed	0.000	0.176	0.249	0.267	0.061	0.246
	Total	0.175	0.204	0.155	0.238	0.041	0.188
SNG primary balance	Developing	0.369	0.234	0.049	0.203	0.020	0.125
	Developed	0.000	0.166	0.262	0.275	0.058	0.239
	Total	0.175	0.199	0.161	0.240	0.040	0.185
GDP Per Capita	Developing	0.369	0.234	0.042	0.234	0.013	0.108
	Developed	0.000	0.201	0.179	0.251	0.051	0.317
	Total	0.175	0.217	0.114	0.243	0.033	0.218
SNG Expenditures	Developing	0.404	0.260	0.058	0.181	0.012	0.086
	Developed	0.000	0.196	0.096	0.292	0.073	0.343
	Total	0.192	0.226	0.078	0.239	0.044	0.221
SNG Own Revenues	Developing	0.482	0.238	0.042	0.149	0.010	0.079
	Developed	0.002	0.217	0.083	0.286	0.065	0.346
	Total	0.241	0.227	0.063	0.218	0.038	0.213
Tax Autonomy	Developing	0.482	0.238	0.042	0.149	0.010	0.079
	Developed	0.002	0.217	0.083	0.286	0.065	0.346
	Total	0.241	0.227	0.063	0.218	0.038	0.213
Government Stability	Developing	0.520	0.220	0.038	0.139	0.008	0.074
	Developed	0.002	0.218	0.082	0.288	0.060	0.350
	Total	0.269	0.219	0.060	0.211	0.033	0.208
Government Fractionalization	Developing	0.550	0.213	0.037	0.115	0.007	0.079
	Developed	0.002	0.214	0.085	0.284	0.051	0.364
	Total	0.295	0.214	0.059	0.193	0.027	0.211
Bailout	Developing	0.550	0.213	0.037	0.115	0.007	0.079
	Developed	0.002	0.214	0.085	0.284	0.051	0.364
	Total	0.295	0.214	0.059	0.193	0.027	0.211
Population Growth	Developing	0.550	0.213	0.037	0.115	0.007	0.079
	Developed	0.002	0.214	0.085	0.284	0.051	0.364
	Total	0.295	0.214	0.059	0.193	0.027	0.211

## Sub-National Borrowing and Fiscal Performance

### *General Government Fiscal Performance*

As discussed above, an important problem with estimating equation (6.1) directly is the possible the reverse causality problem between the sub-national primary balance (and through it, general government primary balance), and the choice of sub-national borrowing regulations. Countries with less disciplined sub-national governments may choose stricter type of regulations, while countries with more disciplined sub-national governments may rely more on market-based regulations. This problem is partly alleviated by the fact that most countries had decided on sub-national borrowing regulations before the observed period of this study, suggesting that the average sub-national fiscal balances could not directly affect the choice. However, because current average sub-national fiscal balances tend to correlate with past averages, the endogeneity concern still exists.

To resolve this issue, the first stage in the instrumental variable regression is modified to incorporate a multinomial logit model to estimate the probabilities of choosing different types of borrowing regulations. The results of the first-stage estimation are summarized in Table A.6. The probabilities of adopting each approach estimated in the first stage are then used instead of their respective dummy variables in the second stage to estimate equation (6.1) using a 2SLS approach.

Table 7 presents the results for the effect of sub-national borrowing and regulations on the general government primary balance. Columns 1 and 2 in Table 7 show the results obtained by applying the dynamic GMM estimator to estimate equation (6.1) when sub-national borrowing regulations are assumed to be exogenous. Columns 3-6, on the other hand, show the results obtained when the assumed endogeneity in sub-national borrowing regulations is



corrected by using the previously predicted values obtained from estimating equation (6.11) by the multinomial logit estimator. As the results suggest, after correcting for endogeneity some coefficients change sign and/or statistical significance.

According to the results in columns 3-6 in Table 7, allowing borrowing at the sub-national level, *ceteris paribus*, has a significant and positive effect on general government primary balance. This result is consistent with expectations because it assumes no restrictions on either the amount of borrowing or its purpose. That is, once the sub-national government is allowed to borrow from private financial markets, and can borrow as much as it wants and for any purpose, it may as well borrow to finance the current deficit. Once we account for the existence of sub-national borrowing regulations, we obtain different conclusions for different types of regulations. For example, centrally-imposed rules and market-based regulations seem to reduce its positive effect on primary balance. On the other hand, cooperative types of sub-national borrowing regulations seem to have positive effect on the primary balance.

The negative effect of rule-based regulations is expected because as soon as the rules are imposed, the sub-national governments may have to reduce the amount of borrowing. This reduction in the amount of borrowing is the result of the requirements the sub-national governments must meet considering revenues, expenditures and deficit.<sup>37</sup> Therefore, sub-national governments' ability to finance deficits through borrowing is thus reduced. The negative effect of the market-based regulations is the result of the similar reason, except in this case the sub-national governments have to improve their creditworthiness in order to be able to borrow with lower interest rates. Since the level of indebtedness contributes to a higher cost of borrowing, sub-national governments may reduce the amount of borrowing, so they may less be able to

---

<sup>37</sup> Recall that this variable does not include the "golden rule" and limit on borrowing and debt.

cover the deficit. Finally, as discussed in Chapter IV, the cooperative type of regulations includes many components of the other three types, and if it is properly implemented, this type of regulations shows the positive characteristics of the other types. The estimated positive effect of cooperative regulations when the sub-national debt is increasing provides support for this conjecture.

Furthermore, the results suggest that the “golden rule” and imposed limits on sub-national borrowing and debt are efficient in regulating sub-national borrowing and improving the effectiveness of a broad variety of regulations. Moreover, when sub-national governments have to face legal sanctions for non-compliance to imposed fiscal rules, they may have better fiscal performance. The coefficient for this variable, however, sometimes shows no effect on the primary balance, which may be explained by the noise in its measurement. In fact, legal sanctions for non-compliance can be administrative, financial or political, and no distinction was made between them while creating this variable due to basic data limitations. Given that not all types of sanctions are equally efficient, the estimated coefficient on this variable may not be robust. Finally, the results suggest that allowing sub-national governments to enter foreign financial markets may deteriorate countries fiscal performance. A possible reason for this is that access to the foreign financial markets may increase exposure to the external shocks.

Next, a greater dependence on financing from the central government, negatively affects the effectiveness of regulations based on fiscal rules (especially self-imposed rules) and administrative regulation. This negative effect of intergovernmental transfers may be due to moral hazard, especially in case of the administrative regulation. Moreover, high dependence on intergovernmental transfers may be reducing the effectiveness of self-imposed rules through reduced commitment to the rules. On the other hand, cooperative and market-based regulations

seem to have positive effects on the primary fiscal balance in the case of a high dependence on transfers. In the case of cooperative regulations, this effect may be explained by possible higher transparency given that representatives of all government units cooperatively make decisions on fiscal policy. Moreover, the positive effect of market-based regulations on the primary fiscal balance in the case of high financing from the central government budget may be explained in the following way. High sub-national dependence on intergovernmental transfers may make creditors feel more certain that a borrower may be more likely bailed out in case of default, and to decide to lend more funds to the borrower. This would increase the indebtedness of the debtor and the interest on debt, causing the primary balance to be higher, given that interest payments are not included in the primary balance. The results also suggest that a history of bailouts has a very significant negative effect on the general government primary balance.

Furthermore, in the case of high dependence on intergovernmental transfers, their predictability (i.e., transfers allocated based on a predictable formula) seems to have a positive effect on the general government primary balance. The effect of predictability of transfers on the primary balance, however, is not straightforward. According to the results, only when the share of intergovernmental transfers in the sub-national total revenue is at least 30 percent, does their predictability have a positive effect on the primary balance. The results also suggest that sub-national tax autonomy positively affects a country's overall fiscal performance, especially when the sub-national governments rely less on financing from the central government budget and more on own-source revenues.

Table 7. Effect of Sub-national Borrowing on General Government Primary Balance

	GMM (regulations exogenous)		GMM (regulations endogenous)			
	1	2	3	4	5	6
GG Primary balance <sub>1</sub>	0.188 (0.149)	0.205 (0.147)	0.376*** (0.128)	0.215 (0.147)	0.215 (0.134)	0.204 (0.142)
SNG debt	0.048* (0.028)	0.026 (0.028)	0.525*** (0.181)	0.598*** (0.205)	0.202 (0.192)	0.493** (0.199)
Administrative	0.013*** (0.005)	0.017*** (0.006)	0.078*** (0.024)	0.188*** (0.038)	0.135*** (0.027)	0.171*** (0.034)
Cooperative	0.056*** (0.011)	0.069*** (0.013)	-0.069** (0.029)	-0.158*** (0.038)	-0.161*** (0.035)	-0.166*** (0.037)
Central Rules	0.020*** (0.008)	0.019** (0.007)	0.074*** (0.023)	0.165*** (0.034)	0.175*** (0.032)	0.150*** (0.030)
Self Rules	0.042*** (0.012)	0.035*** (0.011)	0.058 (0.076)	0.257** (0.103)	0.291*** (0.094)	0.301*** (0.097)
Market	0.025*** (0.009)	0.022** (0.008)	-0.154*** (0.041)	-0.308*** (0.062)	-0.339*** (0.058)	-0.309*** (0.057)
SNG debt * Administrative	-0.418*** (0.068)	-0.423*** (0.068)	-1.177*** (0.392)	-0.173 (0.412)	0.196 (0.431)	-0.203 (0.420)
SNG debt * Cooperative	-0.400*** (0.064)	-0.399*** (0.066)	0.182 (0.274)	1.068*** (0.365)	1.251*** (0.362)	1.068*** (0.357)
SNG debt * Central Rules	-0.290*** (0.049)	-0.279*** (0.049)	-0.415** (0.183)	-0.676*** (0.221)	-0.355* (0.198)	-0.511** (0.207)
SNG debt * Self Rules	-0.571*** (0.127)	-0.541*** (0.126)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
SNG debt * Market	0.000 (0.000)	0.000 (0.000)	-0.695*** (0.264)	-0.482* (0.289)	0.151 (0.298)	-0.404 (0.282)
Sanctions	-0.006*** (0.002)	-0.002 (0.002)	0.005*** (0.001)	0.003** (0.002)	-0.002 (0.002)	0.001 (0.002)
Limit on debt	-0.028*** (0.004)	-0.024*** (0.004)	-0.024*** (0.004)	-0.029*** (0.004)	-0.028*** (0.004)	-0.025*** (0.004)
SNG debt * Limit on debt	0.296*** (0.049)	0.268*** (0.047)	0.150*** (0.034)	0.236*** (0.043)	0.216*** (0.036)	0.201*** (0.036)
“Golden rule”	-0.009*** (0.003)	-0.013*** (0.003)		-0.021*** (0.004)	-0.014*** (0.003)	-0.019*** (0.004)
SNG debt * “Golden rule”	0.177*** (0.032)	0.199*** (0.037)		0.192*** (0.035)	0.116*** (0.023)	0.171*** (0.031)
Foreign	-0.008*** (0.002)	-0.010*** (0.002)		-0.008*** (0.002)	-0.004** (0.002)	-0.007*** (0.002)
SNG debt * Foreign	-0.009 (0.026)	0.019 (0.026)		-0.068** (0.031)	-0.095*** (0.032)	-0.065** (0.031)
IGT	-0.039*** (0.009)	-0.028*** (0.008)	-0.002 (0.007)	0.021** (0.009)	-0.010 (0.007)	0.011 (0.008)
IGT * Administrative	0.027*** (0.010)	0.010 (0.010)	-0.098*** (0.029)	-0.179*** (0.038)	-0.112*** (0.028)	-0.168*** (0.035)
IGT * Cooperative	-0.025 (0.015)	-0.054*** (0.019)	0.109** (0.047)	0.055 (0.052)	0.125** (0.051)	0.104** (0.050)
IGT * Central Rules	0.026 (0.016)	0.024 (0.015)	-0.030 (0.036)	-0.118*** (0.044)	-0.068* (0.036)	-0.100** (0.039)
IGT * Self Rules	0.060* (0.032)	0.048 (0.031)	-0.467*** (0.151)	-1.031*** (0.216)	-0.782*** (0.165)	-1.010*** (0.199)
IGT * Market	-0.016 (0.016)	-0.013 (0.016)	0.265*** (0.075)	0.454*** (0.094)	0.414*** (0.080)	0.464*** (0.089)
Transfer formula	-0.032*** (0.006)	-0.033*** (0.007)	-0.022*** (0.005)	-0.027*** (0.005)	-0.018*** (0.004)	-0.021*** (0.005)

IGT* Transfer formula	0.074*** (0.014)	0.071*** (0.015)	0.040*** (0.010)	0.069*** (0.014)	0.059*** (0.011)	0.059*** (0.012)
Tax autonomy	-0.012** (0.005)	-0.010** (0.005)	0.009* (0.005)	0.018*** (0.006)	0.022*** (0.006)	0.020*** (0.006)
IGT * Tax autonomy	0.009 (0.011)	0.009 (0.011)	-0.043*** (0.015)	-0.057*** (0.016)	-0.070*** (0.016)	-0.062*** (0.016)
SNG Expenditures				0.001 (0.020)		
Urbanization	0.149 (0.100)	0.251** (0.104)	0.239*** (0.066)	0.448*** (0.093)	0.208*** (0.071)	0.305*** (0.081)
Population growth		-0.294*** (0.104)				-0.317*** (0.099)
Age Dependency	-0.128*** (0.024)				-0.142*** (0.024)	
Government Stability	-0.001*** (0.001)		-0.000 (0.000)	-0.000 (0.001)	-0.000 (0.000)	
Government fractionalization	-0.001 (0.002)	0.001 (0.002)			-0.001 (0.002)	0.002 (0.002)
Corruption	-0.000 (0.001)				-0.001* (0.001)	
CBI	0.010* (0.006)	0.014** (0.006)	0.017*** (0.006)	0.029*** (0.007)	0.019*** (0.005)	0.024*** (0.006)
Bailout	0.006*** (0.002)	0.003* (0.002)	-0.016*** (0.004)	-0.038*** (0.007)	-0.029*** (0.005)	-0.031*** (0.006)
GDP per capita	0.003** (0.001)	0.005*** (0.001)	0.006*** (0.001)	0.001 (0.002)	0.000 (0.002)	0.001 (0.001)
Inflation		0.000 (0.001)				0.000 (0.001)
SGP	-0.016*** (0.003)	-0.019*** (0.003)	-0.006** (0.003)	-0.008*** (0.003)	-0.004 (0.003)	-0.007*** (0.003)
Corr (Y, Y <sub>hat</sub> ) sq.	0.649	0.644	0.798	0.799	0.801	0.801
Sargan test (p-value)	0.790	0.775	0.174	0.241	0.212	0.220
AR(2) Test (p-value)	0.926	0.950	0.755	0.671	0.736	0.641
Observations	745	745	749	749	745	745
Number of id	57	57	57	57	57	57

Standard errors in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

### *Sub-national Government Fiscal Performance*

As discussed above, in the case of sub-national government insolvency, the general government can react in of the following three ways. First, the central government can decide to cover the sub-national fiscal imbalances (i.e., bailout). Second, it can re-design the tax and/or transfer system through which the sub-national government would receive a larger portion of the overall revenues collected. Finally, the central government can ignore the sub-national fiscal imbalances. Regardless of which option the central government chooses, the overall national fiscal balance is

likely to deteriorate. However, to obtain a better picture about which of these three scenarios is more likely to happen, equation (6.1) is estimated again but this time with the sub-national primary balance as the dependent variable.

Table 8. Effect of Sub-national Borrowing on Sub-National Government Primary Balance

	GMM (regulations exogenous)		GMM (regulations endogenous)			
	1	2	3	4	5	6
SNG Primary balance <sub>1</sub>	0.651*** (0.171)	0.717*** (0.173)	0.552*** (0.176)	0.604*** (0.174)	0.503*** (0.177)	0.588*** (0.166)
CG Primary Balance	-0.028 (0.122)	-0.034 (0.126)	-0.060 (0.107)	-0.025 (0.109)	-0.034 (0.099)	-0.032 (0.105)
SNG debt	-0.016 (0.039)	-0.038 (0.042)	0.358 (0.240)	0.257 (0.264)	0.170 (0.233)	0.254 (0.248)
Administrative	-0.003 (0.007)	-0.003 (0.007)	0.041 (0.033)	0.051 (0.034)	0.051* (0.030)	0.047 (0.031)
Cooperative	0.014 (0.012)	0.014 (0.013)	-0.011 (0.041)	-0.008 (0.043)	-0.043 (0.043)	-0.024 (0.041)
Central Rules	0.002 (0.008)	-0.001 (0.008)	0.058** (0.028)	0.071** (0.032)	0.096*** (0.035)	0.069** (0.029)
Self Rules	0.015 (0.013)	0.011 (0.013)	0.038 (0.093)	0.128 (0.109)	0.169 (0.106)	0.120 (0.109)
Market	0.011 (0.010)	0.007 (0.009)	-0.126** (0.051)	-0.166*** (0.059)	-0.199*** (0.064)	-0.156*** (0.055)
SNG debt * Administrative	-0.132 (0.086)	-0.109 (0.082)	-0.829 (0.542)	-0.297 (0.539)	-0.232 (0.499)	-0.367 (0.529)
SNG debt * Cooperative	-0.132* (0.073)	-0.108 (0.069)	0.277 (0.362)	0.540 (0.386)	0.645* (0.380)	0.489 (0.376)
SNG debt * Central Rules	-0.083 (0.056)	-0.057 (0.052)	-0.312 (0.235)	-0.257 (0.273)	-0.252 (0.239)	-0.286 (0.251)
SNG debt * Self Rules	-0.176 (0.134)	-0.139 (0.127)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
SNG debt * Market	0.000 (0.000)	0.000 (0.000)	-0.480 (0.350)	-0.243 (0.377)	-0.040 (0.346)	-0.243 (0.359)
Sanctions	-0.000 (0.002)	0.001 (0.002)	0.004** (0.002)	0.004* (0.002)	0.001 (0.002)	0.003 (0.002)
Limit on debt	-0.012** (0.005)	-0.009* (0.005)	-0.018*** (0.006)	-0.013*** (0.005)	-0.016*** (0.005)	-0.012*** (0.004)
SNG debt * Limit on debt	0.109** (0.053)	0.086* (0.047)	0.094** (0.047)	0.066 (0.041)	0.086** (0.042)	0.059* (0.035)
“Golden rule”	-0.005 (0.003)	-0.006* (0.003)		-0.010*** (0.004)	-0.010*** (0.003)	-0.010*** (0.003)
SNG debt * “Golden rule”	0.064* (0.035)	0.058 (0.036)		0.081** (0.032)	0.073*** (0.024)	0.082*** (0.028)
Foreign	-0.004 (0.003)	-0.004 (0.003)		-0.004* (0.003)	-0.003 (0.002)	-0.003 (0.002)
SNG debt * Foreign	0.013 (0.034)	0.032 (0.036)		-0.032 (0.034)	-0.057* (0.033)	-0.037 (0.032)
IGT	-0.027*** (0.010)	-0.021** (0.010)	-0.009 (0.009)	-0.006 (0.010)	-0.017** (0.008)	-0.011 (0.009)
IGT * Administrative	0.031*** (0.011)	0.025** (0.012)	-0.013 (0.050)	-0.009 (0.051)	-0.014 (0.043)	-0.010 (0.047)

IGT * Cooperative	0.013 (0.018)	0.007 (0.020)	-0.049 (0.091)	-0.098 (0.091)	-0.026 (0.091)	-0.077 (0.090)
IGT * Central Rules	0.029 (0.018)	0.028 (0.018)	-0.035 (0.043)	-0.038 (0.046)	-0.029 (0.040)	-0.033 (0.042)
IGT * Self Rules	0.027 (0.036)	0.020 (0.036)	-0.327* (0.192)	-0.441** (0.224)	-0.455** (0.198)	-0.428** (0.213)
IGT * Market	0.003 (0.019)	0.004 (0.020)	0.246*** (0.086)	0.259*** (0.091)	0.286*** (0.086)	0.263*** (0.088)
Transfer formula	-0.010 (0.007)	-0.008 (0.007)	-0.018*** (0.006)	-0.012** (0.005)	-0.010** (0.005)	-0.010** (0.005)
IGT* Transfer formula	0.022 (0.015)	0.016 (0.015)	0.028** (0.013)	0.024* (0.013)	0.028** (0.013)	0.023* (0.012)
Tax autonomy	-0.007 (0.006)	-0.007 (0.006)	0.001 (0.007)	-0.000 (0.007)	0.006 (0.007)	0.000 (0.007)
IGT * Tax autonomy	0.015 (0.015)	0.017 (0.015)	-0.009 (0.023)	0.004 (0.021)	-0.016 (0.023)	0.001 (0.021)
SNG Expenditures				-0.033 (0.022)		
Urbanization	0.088 (0.117)	0.100 (0.126)	0.245*** (0.077)	0.339*** (0.091)	0.243*** (0.075)	0.271*** (0.082)
Population growth		-0.113 (0.134)				-0.051 (0.124)
Age Dependency	-0.052** (0.024)				-0.064** (0.028)	
Government Stability	-0.000 (0.001)		0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	
Government fractionalization	-0.002 (0.003)	-0.002 (0.003)			-0.002 (0.003)	-0.001 (0.003)
Corruption	-0.001 (0.001)				-0.001 (0.001)	
CBI	0.001 (0.007)	0.001 (0.007)	0.008 (0.008)	0.004 (0.007)	0.005 (0.006)	0.004 (0.007)
Bailout	0.002 (0.002)	0.000 (0.002)	-0.014** (0.006)	-0.018*** (0.006)	-0.017*** (0.005)	-0.017*** (0.006)
GDP per capita	0.001 (0.002)	0.001 (0.002)	0.003 (0.002)	-0.000 (0.002)	0.001 (0.002)	0.000 (0.002)
Inflation		-0.000 (0.001)				-0.000 (0.001)
SGP	-0.005 (0.004)	-0.005 (0.005)	-0.002 (0.004)	-0.000 (0.004)	-0.000 (0.003)	-0.001 (0.003)
Corr (Y, Y <sub>hat</sub> )	0.841	0.856	0.861	0.864	0.841	0.856
Sargan test (p-value)	0.899	0.884	0.492	0.424	0.899	0.884
AR(2) Test (p-value)	0.438	0.413	0.278	0.256	0.438	0.413
Observations	745	745	749	749	745	745
Number of id	57	57	57	57	57	57

Standard errors in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

As the results in Table 8 suggest, sub-national debt does not seem to affect the sub-national primary balance, ceteris paribus. Moreover, none of the broad types of sub-national borrowing regulations seems to have an effect on sub-national primary balances in the case of

high sub-national debt. However, the “golden rule” and imposed limits on sub-national borrowing and debt seem to have a positive and significant effect on the sub-national primary balance.

Furthermore, in the case of a high level of financing from the central government budget, market-based regulation seems to have positive effect on the sub-national primary balance, as opposed to self-imposed fiscal rules. These results are consistent with those obtained for the general government primary balance. Moreover, the negative effect of intergovernmental transfers on fiscal performance is diminished when transfers are predictable, which is also consistent with its effect on the general government primary balance. Finally, at the sub-national level, tax autonomy has no effect on fiscal performance when there is high reliance on central government financing, suggesting that, at the margin, sub-national tax autonomy does not matter much for the fiscal performance.

#### Sub-National Borrowing and Duration of Fiscal Sustainability

This section of the chapter evaluates the effect of sub-national borrowing and its regulations on the duration of fiscal sustainability using duration analysis. Results obtained by this approach contribute to the final conclusions by providing a slightly different view on the issue investigated in this study. The results previously discussed support the observation of how the primary balance itself changes as a result of changes in its components and factors that influence it. However, a change in the primary balance suggests that it may be moving closer to or moving away from a fiscally sustainable balance, but does not necessarily mean that it is fiscally sustainable. Duration analysis, however, allows us to investigate this issue by making assumptions about different levels of a fiscally sustainable primary balance.



As discussed above, two alternative thresholds of fiscally sustainable primary balance to GDP are assumed, namely 0 and -3 percent, based on which the failure and duration variables are calculated. Furthermore, because the reverse causality between the level of primary balance and the chosen sub-national regulations still exists, prior to estimating equation (6.8), we estimate the probabilities of choosing types of regulation. These are then used in equation (6.8) (see Table A.6 for the results of the first stage regression). Finally, equation (6.8) is estimated for both the general and the sub-national government primary balances.

#### *General Government Fiscal Sustainability*

Before estimating marginal effects on the median duration of fiscal sustainability, it is important to determine which one among three previously discussed hazard functions should be chosen. Log likelihood ratio, Akaike information criteria (AIC) and Bayesian information criterion (BIC) are 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. Table A.7 shows that the Weibull estimation is the parametric model that at the same time best fits the data (has the largest log likelihood) and also is the most preferred (has the smallest both AIC and BIC value). This conclusion holds for both 0 and -3 percent thresholds, and for both general and sub-national government primary balance.

Table 9. Marginal Effects on Median Reported Duration, General Government Primary Balance

	Threshold = 0%				Threshold = -3%			
	1	2	3	4	5	6	7	8
Number of previous failures	-1.712*** (0.285)	-1.709*** (0.282)	-1.725*** (0.275)	-1.734*** (0.288)	-0.981*** (0.111)	-1.02*** (0.111)	-1.045*** (0.103)	-1.000*** (0.106)
Initial budget balance	0.422*** (0.034)	0.426*** (0.034)	0.437*** (0.035)	0.412*** (0.034)	0.164*** (0.039)	0.179*** (0.040)	0.225*** (0.040)	0.192*** (0.039)
Size of the adjustment	1.451 (1.868)	1.019 (1.89)	-1.870 (1.862)	1.496 (1.794)	5.515** (2.274)	5.804** (2.279)	1.498 (2.158)	6.788*** (2.195)
SNG debt	-0.465*** (0.134)	-0.490*** (0.143)	-0.473*** (0.135)	-0.476*** (0.143)	-0.262 (0.171)	-0.110 (0.186)	-0.104 (0.173)	-0.130 (0.184)
Administrative	-3.606*** (0.049)	-3.393*** (0.996)	-3.585*** (0.971)	-3.357*** (0.078)	1.213 (2.785)	0.822 (2.743)	0.699 (2.689)	0.518 (2.808)
Cooperative	0.371 (3.379)	0.793 (3.371)	0.630 (3.385)	-0.313 (3.699)	-1.096 (4.458)	0.127 (4.499)	1.449 (4.403)	-0.029 (4.745)
Central Rules	-0.941 (2.339)	-1.142 (2.418)	-0.574 (2.345)	-1.328 (2.479)	-3.918 (3.126)	-5.142 (3.349)	-5.462* (3.145)	-5.204** (2.164)
Self Rules	-2.823*** (0.749)	-3.084*** (0.819)	-2.437*** (0.842)	-3.454*** (0.920)	-2.052** (0.938)	-3.208*** (1.102)	-2.971*** (1.084)	-3.386*** (1.174)
Market	1.460*** (0.411)	1.538*** (0.434)	1.243*** (0.418)	1.574*** (0.432)	1.130* (0.591)	1.477** (0.660)	1.423** (0.639)	1.562** (0.644)
SNG debt * Administrative	-0.273 (0.214)	-0.311 (0.213)	-0.397** (0.201)	-0.287 (0.216)	0.275 (0.278)	0.044 (0.287)	-0.121 (0.263)	0.138 (0.284)
SNG debt * Cooperative	0.320** (0.159)	0.299* (0.157)	0.240 (0.151)	0.271 (0.182)	0.186 (0.210)	0.034 (0.218)	-0.055 (0.209)	0.016 (0.232)
SNG debt * Central Rules	0.361* (0.204)	0.368* (0.205)	0.342* (0.193)	0.327 (0.207)	0.516* (0.272)	0.390 (0.293)	0.368 (0.278)	0.412 (0.285)
SNG debt * Self Rules	1.531*** (0.369)	1.622*** (0.386)	1.515*** (0.387)	1.653*** (0.416)	0.663 (0.454)	0.525 (0.449)	0.459 (0.428)	0.606 (0.455)
SNG debt * Market	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Sanctions	-0.100 (0.196)	-0.163 (0.201)	-0.052 (0.197)	-0.197 (0.206)	-0.572*** (0.223)	-0.835*** (0.229)	-0.813*** (0.231)	-0.933*** (0.242)
Limit on debt	0.177 (0.253)	-0.107 (0.287)	-0.253 (0.296)	-0.168 (0.305)	0.978*** (0.305)	0.490 (0.310)	0.213 (0.316)	0.515 (0.321)
SNG debt * Limit on debt	-0.039* (0.023)	-0.026 (0.023)	-0.027 (0.022)	-0.008 (0.025)	-0.044 (0.031)	-0.008 (0.031)	0.005 (0.031)	0.001 (0.032)
“Golden rule”		0.597** (0.297)	0.247 (0.307)	0.474 (0.300)		1.007*** (0.298)	0.649** (0.309)	1.071*** (0.309)
SNG debt * “Golden rule”		-0.007 (0.021)	-0.009 (0.021)	-0.009 (0.022)		-0.089*** (0.033)	-0.109*** (0.034)	-0.104*** (0.034)
Foreign		0.139 (0.259)	0.035 (0.249)	0.075 (0.265)		0.401 (0.290)	0.279 (0.278)	0.339 (0.303)
SNG debt * Foreign		0.001 (0.033)	0.017 (0.029)	0.008 (0.034)		-0.070 (0.046)	-0.048 (0.041)	-0.058 (0.046)
IGT	-0.037*** (0.009)	-0.039*** (0.009)	-0.044*** (0.010)	-0.040*** (0.010)	0.038*** (0.011)	0.041*** (0.011)	0.032*** (0.012)	0.046*** (0.011)
IGT * Administrative	0.116*** (0.028)	0.131*** (0.027)	0.116*** (0.029)	0.129*** (0.030)	-0.073* (0.041)	-0.061 (0.042)	-0.065 (0.042)	-0.069 (0.043)

IGT * Cooperative	0.148*** (0.042)	0.139*** (0.050)	0.206*** (0.049)	0.152*** (0.053)	0.054 (0.062)	0.020 (0.071)	0.116* (0.070)	0.037 (0.073)
IGT * Central Rules	-0.006 (0.043)	-0.018 (0.044)	-0.023 (0.042)	-0.019 (0.043)	0.015 (0.06)	0.016 (0.063)	0.030 (0.058)	0.025 (0.059)
IGT * Self Rules	0.12 (0.124)	0.116 (0.132)	0.039 (0.133)	0.158 (0.132)	0.261* (0.158)	0.502*** (0.194)	0.488** (0.194)	0.524*** (0.192)
IGT * Market	-0.018 (0.063)	-0.007 (0.066)	0.049 (0.065)	-0.038 (0.066)	-0.167 (0.102)	-0.240** (0.115)	-0.214* (0.113)	-0.276** (0.112)
Transfer formula	0.419 (0.422)	0.008 (0.456)	0.644 (0.48)	-0.232 (0.459)	0.410 (0.532)	0.092 (0.555)	0.893 (0.563)	-0.046 (0.572)
IGT* Transfer formula	-0.017** (0.008)	-0.011 (0.009)	-0.018* (0.009)	-0.006 (0.009)	-0.005 (0.011)	0.000 (0.011)	-0.007 (0.011)	0.002 (0.011)
Tax autonomy	-0.284 (0.489)	-0.039 (0.511)	0.492 (0.509)	0.211 (0.534)	1.061 (0.891)	1.569 (0.998)	2.576** (1.009)	2.069** (1.02)
IGT * Tax autonomy	0.011 (0.012)	0.004 (0.012)	-0.012 (0.012)	0.000 (0.013)	-0.034* (0.019)	-0.045** (0.02)	-0.070*** (0.019)	-0.056*** (0.02)
SNG Expenditures		0.004 (0.022)				0.019 (0.032)		
Urbanization	-0.001 (0.007)	-0.005 (0.007)	-0.003 (0.007)	-0.005 (0.007)	-0.025** (0.010)	-0.030*** (0.010)	-0.030*** (0.010)	-0.029*** (0.010)
Population growth				0.080 (0.112)				-0.111 (0.146)
Age Dependency			-0.009 (0.014)				-0.031* (0.017)	
Government Stability	0.245*** (0.047)	0.260*** (0.048)	0.260*** (0.045)		0.210*** (0.059)	0.199*** (0.061)	0.223*** (0.056)	
Government fractionalization			0.087 (0.299)	0.046 (0.313)			0.421 (0.331)	0.351 (0.343)
Corruption			-0.484*** (0.079)				-0.732*** (0.103)	
CBI	1.722*** (0.46)	1.658*** (0.511)	1.779*** (0.49)	1.734*** (0.504)	2.615*** (0.594)	3.422*** (0.621)	3.507*** (0.629)	3.285*** (0.636)
Bailout	0.141 (0.435)	0.231 (0.433)	0.329 (0.411)	0.03 (0.475)	0.146 (0.520)	0.237 (0.510)	0.556 (0.473)	0.27 (0.551)
GDP per capita	0.239* (0.128)	0.393*** (0.135)	0.585*** (0.130)	0.466*** (0.135)	0.691*** (0.157)	0.844*** (0.178)	1.110*** (0.169)	0.848*** (0.172)
Inflation				-0.179*** (0.051)				-0.328*** (0.06)
SGP	0.049 (0.341)	-0.128 (0.333)	-0.122 (0.331)	-0.115 (0.329)	-0.374 (0.318)	-0.603* (0.316)	-0.413 (0.330)	-0.452 (0.322)
Duration Dependence Parameter (P)	2.783	2.827	2.870	2.800	3.867	3.904	4.205	3.933
Median	3.992	3.990	3.992	3.997	5.844	5.844	5.850	5.845
OBS	806	806	806	806	806	806	806	806

Standard errors in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

The results in Table 9 show that median duration is 4 years for the zero percent threshold and around 6 years for the -3 percent threshold. Furthermore, the results suggest that the effect of sub-national outstanding debt on fiscal sustainability depends on the definition of fiscal sustainability. When a 0 percent threshold is used to define fiscal sustainability, the sub-national outstanding debt regulated by self-imposed rules seems to increase the duration of fiscal sustainability by around one year above the median. Other types of sub-national borrowing regulations seem to have either no or very small negative effects on the duration of fiscal sustainability. Moreover, the “golden rule” has a positive effect on the duration of fiscal sustainability when the more relaxed -3 percent definition of fiscal sustainability is used. This positive effect, however, is reduced as sub-national outstanding debt increases. On the other hand, when fiscal sustainability is defined using the 0 percent threshold, the “golden rule” seems to have no effect on its duration.

Furthermore, the effect of intergovernmental transfers on duration of fiscal sustainability also depends on the definition of fiscal sustainability. With no restricted sub-national borrowing, intergovernmental transfers in fact have a very small effect on the duration of fiscal sustainability (around half of a month for one percentage point increase in intergovernmental transfers). Moreover, more centralized types of sub-national borrowing regulations (i.e., administrative and cooperative regulations) seem to have an effect on duration of fiscal sustainability when the stricter (0 percent) definition of fiscal sustainability is used. On the other hand, more decentralized types of sub-national borrowing regulations are more effective when more relaxed (-3 percent) definition is implemented.

Table 10. Marginal Effects on Median Reported Duration, Sub-National Government Primary Balance

	0%				-3%			
	1	2	3	4	5	6	7	8
Number of previous failures	-3.373*** (0.192)	-3.375*** (0.19)	-3.238*** (0.19)	-3.332*** (0.193)	-0.760*** (0.087)	-0.760*** (0.091)	-0.749*** (0.082)	-0.783*** (0.086)
Initial budget balance	0.157*** (0.03)	0.161*** (0.029)	0.193*** (0.032)	0.177*** (0.031)	0.142*** (0.040)	0.147*** (0.041)	0.191*** (0.038)	0.151*** (0.042)
Size of the adjustment	3.9 (3.084)	3.525 (2.965)	3.376 (3.033)	4.921* (2.93)	8.590** (3.42)	7.643** (3.497)	4.512 (3.050)	9.134*** (3.418)
SNG Primary Balance	7.036*** (2.024)	6.435*** (2.117)	5.691*** (2.033)	7.106*** (2.002)	5.270** (2.676)	3.463 (2.850)	4.350* (2.583)	5.452** (2.692)
SNG debt	-0.393*** (0.148)	-0.407** (0.165)	-0.551*** (0.165)	-0.403** (0.171)	-0.359*** (0.137)	-0.228 (0.182)	-0.312* (0.165)	-0.287 (0.181)
Administrative	-3.274* (1.818)	-3.52* (1.806)	-2.852 (1.853)	-3.489* (1.895)	-0.572 (2.467)	-1.629 (2.518)	-3.059 (2.401)	-2.917 (2.614)
Cooperative	0.867*** (0.336)	0.910** (0.379)	0.909** (0.369)	0.934** (0.376)	0.431 (0.442)	0.681 (0.513)	0.860* (0.474)	0.552 (0.490)
Central Rules	-1.876 (3.039)	-2.430 (3.084)	-3.142 (2.088)	-2.955 (3.087)	-3.389 (3.079)	-5.292* (3.217)	-5.434** (2.165)	-5.103* (3.079)
Self Rules	-1.166 (0.977)	-1.827* (1.100)	-1.757 (1.129)	-2.497** (1.150)	0.583 (1.078)	-1.355 (1.291)	-0.854 (1.262)	-1.172 (1.366)
Market	1.340*** (0.493)	1.508*** (0.523)	1.666*** (0.519)	1.580*** (0.546)	0.545 (0.523)	0.802 (0.575)	0.984* (0.520)	0.921 (0.566)
SNG debt * Administrative	-0.218 (0.257)	-0.317 (0.259)	-0.331 (0.249)	-0.284 (0.26)	0.109 (0.271)	-0.047 (0.294)	-0.194 (0.279)	0.027 (0.296)
SNG debt * Cooperative	-0.254 (0.161)	-0.330* (0.177)	-0.268 (0.176)	-0.336* (0.181)	-0.192 (0.209)	-0.391 (0.247)	-0.515** (0.236)	-0.452* (0.248)
SNG debt * Central Rules	0.394* (0.23)	0.440* (0.249)	0.652*** (0.241)	0.420* (0.249)	0.595*** (0.220)	0.532** (0.252)	0.628*** (0.241)	0.531** (0.247)
SNG debt * Self Rules	1.224*** (0.475)	1.286** (0.540)	1.573*** (0.545)	1.420*** (0.554)	1.073** (0.446)	1.292** (0.528)	1.186** (0.501)	1.397*** (0.522)
SNG debt * Market	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Sanctions	-0.569*** (0.190)	-0.483** (0.217)	-0.181 (0.247)	-0.342 (0.243)	-0.661*** (0.216)	-0.880*** (0.244)	-0.791*** (0.243)	-1.032*** (0.25)
Limit on debt	0.518** (0.256)	0.523* (0.276)	0.520* (0.266)	0.407 (0.27)	1.074*** (0.312)	0.930*** (0.330)	0.945*** (0.313)	0.949*** (0.322)
SNG debt * Limit on debt	-0.087*** (0.026)	-0.083*** (0.028)	-0.089*** (0.028)	-0.069** (0.028)	-0.088*** (0.034)	-0.076** (0.036)	-0.111*** (0.035)	-0.063* (0.036)
“Golden rule”		-0.005 (0.334)	-0.333 (0.321)	0.022 (0.321)		0.184 (0.312)	-0.258 (0.311)	0.131 (0.315)
SNG debt * “Golden rule”		-0.037 (0.025)	-0.031 (0.024)	-0.04 (0.024)		-0.048 (0.032)	-0.064** (0.031)	-0.047 (0.033)
Foreign		0.222 (0.281)	0.131 (0.268)	0.216 (0.283)		1.004*** (0.323)	0.901*** (0.303)	0.855** (0.340)
SNG debt * Foreign		0.009 (0.031)	0.038 (0.03)	0.009 (0.031)		-0.107** (0.047)	-0.063 (0.041)	-0.083* (0.047)
IGT	-0.003	-0.002	-0.007	-0.005	0.008	0.003	-0.014	0.004

	(0.008)	(0.009)	(0.009)	(0.008)	(0.014)	(0.013)	(0.014)	(0.014)
IGT * Administrative	-0.006	-0.013	-0.027	-0.014	-0.041	-0.040	-0.025	-0.033
	(0.027)	(0.027)	(0.03)	(0.028)	(0.037)	(0.038)	(0.037)	(0.039)
IGT * Cooperative	0.003	0.022	0.101	0.025	0.017	0.015	0.098	0.053
	(0.055)	(0.062)	(0.065)	(0.063)	(0.062)	(0.073)	(0.072)	(0.072)
IGT * Central Rules	-0.102*	-0.086*	-0.067	-0.078	0.026	0.066	0.117*	0.040
	(0.053)	(0.051)	(0.051)	(0.050)	(0.060)	(0.063)	(0.061)	(0.059)
IGT * Self Rules	-0.117	0.002	-0.062	0.057	-0.179	0.016	0.109	-0.038
	(0.143)	(0.150)	(0.156)	(0.151)	(0.151)	(0.182)	(0.175)	(0.186)
IGT * Market	0.048	0.014	0.020	-0.016	0.024	-0.058	-0.093	-0.055
	(0.075)	(0.075)	(0.076)	(0.076)	(0.086)	(0.092)	(0.085)	(0.089)
Transfer formula	-0.148	-0.043	0.469	-0.323	-0.101	-0.405	0.196	-0.376
	(0.616)	(0.628)	(0.625)	(0.669)	(0.587)	(0.609)	(0.617)	(0.610)
IGT* Transfer formula	0.010	0.006	-0.001	0.009	0.006	0.014	0.009	0.015
	(0.012)	(0.013)	(0.012)	(0.013)	(0.012)	(0.013)	(0.013)	(0.013)
Tax autonomy	-0.720	-0.853	-0.839	-0.924	-0.659	-0.454	0.264	-0.222
	(0.588)	(0.577)	(0.553)	(0.577)	(0.697)	(0.758)	(0.746)	(0.761)
IGT * Tax autonomy	0.022	0.022	0.020	0.025*	0.005	0.000	-0.016	-0.007
	(0.015)	(0.015)	(0.014)	(0.015)	(0.018)	(0.018)	(0.018)	(0.018)
SNG Expenditures		0.015				-0.004		
		(0.024)				(0.029)		
Urbanization	-0.014**	-0.018**	-0.008	-0.010	-0.009	-0.010	-0.011	-0.015
	(0.007)	(0.007)	(0.007)	(0.007)	(0.009)	(0.01)	(0.009)	(0.010)
Population growth				0.210				-0.305**
				(0.132)				(0.151)
Age Dependency			0.019				-0.059***	
			(0.018)				(0.018)	
Government Stability	0.124**	0.113**	0.123**		0.201***	0.208***	0.200***	
	(0.048)	(0.050)	(0.048)		(0.061)	(0.062)	(0.058)	
Government fractionalization			-0.085	-0.089			-0.258	0.000
			(0.317)	(0.300)			(0.355)	(0.35)
Corruption			-0.444***				-0.653***	
			(0.093)				(0.111)	
CBI	1.170**	1.563**	1.327**	1.553***	2.166***	2.697***	2.221***	2.44***
	(0.585)	(0.619)	(0.579)	(0.590)	(0.592)	(0.636)	(0.622)	(0.636)
Bailout	1.508	1.507	1.461	1.089	0.598	0.537	1.227	0.988
	(0.43)	(0.466)	(0.433)	(0.480)	(0.492)	(0.509)	(0.476)	(0.561)
GDP per capita	0.536***	0.528***	0.755***	0.550***	0.868***	0.944***	1.014***	1.001***
	(0.124)	(0.127)	(0.150)	(0.128)	(0.154)	(0.159)	(0.160)	(0.162)
Inflation				-0.231***				-0.334***
				(0.056)				(0.068)
SGP	-0.838***	-0.754**	-0.841***	-0.757**	-0.597**	-0.551*	-0.315	-0.369
	(0.288)	(0.325)	(0.305)	(0.323)	(0.297)	(0.327)	(0.33)	(0.329)
Duration Dependence Parameter (P)	2.463	2.508	2.533	2.524	3.655	3.681	3.860	3.746
Median	3.942	3.945	3.962	3.960	5.714	5.714	5.753	5.744
OBS	806	806	806	806	806	806	806	806

Standard errors in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Moreover, sub-national tax autonomy has a significant and highly positive effect on the duration of fiscal sustainability when a more relaxed definition of fiscal sustainability is used. However, this positive effect is reduced the more sub-national governments are dependent on intergovernmental transfers. On the other hand, sub-national tax autonomy seems to have no effect on duration with the stronger definition of fiscal sustainability.

#### *Sub-national Government Fiscal Sustainability*

The results on the effect of sub-national borrowing and regulations on duration of sub-national fiscal sustainability are presented in Table 5.8. As the results suggest, the median duration is close to the one obtained for general government primary balance. Furthermore, the effect of sub-national borrowing and regulations on duration of fiscal sustainability seems to be more robust than in case of general government primary balance. According to the results, sub-national debt regulated by self-imposed rules leads to an increase in the duration of fiscal sustainability by around one year above the median. Centrally-imposed rules have also a positive effect, but it is much smaller in magnitude.

Furthermore, limits on borrowing and debt levels seem to have an effect on sub-national fiscal sustainability while the “golden rule” does not. Moreover, the effect of borrowing and debt limits declines as the level of sub-national outstanding debt increases. Interestingly, sanctions for non-compliance reduce the duration of fiscal sustainability below the median for both general and sub-national government primary balance. This effect actually measures the effect of a discrete change from no sanctions to their introduction, and is between 6 months and one year, depending on the specification. Hence, it suggests that introduction of sanctions for non-compliance may reduce the duration of fiscal sustainability and this effect should be considered as short term.

## CONCLUSION

This chapter empirically investigated the effects of sub-national borrowing and its regulations on general and sub-national government fiscal performance and the duration of fiscal sustainability. Firstly, the determinants of the sub-national borrowing regulations are evaluated using the multinomial logit estimator. Next, the effect of sub-national borrowing on fiscal performance and sustainability is investigated using the system GMM estimator and the duration analysis.

The results in this chapter suggest that the depth of the financial market is particularly important for choosing cooperative regulations and regulations based on centrally and self-imposed rules. Furthermore, countries with higher primary balances (both general and sub-national) are more likely to choose self-imposed rules and market-based regulations over the other types. Finally, countries with higher sub-national outstanding debt seem to be most likely to choose self-imposed fiscal rules to regulate sub-national borrowing.

The empirical results suggest that, in general, the conclusion about the effects of the sub-national borrowing and regulations on fiscal sustainability depend on the level of government at which they are tested, and can be summarized as follows:

- The cooperative type of the sub-national borrowing regulations seems to have positive effect on improving general government fiscal performance even in the case of a high level of sub-national debt and a high dependence on the intergovernmental transfers. However, none of the broad types of the sub-national borrowing regulations seems to show a significant effect on fiscal sustainability at the sub-national level. These results are not consistent with the expectations that policies focused on regulating sub-national behavior should be effective at the sub-national level. On the contrary, our results suggest that they have no effect at the sub-national level and provide support to the hypothesis



that sub-national fiscal behavior primarily affects the overall fiscal balance of the country;

- When a particular level of the primary balance is predetermined to be considered as sustainable, then self-imposed rules seem to be the only effective method in maintaining the primary balance above that predetermined threshold, for all government levels;
- The “golden rule” and limits on debt and borrowing positively affect the primary balance at all levels of government. However, their effectiveness in maintaining the primary balance above a predetermined threshold for a sustainable primary balance depends on the level of the threshold, being more efficient in the case of the lower threshold;
- More centralized types of regulations (administrative and cooperative) seem to be more effective with a higher threshold for fiscally sustainable primary balance, while more decentralized regulations (self-imposed rules) seem to show better performance with lower thresholds;
- Sub-national tax autonomy contributes to a higher general government primary balance but only when the sub-national governments do not depend on intergovernmental transfers. This effect is not found to be significant at the sub-national level, suggesting that the effect of sub-national tax autonomy is actually, on the margin, not significantly high;
- In those countries with a history of bailouts at the sub-national government level, the primary balance is, on average, lower at both the sub-national and the general government levels than in other countries, suggesting the importance of the absence of moral hazard for fiscal responsibility.

The results obtained suggest that sub-national borrowing should not endanger fiscal sustainability if it is allowed only for financing capital investments, regardless of how centralized decisions on the borrowing issuances are. The limit on borrowing and debt is also proven to play important role on fiscal discipline. Sub-national tax autonomy does not seem to be as important as we expected given its low marginal effect. The results also emphasize the risk of a soft budget constraint and moral hazard. High central government financing may give encouraging signs to the sub-national governments to over-borrow and to expect to be bailed out by the central government. This deteriorates the general government budget directly, through the unplanned bailout from the central government, and indirectly, through the spillover effect on other sub-national governments that are highly fiscally dependent on the central government transfers.

Depending on how the central government defines the fiscally sustainable balance, it may choose more or less centralized types of the sub-national borrowing regulations. More centralized regulations of sub-national borrowing (e.g., administrative and cooperative) seem to be more appropriate when the central government's definition of fiscal sustainability is more strict, while for a more relaxed definition of fiscal sustainability, the more decentralized options for regulating the sub-national borrowing seem to be more suitable. Finally, no one of the broad types of regulations shows a dominant effect on fiscal behavior at both the sub-national and the general government level.

## VII. CONCLUSION, POLICY IMPLICATIONS AND THE NEED FOR FUTURE RESEARCH

The debt crisis in Brazil and Argentina which involved the sub-national government borrowing are often used to illustrate potential danger of decentralizing borrowing autonomy on fiscal sustainability and macroeconomic stability. Moreover, recent events in the European Union related to the soaring government debt of some of its member countries and violations of fiscal rules add to the importance of revisiting this issue. The argument for this potential hazardous effect focuses on the possible moral hazard resulting from the soft budget constraint to the sub-national governments.

On the other side are the arguments in favor of devolving more borrowing autonomy to the sub-national governments. Financing large capital investments would be inefficient if it was done by the current revenues. Moreover, since the benefits of such investments are not enjoyed only by the current generation, but often spans over few future generations, it is equitable that future generations should too participate in their financing. Furthermore, access to the financial markets can increase fiscal transparency and political accountability of the sub-national governments. Finally, sub-national access to the financial markets contributes to their deepening.

Hence, having in mind potential benefits of the sub-national borrowing, but as well its potential hazardous impact on fiscal sustainability, the challenge is how to simultaneously achieve both goals, allowing the sub-national governments to borrow and maintain fiscal sustainability. The main hypothesis which is the focus of this dissertation is that, if the sub-national borrowing is numerically limited and restricted to only financing capital investments and the sub-national governments are provided with certain measure of revenue autonomy, then the sub-national borrowing should not endanger fiscal sustainability. The basic theoretical

framework for testing this hypothesis if first developed, and then the hypothesis is tested on a sample of 57 industrialized, developing and countries in transition using two alternative methodologies, namely, the “system” GMM and duration analysis. In overall, results of this study provide support for the main hypothesis of this dissertation.

The theoretical results of this study are based on the assumption that borrowing is allowed only for financing capital investments and can be summarized as follows:

- The fiscally sustainable debt limit increases with more revenue autonomy given to the sub-national governments if the transfer structure gives more incentive to an increase in revenue efforts and creditworthiness; and
- Fiscally sustainable debt limit increases with borrowing regulations that target fiscal performance and the borrowing costs.

These theoretical results suggest that giving more revenue autonomy to the sub-national governments and allocating the intergovernmental transfers in a way which would reward the sub-national revenue efforts should give the sub-national governments more ability to borrow without endangering fiscal sustainability. In addition, the results suggest that, besides allowing the sub-national borrowing for financing only the capital investments, the sub-national borrowing regulations which are based on the fiscal rules and the market discipline would be effective in maintaining the sub-national debt within the sustainable limit.

The empirical results suggest that, in general, the empirical support for the obtained theoretical results depends on the government level at which they are tested, and can be summarized as follows:

- Depth of the financial market is particularly important when choosing the cooperative regulations and regulations based on centrally and self-imposed rules. Furthermore,

countries with higher primary balance (both general and sub-national) are more likely to choose self-imposed rules and market-based regulations over the other types. Finally, countries with higher sub-national outstanding debt seem to be most likely to choose self-imposed fiscal rules to regulate the sub-national borrowing;

- Cooperative type of the sub-national borrowing regulations seems to have positive effect on improving general government fiscal performance even in the case of high level of the sub-national debt and high dependence on the intergovernmental transfers. However, none of the broad types of sub-national borrowing regulations seems to show significant effect on fiscal sustainability at the sub-national level. These results are not consistent with the expectations that the policies focused on regulating the sub-national behavior should show the effectiveness at the sub-national level. On the contrary, our results suggest that they have no effect at the sub-national level and provide support to the conjecture that the sub-national fiscal behavior primarily affects the overall fiscal balance of the country;
- When a particular level of the primary balance is predetermined as sustainable, then self-imposed rules seem to be the only one effective in maintaining the primary balance above that threshold, for all government levels;
- The “golden rule” and limits on debt and borrowing positively affect the primary balance at all levels of government. However, their effectiveness in maintaining the primary balance above a predetermined threshold for sustainable primary balance depends on the level of the threshold, being more efficient in the case of the lower threshold;
- More centralized types of regulations (administrative and cooperative) seem to be more effective with a higher threshold for fiscally sustainable primary balance, while more

decentralized regulations (self-imposed rules) seem to show better performance with lower thresholds;

- The sub-national tax autonomy contributes to higher general government primary balance but only when the sub-national governments do not depend on the intergovernmental transfers. This effect is not found to be significant at the sub-national level, suggesting that the effect of the sub-national tax autonomy is actually, on the margin, not significantly high;
- In those countries with the history of bailouts at the sub-national government level, the primary balance is, on average, lower at both the sub-national and the general government level is than in other countries, suggesting the importance of the absence of moral hazard for fiscal responsibility.

The obtained results suggest that the sub-national borrowing should not endanger fiscal sustainability if it was allowed only for financing capital investments, regardless of how centralized decisions on the borrowing issuances are. The limit on borrowing and debt is also proven to play important role on maintaining fiscal discipline. The importance of the sub-national tax autonomy does not seem to be as important as we expected given its low marginal effect. The obtained results also emphasize the risk of the soft budget constraint and the moral hazard. High central government financing 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 the unplanned bailout from the central government, and indirectly, through the spillover effect on other sub-national governments that are highly fiscally dependent on the central government transfers.

When choosing the sub-national borrowing regulations, the central government authorities should be guided, among other requirements, by their preferences towards fiscal sustainability. Depending on how the central government defines the fiscally sustainable fiscal balance, it may choose more or less centralized types of the sub-national borrowing regulations. More centralized regulations of the sub-national borrowing (e.g., administrative and cooperative) seem to be more appropriate when the central government's definition of the fiscal sustainability is more strict, while for a more relaxed definition of fiscal sustainability, the more decentralized options for regulating the sub-national borrowing seem to be more suitable. Finally, no one of the broad types of regulations shows the dominant effect on fiscal behavior at both the sub-national and the general government level.

Results obtained in this study point out to the importance of strong institutions (??).

While this dissertation has accomplished to provide support to its main hypothesis indicated above, it highlights the need for future research on this topic. First, extending the dataset to even larger number of countries and longer observation period would enable to reduce the potential sample selection bias. Furthermore, an extension under consideration is to evaluate the direct effect of sub-national debt and its regulation on macroeconomic stability. Finally, even though the depth of financial markets is intuitively good instrument for the sub-national borrowing regulations, future research could consider using additional or alternative instruments.

## APPENDIX

Table A.1 Descriptive Statistics

Variable	OBS	Mean	Std. Dev.	Min	Max
GG primary balance	847	0.029	0.042	-0.13	0.22
SNG primary balance	847	0.007	0.047	-0.33	0.33
CG primary balance	847	0.022	0.058	-0.36	0.37
SNG debt	993	0.067	0.093	0.00	0.89
Liquid liabilities	1075	0.558	0.355	0.06	2.42
Financial freedom	987	58.987	18.883	10	90
Intergovernmental transfers (IGT)	847	0.385	0.211	0.01	0.89
SNG expenditures	847	0.117	0.077	0.01	0.37
Prohibited	1140	0.247	0.432	0	1
Administrative	1140	0.243	0.429	0	1
Cooperative	1140	0.098	0.298	0	1
Centrally-imposed Rules	1140	0.204	0.403	0	1
Self-imposed Rules	1140	0.046	0.211	0	1
Market-based	1140	0.161	0.367	0	1
Limit on debt	1140	0.479	0.500	0	1
The "golden rule"	1140	0.438	0.496	0	1
Foreign: prohibited	1140	0.452	0.498	0	1
Foreign: allowed	1140	0.204	0.403	0	1
Foreign: approval	1140	0.341	0.474	0	1
Transfer formula	1140	0.457	0.498	0	1
Tax autonomy	1140	0.514	0.500	0	1
Bailout	1140	0.396	0.489	0	1
Sanctions	1140	0.394	0.489	0	1
Stability and Growth Pact (SGP)	1140	0.096	0.295	0	1
Corruption	1043	3.516	1.419	0.33	6
Government stability	1044	8.129	1.805	2.17	12
GDP per capita	1124	1.392	1.088	0.07	5.81
Urbanization	1140	64.686	15.958	20.30	97.36
Government fractionalization	1085	0.295	0.281	0.00	0.89
Inflation	1116	0.744	5.646	-0.17	154.42
Population growth	1140	0.006	0.011	-0.07	0.04
Age dependency	1140	0.533	0.099	0.38	0.95
Central bank independence (CBI)	1101	0.525	0.213	0.15	0.92



Table A.1.1. Descriptive Statistics, Balanced Panel

Variable	OBS	Mean	Std. Dev.	Min	Max
GG primary balance	807	0.026	0.040	-0.13	0.22
SNG primary balance	807	0.006	0.047	-0.33	0.33
CG primary balance	807	0.021	0.058	-0.36	0.37
SNG debt	807	0.076	0.097	0.00	0.89
Liquid liabilities	807	0.587	0.328	0.06	2.24
Financial freedom	807	59.641	18.404	10	90
Intergovernmental transfers (IGT)	807	0.391	0.211	0.02	0.89
SNG expenditures	807	0.119	0.078	0.01	0.37
Prohibited	807	0.177	0.382	0	1
Administrative	807	0.203	0.403	0	1
Cooperative	807	0.136	0.343	0	1
Centrally-imposed Rules	807	0.235	0.425	0	1
Self-imposed Rules	807	0.051	0.220	0	1
Market-based	807	0.197	0.398	0	1
Limit on debt	807	0.529	0.499	0	1
The "golden rule"	807	0.441	0.497	0	1
Foreign: prohibited	807	0.409	0.492	0	1
Foreign: allowed	807	0.271	0.445	0	1
Foreign: approval	807	0.318	0.466	0	1
Transfer formula	807	0.542	0.499	0	1
Tax autonomy	807	0.591	0.492	0	1
Bailout	807	0.430	0.495	0	1
Sanctions	807	0.437	0.496	0	1
Stability and Growth Pact (SGP)	807	0.130	0.337	0	1
Corruption	807	3.673	1.439	0.33	6
Government stability	806	8.334	1.671	2.92	12
GDP per capita	807	1.607	1.077	0.09	5.81
Urbanization	807	66.842	15.807	25.14	97.34
Government fractionalization	802	0.309	0.280	0.00	0.89
Inflation	807	0.237	1.367	-0.04	20.77
Population growth	807	0.005	0.008	-0.04	0.02
Age dependency	807	0.515	0.075	0.38	0.86
Central bank independence (CBI)	807	0.554	0.216	0.17	0.92

Table A.2 Variables, Description and Sources

Variable	Description	Sources
GG primary balance	General government primary balance	
SNG primary balance	Sub-national government primary balance	
CG primary balance	Central government primary balance	
Intergovernmental transfers (IGT)	Sub-national intergovernmental transfers as a share of total sub-national revenues	IMF GFS Database; Ministry of Finance (Albania, Argentina, Brazil, Colombia, India, Indonesia, Pakistan, Serbia, Slovenia, USA, Vietnam); Statistical Agency (Japan)
SNG expenditures	Sub-national expenditure to general government expenditure	
SNG debt	Sub-national outstanding debt to GDP	Various Sources: Central Bank (Brazil, Colombia, El Salvador, Honduras, Hungary, India, Romania, Slovakia, Spain, South Africa); Ministry of Finance (Argentina, Bulgaria, Costa Rica, Croatia, Macedonia, Serbia, Slovenia); OECD Database (Austria, Canada, Mexico, Portugal, United Kingdom); Statistical Agency (Australia, Austria, Estonia, Japan, Latvia, Lithuania, Norway, Ukraine, USA)
Liquid liabilities	Liquid liabilities as share of GDP	World Development Indicators
Financial freedom	Measure of banking efficiency as well as a measure of independence from government control and interference in the financial sector	The Heritage Foundation
Prohibited	= 1 if sub-national borrowing is prohibited	
Administrative	= 1 if sub-national borrowing is administratively regulated	
Cooperative	= 1 if sub-national borrowing is cooperatively regulated	
Centrally-imposed rules	= 1 if sub-national borrowing is regulated by centrally-imposed fiscal rules	
Self-imposed rules	= 1 if sub-national borrowing is regulated by self-imposed fiscal rules	
Market-based	= 1 if sub-national borrowing is regulated solely by the financial market	
Limit on debt	= 1 if there is a limit on debt and borrowing	

Various Sources  
(see Table A.4 for sources by country)

The "golden rule"	= 1 if sub-national borrowing is allowed only for financing capital investments	
Foreign: prohibited	= 1 if borrowing in the foreign market is prohibited	
Foreign: allowed	= 1 if borrowing in the foreign market is allowed	
Foreign: approval	= 1 if borrowing in the foreign market is allowed with an approval from the central government authority	
Transfer formula	= 1 if unconditional transfers are allocated based on a predetermined formula	
Tax autonomy	= 1 if sub-national government has ability to set and/or change rates on income, business or consumption tax	
Bailout	= 1 if country there is bailout history at the sub-national level	
Sanctions	= 1 if there are legal sanctions for non-compliance with the fiscal rules	
Stability and Growth Pact	= 1 if country signed the Stability and Growth Pact	
Corruption	Corruption index which value between 0 and 6, with higher index meaning lower corruption	
Government stability	Index of government stability. It is the sum of three subcomponents (government unity, legislative strength, and popular supports), each with a maximum of 4 and a minimum of 0 points. A score of 4 equates to "very low risk" and a score of 0 points to "very high risk"	International Country Risk Guide
Government fractionalization	Probability that two random draws will produce legislators from different parties	Database of Political Indicators
GDP per capita	GDP per capita, PPP (current international \$10,000)	
Urbanization	Urban population (% of total)	
Inflation	Inflation, GDP deflator (annual %)	
Population growth	Population growth (annual %)	World Development Indicators
Age dependency	Ratio of dependents (people younger than 15 or older than 64) to the working-age population (those ages 15-64) per 100 working-age population	
Central bank independence	Index of central bank independence	(Polillo and Guillén, 2005)

Table A.3 Qualitative Indicators

Country	Tax Autonomy <sup>1</sup>	Transfers formula	Prohibited	Administrative	Cooperative	Centrally-imposed Rules	Self-imposed Rules	Market-based	Limit on Debt or Borrowing <sup>2</sup>	"Golden Rule" <sup>2</sup>	Borrowing in Foreign Market <sup>3</sup>	Legal Sanctions for Non-compliance
Albania	2007-08 (L)	2002-08	2000-07	2008					2008	2008	P	No
Argentina	No	No					1990-04		1990-04	1990-04	AP	No
Armenia	No	No	2002-08						-	-	P	-
Australia	1990-08	1990-08		1990-93	1994-08				1990-08	No	AL	1998-08
Austria	No	1990-08			1999-08	1990-98			No	1990-08	AP	Yes
Azerbaijan	No	No	1994-99						-	-	P	-
Belarus	No	No	1992-08						-	-	P	-
Belgium	1990-07 (L)	1990-07			1990-07				No	1990-07	AL	1996-08
Bosnia and Herzegovina	No	No	2004-08						-	-	P	-
Brazil	1997-08 (L)	1997-08				1997-08			1998-08	1997-08	AP	2000-08
Bulgaria	No	2003-08	1990-95			2005-08		1996-04	2002-08	2002-08	AL	Yes
Canada	1990-08	1990-08						1990-08	No	No	AL	Yes
Chile	No	1991-08	1991-08						-	-	P	-
China	No	1995-08	1995-08						-	-	P	-
Colombia	No	1998-08				1998-08			1998-08	1998-08	AP	No
Costa Rica	No	No		2001-07					2001-07	2001-07	AP	Yes
Croatia	No	No		1994-08					1996-08	No	P	No
Czech Republic	No	No				2005-08		1993-04	2002-08	No	AL	No
Denmark	1990-08	1990-08		1990-08					1990-08	1990-08	AL	No
El Salvador	No	2001-08						2001-08	No	2001-08	AP	No

Table A.3 Qualitative Indicators (cont'd)

Country	Tax Autonomy <sup>1</sup>	Transfers formula	Prohibited	Administrative	Cooperative	Centrally-imposed Rules	Self-imposed Rules	Market-based	Limit on Debt or Borrowing <sup>2</sup>	"Golden Rule" <sup>1,2</sup>	Borrowing in Foreign Market <sup>3</sup>	Legal Sanctions for Non-compliance
Estonia	1995-08 (L)	2003-08				1995-08			1995-08	No	AL	Yes
Finland	1990-08	1990-08						1990-08	No	No	AL	Yes
France	1990-08	1990-08						1990-08	No	1990-08	AL	Yes
Georgia	No	2006-07	1996-07						-	-	P	-
Germany	No	1990-08			1992-08	1990-91			1990-08	1990-08	AL	No
Greece	No	1994-07				1994-07			1994-07	No	AP	Yes
Honduras	No	No		2002-08					No	No	AP	No
Hungary	No	No				1996-08		1990-95	1996-08	No	AL	No
Iceland	No	No						1990-08	No	No	AL	No
India	No	No				1990-08			2002-08	No	P	2003-08
Indonesia	No	No		1990-08					1990-08	1990-08	AP	Yes
Ireland	No	1990-07		1990-07					1990-07	No	P	Yes
Italy	1994-08 (L)	No				1994-08			1994-08	1994-08	P	Yes
Japan	No	2001-07		2001-05		2006-07			2001-07	No	AP	Yes
Kazakhstan	No	No	1997-08						-	-	P	-
Korea	No	No		2005-08					2005-08	2005-08	AP	Yes
Latvia	No	No		1994-08					1994-04	1994-08	AP	1996-08
Lithuania	No	No	1991-97			1998-08			1998-08	No	AP	No
Macedonia	No	No		2005-08					2005-08	No	AP	Yes
Mexico	No	No		1990-00					1990-00	1990-00	P	No

Table A.3 Qualitative Indicators (cont'd)

Country	Tax Autonomy <sup>1</sup>	Transfers formula	Prohibited	Administrative	Cooperative	Centrally-imposed Rules	Self-imposed Rules	Market-based	Limit on Debt or Borrowing <sup>2</sup>	"Golden Rule" <sup>2</sup>	Borrowing in Foreign Market <sup>3</sup>	Legal Sanctions for Non-compliance
Netherlands	No	No						1990-08	1990-08	1990-08	P	Yes
Norway	No	1996-08				1990-08			No	No	P	Yes
Pakistan	No	1997-08	1997-08						-	-	P	-
Poland	No	No	1993-94			1995-08			1995-08	No	P	Yes
Portugal	No	1990-07						1990-07	1990-07	1990-07	P	Yes
Romania	No	1998-08	1990-97		1998-08				1990-08	1990-08	AP	2007-08
Serbia	No	2002-08	2002-04	2005-08					2005-08	2005-08	AP	No
Slovakia	No	No				1996-08			2005-08	1996-08	AP	Yes
Slovenia	No	No		1992-07					2008-07	No	P	No
South Africa	No	1990-07			1990-07				1996-07	2003-07	P	No
Spain	1990-08 (L)	1990-08			1992-08	1990-91			No	1990-08	AP	Yes
Sweden	2000-01	1990-01				2001		1990-00	No	No	AL	Yes
Switzerland	1990-07	1990-07					1990-07		1990-07	1990-07	AP	Yes
Ukraine	No	No				1998-08			1998-08	1998-08	P	No
United Kingdom	No	1990-08		1990-08					1990-08	No	AP	1998-08
United States	1990-01	No					1990-01		1990-01	No	AP	No
Vietnam	No	2002-08	2002-08						-	-	P	-

<sup>1</sup> (L) = ability to set/change rates within a limit; <sup>2</sup> "-" = not applicable; <sup>3</sup> P = Prohibited; AP = Allowed with an approval; AL = Allowed

Table A.4 Sources for Qualitative Indicators by Country

Country	Country
Albania (Conway et al., 2007; Shehu, 2006)	India (Heredia-Ortíz and Rider, 2005; Purfield, 2004)
Argentina (Reid, 2003; Webb and Dillinger, 1999)	Indonesia (Alm and Indrawati, 2004; IMF, 2005)
Armenia (Boex et al., 2005; Tumanyan, 2006)	Ireland (Brownlow, 2004; Council of Europe, 1998)
Australia (Koutsogeorgopoulou, 2007; Von Hagen et al., 2000)	Italy (Council of Europe, 2008b; Von Hagen, et al., 2000)
Austria (Council of Europe, 1999a; IMF, 2008)	Japan (Aoki, 2008; Mochida, 2008)
Azerbaijan (Bayramov, 2006; Mikayilov, 2007)	Kazakhstan (Leschenko and Troschke, 2006)
Belarus (Kobasa et al., 2001; Krivorotko, 2006)	Korea (Kook, 2001; Lee, 2005)
Belgium (Council of Europe, 1997a, 2006a; OECD, 2009a)	Latvia (Council of Europe, 2006c; Vanags and Vilka, 2000)
Bosnia and Herzegovina (Glasser and Jokay, 2000; Lenić, 2006)	Lithuania (Beksta and Petkeviciu, 2000; Council of Europe, 2006d)
Brazil (Goldstein, 2003; Webb and Dillinger, 1999)	Macedonia (Angelov, 2008; Nikolov, 2005)
Bulgaria (Council of Europe, 1996a; Savov, 2006)	Mexico (Hernández, et al., 2002; Hernández and Jarillo, 2008; Reid, 2003)
Canada (Bird and Tassonyi, 2001; Shah, 1995)	Netherlands (Council of Europe, 2008c)
Chile (Letelier, 2010; OECD, 2009b)	Norway (Borge, 2009; Council of Europe, 1997d)
China (Era Dabla-Norris, 2005)	Pakistan (Bahl et al., 2008)
Colombia (Chaparro et al., 2005; Echavarría et al., 2000)	Poland (Kopańska, 2009; Kopańska et al., 2004; Nam and Parsche, 2001)
Costa Rica (Hall et al., 2002)	Portugal (Council of Europe, 2006e; OECD, 2008)
Croatia (Alibegović, 2006; Bajo and Bronić, 2007)	Romania (Ghinea et al., 2004; Nikolov, 2006)
Czech Republic (Bryson, 2008; Ježek et al., 2004; Nam and Parsche, 2001)	Serbia (Stipanović, 2006)
Denmark (Council of Europe, 2008a; Milinković, 2008)	Slovakia (Bryson, 2008; Kling et al., 2004; Nam and Parsche, 2001)
El Salvador (World Bank, 2004, 2010a)	Slovenia (Ploštajner, 2008; Setnikar-Canka et al., 2000)
Estonia (Jaansoo et al., 2004; Wehner et al., 2008)	South Africa (Glasser et al., 1998; Liebig, et al., 2008)
Finland (Council of Europe, 1997b, 2009)	Spain (Laborda, et al., 2006; Vinuela, 2000)
France (Council of Europe, 1997c; Dufrénot, et al., 2010)	Sweden (Berggren and Tingvall, 2005; Von Hagen, et al., 2000)
Georgia (Boex et al., 2005; Shergelashvili and Narmania, 2006)	Switzerland (Dafflon, 1999; IMF, 2006b)
Germany (Hepp and Von Hagen, 2009; Von Hagen, et al., 2000)	Ukraine (CEU, 2004; Kuhn, 2004)
Greece (Council of Europe, 2000; Hawkesworth et al., 2008)	United Kingdom (Council of Europe, 1999b; Rutters, 2008)
Honduras (Jametti and Joanis, 2010)	United States (Laubach, 2005)
Hungary (Balás and Hegedüs, 2004; Jokay, 2006; Nam and Parsche, 2001)	Vietnam (Martinez-Vazquez, 2005)
Iceland (Council of Europe, 2006b; IMF, 2010)	

Table A.5 Descriptive Statistics: Failure and Duration

	GG Primary Balance		SNG Primary Balance	
	0%	-3%	0%	-3%
<b>Failure</b>				
Mean	0.201	0.067	0.239	0.081
Standard Deviation	0.401	0.250	0.427	0.272
Variance	0.161	0.063	0.182	0.074
Skewness	1.494	3.466	1.223	3.083
Kurtosis	3.233	13.016	2.496	10.503
Number of failures	162	54	193	65
Observations	807	807	807	807
<b>Duration</b>				
Mean	5.401	7.284	5.420	7.244
Standard Deviation	4.561	5.009	4.749	5.089
Variance	20.801	25.089	22.557	25.899
Skewness	1.028	0.533	1.050	0.543
Kurtosis	3.197	2.242	3.172	2.219
Observations	807	807	807	807
Min number of years of consolidation	1	1	1	1
Max number of years of consolidation	19	19	19	19
1 year	25.90%	13.14%	28.75%	14.50%
2 years	10.78%	8.30%	9.79%	8.18%
3 or more years	63.32%	78.56%	61.46%	77.32%



Table A.6. Factor changes in relative risk ratios of choosing particular sub-national borrowing regulation versus prohibiting sub-national borrowing (for one unit increase in independent variable)

	Prohibited	Administrative	Cooperative	Central Rule	Self Rule
Liquid Liabilities	4.083 (4.669)	1.052 (0.584)	0.301* (0.581)	0.058*** (0.530)	0.448 (0.693)
Financial Freedom	1.136* (0.053)	1.014 (0.009)	1.000 (0.010)	1.009 (0.008)	1.036* (0.016)
SNG Debt	. (.)	0.000*** (3.901)	0.004** (2.124)	0.114 (1.495)	6.879* (2.089)
GDP Per Capita	2.206 (1.068)	0.996 (0.135)	2.526*** (0.157)	1.837*** (0.123)	3.165*** (0.201)
SNG Expenditures	2.377 (8.780)	7.161** (2.782)	1.705*** (0.898)	0.007 (2.604)	0.012 (4.509)
SNG Own Revenues	6.718** (4.794)	6.677*** (1.727)	0.280 (1.616)	2.896*** (1.425)	6.726 (5.218)
Tax Autonomy	0.000*** (3.989)	0.145*** (0.380)	0.397** (0.323)	0.237*** (0.294)	0.771 (0.564)
Government Fractionalization	. (.)	1.255 (0.553)	3.135* (0.558)	7.345*** (0.495)	12.531** (0.856)
Bailout	0.920 (2.440)	1.431 (0.312)	0.397* (0.365)	1.388 (0.311)	0.042*** (0.616)
Population Growth	0.000 (0.720)	6.222** (3.527)	1.040*** (0.798)	0.000 (8.212)	6.892*** (3.500)
Pseudo R-sq.			0.431		
Chi2			1184.704		
P			0.000		

Coefficient represent factor changes in relative risk for unit increase in independent variable X: exp(b); SD(b) in parentheses; \*\*\*p<.01; \*p<.05; \*p<.10; The market-based regulations is the based category

Table A.7. Log Likelihood and Information Criteria for Optional Distributions of the Baseline Hazard Function

	GG Primary Balance			SNG Primary Balance		
	Weibull	Exponential	Cox	Weibull	Exponential	Cox
Threshold = 0%						
Log Likelihood	-482.88	-890.76	-4231.63	-567.51	-905.78	-4282.85
AIC	1033.76	1847.53	8565.27	1203.02	1877.57	8665.70
BIC	1193.29	2002.37	8804.57	1362.55	2032.40	8900.30
Threshold = -3%						
Log Likelihood	-247.20	-860.97	-3865.79	-296.97	-867.47	-3930.21
AIC	562.40	1787.94	7831.57	661.94	1800.93	7960.43
BIC	721.93	1942.78	8066.18	821.47	1955.77	8195.03

## REFERENCES

- Abrams, B. A., & Dougan, W. R. (1986). The effects of constitutional restraints on governmental spending. *Public Choice*, 49(2), 101-116.
- Adam, C. S., & Bevan, D. L. (2003). Staying the Course: Maintaining Fiscal Control in Developing Countries. *Brookings Trade Forum*, 167-227.
- Afonso, A., & Hauptmeier, S. (2009). Fiscal behaviour in the European Union: rules, fiscal decentralization and government indebtedness. *ECB Working Paper Series No. 1054*.
- Ahmad, E., Albino-War, M., & Singh, R. (2005). Sub-national Public Financial Management: Institutions and Macroeconomic Considerations. *IMF Working Paper Series 05/108*.
- Alesina, A. F., & Bayoumi, T. (1996). The costs and benefits of fiscal rules: evidence from U.S. states. *NBER Working Paper No. 5614*.
- Alesina, A. F., Hausmann, R., Hommes, R., & Stein, E. (1999). Budget institutions and fiscal performance in Latin America. *Journal of Development Economics*, 59(2), 253-273.
- Alibegović, D. J. (2006). Intergovernmental Finance and Fiscal Equalization in Croatia. In G. Péteri (Ed.), *Fiscal Equalization in South Eastern Europe*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Alm, J., & Indrawati, S. M. (2004). Decentralization and Local Government Borrowing in Indonesia: The "Bing Bang" Program and Its Economic Consequences. In J. Alm, J. Martinez-Vazquez and S. M. Indrawati (Eds.), *Reforming Intergovernmental Fiscal Relations and the Rebuilding of Indonesia*. Northampton, Massachusetts: Edward Elgar Publishing Limited.
- Alt, J. E., & Lowry, R. C. (1994). Divided government, fiscal institutions, and budget deficits: Evidence from the states. *American Political Science Review*, 88(4), 811-828.
- Angelov, G. (2008). Trial And Error – Experience - Local Self-Governance in Macedonia. In Z. Zlokapa (Ed.), *Block By Block - It's good to Build Well - Models of Organization of Local Self-Governance*. Banja Luka: Enterprise Development Agency – EDA.
- Aoki, I. (2008). Decentralization and Intergovernmental Finance in Japan. *PRI Discussion Paper Series No.08A-04*.
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277-297.
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(1), 29-51.

- Artana, D. (2007). Are Latin-American Countries Decentralized? *Fundación de Investigaciones Económicas Latinoamericanas, Documento de Trabajo No. 92.*
- Ayuso-i-Casals, J., Hernandez, D., Moulin, L., & Turrini, A. (2007). *Beyond the SGP: Features and effects of EU national-level fiscal rules.* Paper presented at the Banca d'Italia Workshop "Fiscal policy: Current Issues and Challenges", Perugia, Italy, 29-31 March 2007.
- Bahl, R. W., Wallace, S., & Cyan, M. (2008). Pakistan: Provincial government taxation. *International Studies Program Working Paper 08-07.*
- Bahl, R. W. (1971). A regression approach to tax effort and tax ratio analysis. *IMF staff papers*, 18(3), 570-612.
- Bahl, R. W., & Linn, J. F. (1992). *Urban public finance in developing countries.* New York: Oxford University Press
- Bahl, R. W., & Wallich, C. I. (1995). Intergovernmental fiscal relations in the Russian federation. In R. M. Bird, R. D. Ebel and C. Wallich (Eds.), *Decentralization of the socialist state: intergovernmental finance in transition economies.* Washington D.C.: World Bank.
- Bajo, A., & Bronić, M. (2007). Assessments of the Effectiveness of the Croatian Fiscal Equalisation model. *Financial Theory and Practice*, 31(1), 1-26.
- Balás, G., & Hegedüs, J. (2004). Local Government Borrowing in Hungary. In P. Swianiewicz (Ed.), *Local Government Borrowing: Risks and Rewards.* Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Balassone, F., & Franco, D. (2000). Assessing fiscal sustainability: a review of methods with a view to EMU. In Banca d'Italia (Ed.), *Fiscal Sustainability.* Rome: Bank of Italy.
- Balassone, F., Franco, D., & Zotteri, S. (2002). *Fiscal rules for sub-national governments in the EMU context.* Paper presented at the Conference "Rules-Based Macroeconomic Policies in Emerging Market Economies" jointly organised by the IMF and the World Bank, Oaxaca, Mexico, February 14-16, 2002.
- Bardhan, P., & Mookherjee, D. (1998). Expenditure decentralization and the delivery of public services in developing countries. *Boston University-Institute for Economic Development.*
- Baskaran, T. (2009). On the link between fiscal decentralization and public debt in OECD countries. *Public Choice*, 145(3-4), 351-378.
- Bayramov, G. I. (2006). Problems of Fiscal Equalization and Decentralization of Local Governments in Azerbaijan. In G. Péteri (Ed.), *Fiscal Equalization in South Eastern*

- Europe*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Beksta, A., & Petkeviciu, A. (2000). Local Government in Lithuania. In T. M. Horváth (Ed.), *Decentralization: Experiments and Reforms*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Berggren, H., & Tingvall, L. (2005). Local Government Financial Equalisation in Sweden. *Eskilstuna: Ministry of Finance and Swedish Association of Local Authorities and Regions*.
- Bevilaqua, A. S. (2002). State government bailouts in Brazil. *Inter-American Development Bank, Research Network Working Paper #R-441*.
- Bird, R. M., Martinez-Vazquez, J., & Torgler, B. (2005). Societal Institutions and Tax Effort in Developing Countries. In J. Alm and J. Martinez-Vazquez (Eds.), *The Challenges of Tax Reform in the Global Economy* (pp. 283–338): Springer-Verlag.
- Bird, R. M., & Tassonyi, A. T. (2001). Constraints on provincial and municipal borrowing in Canada: markets, rules, and norms. *Canadian Public Administration*, 44(1), 84-109.
- Blanchard, O., & Shleifer, A. (2001). Federalism with and without political centralization: China versus Russia. *IMF staff papers*, 171-179.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics*, 87(1), 115-143.
- Boex, J., & Martinez-Vazquez, J. (2007). Designing intergovernmental Equalization transfers with imperfect data: Concepts, practices, and lessons. In J. Martinez-Vazquez and B. Searle (Eds.), *Fiscal Equalization, Challenges in the Design of Intergovernmental Transfers* (pp. 291-343). New York: Springer.
- Boex, J., Martinez-Vazquez, J., & Schaeffer, M. (2005). Country Report: An Assessment of Fiscal Decentralization Reform in Georgia. *Fiscal Decentralization in Transition, Economies: Case Studies from the Balkans and Caucasus*.
- Boex, J., Martinez-Vazquez, J., & Timofeev, A. (2005). Country Report: An Assessment of Fiscal Decentralization Reform in Armenia. *Fiscal Decentralization in Transition, Economies: Case Studies from the Balkans and Caucasus*.
- Borge, L. E. (2009). *Block Grants and Earmarked Grants: The Norwegian Experience*. Paper presented at the Copenhagen Workshop on Intergovernmental Grants September 17-18, 2009.

- Braun, M. (2006). *The Political Economy of Debt in Argentina, or Why History Repeats Itself*. Paper presented at the World Bank Conference on Sovereign Debt and Development: Market Access Countries, Washington D.C., October 12-13, 2006.
- Braun, M., & Tommasi, M. (2002). *Fiscal Rules for Subnational Governments: Some Organizing Principles and Latin American Experiences*. Paper presented at the the IMF/World Bank Conference "Rules-Based Fiscal Policy in Emerging Market Economies", Oaxaca, Mexico, February 14 – 16.
- Brennan, G., & Buchanan, J. (1980). *The Power to Tax: Analytical Foundations of a Fiscal Constitution*. Cambridge: Cambridge University Press.
- Brownlow, G. A. (2004). Fiscal decentralization in Ireland. *Institute for Research in Economic and Fiscal Issues*.
- Bryson, P. J. (2008). "State administration" vs. self-government in the Slovak and Czech Republics. *Communist and Post-Communist Studies*, 41(3), 339-358.
- Burnside, C. (2005). Some Tools for Fiscal Sustainability Analysis. In C. Burnside (Ed.), *Fiscal Sustainability Analysis: A Handbook*. Washington D.C.: The World Bank.
- Cabasés, F., Pascual, P., & Vallés, J. (2007). The effectiveness of institutional borrowing restrictions: Empirical evidence from Spanish municipalities. *Public Choice*, 131(3), 293-313.
- Castellani, F., & Debrun, X. (2001). Central bank independence and the design of fiscal institutions. *IMF Working Paper*, WP/01/205.
- CEU. (2004). *Setting regulatory framework for municipal borrowing and debt in Ukraine*: Institute for Economic Research and Policy Consulting.
- Chan, Y. S., & Kanatas, G. (1985). Asymmetric valuations and the role of collateral in loan agreements. *Journal of Money, Credit and Banking*, 17(1), 84-95.
- Chaparro, J. C., Smart, M., & Zapata, J. G. (2005). Intergovernmental transfers and municipal finance in Colombia. *ITP Paper 0403*.
- Chelliah, R. J. (1971). Trends in taxation in developing countries. *IMF staff papers*, 18(2), 254-325.
- Claeys, P., Ramos, R., & Suriñach, J. (2008). Fiscal sustainability across government tiers. *International Economics and Economic Policy*, 5(1), 139-163.
- Clingermayer, J. C., & Wood, B. D. (1995). Disentangling patterns of state debt financing. *American Political Science Review*, 89(1), 108-120.

- Cluff, G., & Farnham, P. (1984). Standard and Poor's vs. Moody's: which city characteristics influence municipal bond ratings? *Quarterly Review of Economics and Business*, 24(3), 72-94.
- Conway, F., Cooley, S., Mark, K., & Polen, S. (2007). *Local Government and Decentralization in Albania - Completion Report, July 2004 to July 2007*. Washington D.C.: The Urban Institute.
- Conyers, D. (1990). Centralization and development planning: a comparative perspective. In P. DeValk and K. Wekwete (Eds.), *Decentralizing for participatory planning?* Aldershot: Avebury.
- Council of Europe. (1995). *European Charter of Local Self-Government*.
- Council of Europe. (1996a). *Structure and Operation of Local and Regional Democracy: Bulgaria*.
- Council of Europe. (1996b). *Structure and Operation of Local and Regional Democracy: Sweden*.
- Council of Europe. (1997a). *Structure and Operation of Local and Regional Democracy: Belgium*.
- Council of Europe. (1997b). *Structure and Operation of Local and Regional Democracy: Finland*.
- Council of Europe. (1997c). *Structure and Operation of Local and Regional Democracy: France*.
- Council of Europe. (1997d). *Structure and Operation of Local and Regional Democracy: Norway*.
- Council of Europe. (1998). *Structure and Operation of Local and Regional Democracy: Ireland*.
- Council of Europe. (1999a). *Structure and Operation of Local and Regional Democracy: Austria*.
- Council of Europe. (1999b). *Structure and Operation of Local and Regional Democracy: United Kingdom*.
- Council of Europe. (2000). *Structure and Operation of Local and Regional Democracy: Greece*.
- Council of Europe. (2006a). *Structure and Operation of Local and Regional Democracy: Belgium*.
- Council of Europe. (2006b). *Structure and Operation of Local and Regional Democracy: Iceland*.

- Council of Europe. (2006c). *Structure and Operation of Local and Regional Democracy: Latvia*.
- Council of Europe. (2006d). *Structure and Operation of Local and Regional Democracy: Lithuania*.
- Council of Europe. (2006e). *Structure and Operation of Local and Regional Democracy: Portugal*.
- Council of Europe. (2008a). *Structure and Operation of Local and Regional Democracy: Denmark*.
- Council of Europe. (2008b). *Structure and Operation of Local and Regional Democracy: Italy*.
- Council of Europe. (2008c). *Structure and Operation of Local and Regional Democracy: Netherlands*.
- Council of Europe. (2009). *Structure and Operation of Local and Regional Democracy: Finland*.
- Craig, J. (1997). Australia. In T. Ter-Minassian (Ed.), *Fiscal Federalism in Theory and Practice*. Washington, D.C.: International Monetary Fund.
- Dabla-Norris, E. (2005). Issues in Intergovernmental Fiscal Relations in China. *IMF Working Paper WP/05/30*.
- Dabla-Norris, E. (2006). The challenge of fiscal decentralisation in transition countries. *Comparative Economic Studies*, 48(1), 100-131.
- Dafflon, B. (1999). *Fiscal Federalism in Switzerland: a survey of constitutional issues, budget responsibility and equalisation*. Paper presented at the Workshop “Federalism and Development”, The Swiss Agency for Development and Co-operation and the World Bank Institute, Berne, 8 – 9 December 1999.
- Dafflon, B. (2002a). Capital Expenditure and Financing in the Communes in Switzerland. In B. Dafflon (Ed.), *Local public finance in Europe: Balancing the budget and controlling debt*. Cheltenham-Northampton: Edward Elgar Publishing.
- Dafflon, B. (2002b). The Theory of Sub-national Balanced Budget and Debt Control. In B. Dafflon (Ed.), *Local public finance in Europe: Balancing the budget and controlling debt*. Cheltenham-Northampton: Edward Elgar Publishing.
- De Mello, L. R. (2000). Fiscal decentralization and intergovernmental fiscal relations: A cross-country analysis. *World Development*, 28(2), 365-380.
- De Mello, L. R. (2001). Fiscal decentralization and borrowing costs: the case of local governments. *Public Finance Review*, 29(2), 108.

- De Mello, L. R. (2004). Can fiscal decentralization strengthen social capital? *Public Finance Review*, 32(1), 4.
- Debrun, X., & Kumar, M. S. (2007). The Discipline-Enhancing Role of Fiscal Institutions: Theory and Empirical Evidence. *IMF Working Paper WP/07/171*.
- Debrun, X., Moulin, L., Turrini, A., Ayuso i Casals, J., & Kumar, M. S. (2008). Tied to the mast? National fiscal rules in the European Union. *Economic Policy*, 23(54), 297-362.
- Derycke, P. H., & Gilbert, G. (1985). The public debt of French local government. *Journal of Public Policy*, 5(03), 387-399.
- Diamond, D. W. (1989). Reputation acquisition in debt markets. *The Journal of Political Economy*, 97(4), 828-862.
- Dillinger, W. (2002). Brazil: Issues in Fiscal Federalism. *World Bank Report*, 22523.
- Dillinger, W. (2003). Regulations and Markets: Brazil's Efforts to Control Subnational Borrowing. USAID.
- Dillinger, W., & Webb, S. B. (1999). Fiscal management in federal democracies: Argentina and Brazil. *World Bank Policy Research Working Paper No. 2121*.
- Dufrénot, G., Frouté, P., & Schalck, C. (2010). The French Regions' Borrowing Behaviours. How heterogeneous are they? *Banque de France Document de Travail No. 289*.
- Echavarría, J. J., Rentería, C., & Steiner, R. (2000). Decentralization and bailouts in Colombia. *Inter-American Development Bank, Research Network Working Paper #R-442*.
- English, W. B. (1996). Understanding the costs of sovereign default: American state debts in the 1840's. *American Economic Review*, 86(1), 259-275.
- Fabozzi, F. J., Fabozzi, T. D., & Feldstein, S. G. (1995). *Municipal bond portfolio management*. Burr Ridge, IL: Irwin Professional Pub.
- Fatás, A., & Mihov, I. (2003). The Case for Restricting Fiscal Policy Discretion. *Quarterly Journal of Economics*, 118(4), 1419-1447.
- Fatás, A., & Mihov, I. (2006). The macroeconomic effects of fiscal rules in the US states. *Journal of Public Economics*, 90(1-2), 101-117.
- Fenge, R., & Meier, V. (2002). Why cities should not be subsidized. *Journal of urban Economics*, 52(3), 433-447.
- Fölscher, A. (2007). Local Fiscal Discipline: Fiscal Prudence, Transparency, and Accountability. In A. Shah (Ed.), *Local Budgeting*. Washington D.C.: The World Bank.



- Fornasari, F., Webb, S. B., & Zou, H.-F. (2000). The macroeconomic impact of decentralized spending and deficits: International evidence. *Annals of Economics and Finance*, 1(2), 403-433.
- Freire, M., & Petersen, J. E. (2004). *Subnational capital markets in developing countries: from theory to practice*. Washington D.C. / New York: The World Bank and Oxford University Press.
- Freitag, M., & Vatter, A. (2008). Decentralization and fiscal discipline in sub-national governments: evidence from the Swiss federal system. *Publius: The Journal of Federalism*, 38(2), 272.
- Fukasaku, K., & De Mello, L. R. (1998). Fiscal Decentralization and Macroeconomic Stability: The Experience of Large Developing and Transition Economies. In K. Fukasaku and R. Hausmann (Eds.), *Democracy, Decentralization and Deficits in Latin America*. Paris: OECD.
- Ghinea, A., Călușeru, G., Nicola, I., & Stretean, S. (2004). Bond Issues and Bank Loans - New Mechanisms to Support Local Development in Romania. In P. Swianiewicz (Ed.), *Local Government Borrowing: Risks and Rewards*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Giugale, M., Trillo, F. H., & Oliveira, J. C. (2000). Sub-national borrowing and debt management. In M. Giugale and S. B. Webb (Eds.), *Achievements and Challenges of Fiscal Decentralization: Lessons from Mexico*. Washington, D.C.: The World Bank.
- Glasser, M., Cochran, T. H., DeAngelis, M., Hesketh, M., Johnson, R. W., Kapp, C. J., et al. (1998). *Formulation of a Regulatory Framework for Municipal Borrowing in South Africa*: World Bank.
- Glasser, M., & Jokay, C. (2000). Advisory Note on Regulatory Framework and Institutional Issues: Municipal Borrowing in Bosnia and Herzegovina. *Local Development Pilot Project Bosnia and Herzegovina*.
- Goldstein, M. (2003). Debt sustainability, Brazil, and the IMF. *Institute for International Economics WP 03-1*.
- Goodspeed, T. J. (2002). Bailouts in a Federation. *International Tax and Public Finance*, 9(4), 409-421.
- Hall, L. J., Arce, G. E., & Monge-Naranjo, A. (2002). Bailouts in Costa Rica as a result of government centralization and discretionary transfers. *Inter-American Development Bank, Research Network Working Paper #R-475*.

- Haug, P. (2004). *Decreasing Population and Rising Costs of Providing Water and Sewage Treatment within Cities: A Case Study*. Paper presented at the ERSA Conference, Vienna, Austria.
- Hausker, A. J. (1991). *Fundamentals of public credit analysis*. Greenwich, CT: JAI Press, Inc.
- Hawkesworth, I., Bergvall, D., Emery, R., & Wehner, J. (2008). Budgeting in Greece. *OECD journal on budgeting*, 8(3), 70-119.
- Hayek, F. A. (1945). The use of knowledge in society. *The American Economic Review*, 35(4), 519-530.
- Hepp, R., & Von Hagen, J. (2009). Fiscal federalism in Germany: stabilization and redistribution before and after unification. *Centre for Economic Policy Research Discussion Paper No. DP7246*
- Heredia-Ortíz, E., & Rider, M. (2005). India's Intergovernmental Transfer System and the Fiscal Condition of the States. *Andrew Young School of Policy Studies, Research Paper Series, Department of Economics, International Studies Program, Working Paper 06, 47*.
- Hernández-Trillo, F., Cayeros, A. D., & González, R. G. (2002). Fiscal decentralization in Mexico: the bailout problem. *Inter-American Development Bank, Research Network Working Paper #R-447*.
- Hernández-Trillo, F., & Jarillo-Rabling, B. (2008). Is Local Beautiful? Fiscal Decentralization in Mexico. *World Development*, 36(9), 1547-1558.
- Hillman, A. L. (2009). *Public finance and public policy: responsibilities and limitations of government* (2 ed.): Cambridge University Press.
- Hines Jr, J. R., & Thaler, R. H. (1995). Anomalies: The flypaper effect. *Journal of Economic Perspectives*, 9(4), 217-226.
- Holtz-Eakin, D., Newey, W., & Rosen, H. (1988). Estimating vector autoregressions with panel data. *Econometrica: Journal of the Econometric Society*, 56(6), 1371-1395.
- Hunter, J., & Shah, A. (1996). A simple measure of good governance and its application to the debate on the appropriate level of fiscal decentralization. *World Bank Working Paper*.
- IMF. (2001). *Manual on Fiscal Transparency*. Washington D.C.: International Monetary Fund.
- IMF. (2005). Indonesia: Selected Issues. *IMF Country Report No. 05/327*.
- IMF. (2006a). *Article IV Consultation with Argentina, Public Information Notice No. 06/93*.
- IMF. (2006b). Switzerland: Selected Issues. *IMF Country Report No. 06/203*.

- IMF. (2008). Austria: Selected Issues. *IMF Country Report No. 08/189*.
- IMF. (2009). *Article IV Consultation with Brazil, Public Information Notice No. 09/92*.
- IMF. (2010). *Iceland: Letter of Intent, Memorandum of Economic and Financial Policies, and Technical Memorandum of Understanding*.
- Jaansoo, A., Sulev Liivik, Jõgi, A., & Milt, T. (2004). Local Government Borrowing: Regulations and Practices in Estonia. In P. Swianiewicz (Ed.), *Local Government Borrowing: Risks and Rewards*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Jackson, B. (2007). *Obtaining a municipal credit rating: a brief overview*. Paper presented at the Commonwealth Local Government Forum, Auckland, New Zealand, 26–29 March.
- Jametti, M., & Joanis, M. (2010). Determinants of fiscal decentralization: political economy aspects. *Documents de treball IEB(7)*, 1.
- Jensen, M. C. & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4): 305–360.
- Ježek, V., Marková, H., & Váňa, L. (2004). Local Government Borrowing in the Deregulated Market of the Czech Republic. In P. Swianiewicz (Ed.), *Local Government Borrowing: Risks and Rewards*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Jokay, C. (2006). Municipal Borrowing – Best and Worst Practices from a Regulatory Perspective. IGE Consulting.
- Jorgen, N., & Pedersen, M. (2002). Local Government and Debt Financing in Denmark. In B. Dafflon (Ed.), *Local public finance in Europe: Balancing the budget and controlling debt*. Cheltenham-Northampton: Edward Elgar Publishing.
- Joumard, I., & Kongsrud, P. M. (2003). Fiscal relations across government levels. *OECD Economic Studies*, 1(36).
- Kau, J. B., & Rubin, P. H. (1981). The size of government. *Public Choice*, 37(2), 261-274.
- Kennedy, S., & Robbins, J. (2003). The role of fiscal rules in determining fiscal performance. *Department of Finance Canada*.
- Kenyon, D. (1991). Effects of Federal Volume Caps on State and Local Borrowing. *National Tax Journal*, 44(4), 81-92.
- King, D. N. (1984). *Fiscal Tiers: The economics of multi-level government*: Allen and Unwin Pty.

- Kling, J., & Nižňanský, V. (2004). From Deregulation to Regulation and Stabilization in Slovakia. In P. Swianiewicz (Ed.), *Local Government Borrowing: Risks and Rewards*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Kobasa, M., Karamyshev, A., & Dritz, V. (2001). Local Government in Belarus. In I. Munteanu and V. Popa (Eds.), *Developing New Rules in the Old Environment*. Budapest, Hungary: Local Government and Public Service Reform Initiative: Open Society Institute.
- Kook, J. H. (2001). Intergovernmental Transfers and Regional Economic Policy in Korea. *Yokohama City University*.
- Kopańska, A. (2009). Factors influencing local government debt policy in Poland in 1999-2009. *Department of Banking and Finance, Faculty of Economics, Warsaw University, Poland*.
- Kopańska, A., & Levitas, T. (2004). The Regulation and Development of the Subsovereign Debt Market in Poland: 1993–2002. In P. Swianiewicz (Ed.), *Local Government Borrowing: Risks and Rewards*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Koutsogeorgopoulou, V. (2007). Fiscal relations across levels of government in Australia. *OECD Economics Department Working Papers No. 541*.
- Kreps, D. M. (1990). *A course in microeconomic theory*. Princeton, NJ: Princeton University Press.
- Krivorotko, Y. (2006). *Local Governments and the financial markets: problems and prospects of interaction in Belarus*. Paper presented at the 14-th NISPAcee Annual Conference “Public Administration and Public Policy in Emerging Europe and Eurasia: For Professionalism, Impartiality and Transparency, Ljubljana, Slovenia, May 11-13, 2006.
- Kuhn, A. (2004). *Local government revenues: increasingly dependent on Kyiv*: Institute for Economic Research and Policy Consulting.
- Laborda, J. L., Martinez-Vazquez, J., & Escudero, C. M. (2006). The Practice of Fiscal Federalism in Spain. *International Studies Program Working Paper 06-23*.
- Lane, T. D. (1993). Market discipline. *IMF Staff Papers*, 40(1), 53-88.
- Laubach, T. (2005). Fiscal Relations across Levels of Government in the United States. *OECD Economics Department Working Papers No. 462*.
- Lee, Y. (2005). Adequacy of Korea’s tax assignment: a fiscal federalism approach. *International Review of Public Administration*, 9, 139-148.

- Leigland, J. (1997). Accelerating municipal bond market development in emerging economies: an assessment of strategies and progress. *Public Budgeting and Finance*, 17(2), 57-79.
- Lenić, B. (2006). Bosnia and Herzegovina on the Path to Fiscal Equalization. In G. Péteri (Ed.), *Fiscal Equalization in South Eastern Europe*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Leschenko, N., & Troschke, M. (2006). Fiscal decentralization in centralized states: the case of Central Asia. *Osteuropa-Institut München Working Paper No. 261*.
- Letelier, S.L.E. (2010). Theory and evidence of municipal borrowing in Chile. *Public Choice*, 1-17.
- Liebig, K., Bahrinipour, M., Fuesers, L., Knödler, B., Schönhofen, C., & Stein, M. (2008). *Municipal Borrowing for Infrastructure Service Delivery in South Africa: A Critical Review*: Deutsches Institut für Entwicklungspolitik.
- Lin, D., & Wei, L. J. (1989). The robust inference for the Cox proportional hazards model. *Journal of the American Statistical Association*, 84(48), 1074-1078.
- Liu, C. H. (2007). What type of fiscal decentralization system has better performance. Doctoral Dissertation, University of Maryland, December 2007.
- Liu, L. (2008). Creating a Regulatory Framework for Managing Subnational Borrowing. In J. Lou and S. Wang (Eds.), *Public finance in China: reform and growth for a harmonious society* (pp. 171–190). Washinton D.C.: The World Bank.
- Liu, L., & Waibel, M. (2006). Subnational Borrowing Notes for Middle-Income Countries. *The World Bank*.
- Mankiw, N. G. (1987). The optimal collection of seigniorage:: Theory and evidence. *Journal of Monetary Economics*, 20(2), 327-341.
- Martell, C. R. (2000). Transformation of municipal credit systems in developing countries: evidence from Brazilian municipalities. Doctoral Dissertation, Indiana University, June 2000.
- Martell, C. R. (2008). Fiscal institutions of Brazilian municipal borrowing. *Public Administration and Development*, 28(1), 30-41.
- Martell, C. R., & Guess, G. M. (2006). Development of local government debt financing markets: application of a market-based framework. *Public Budgeting and Finance*, 26(1), 88-119.
- Martinez-Vazquez, J. (1999). The Assignment of Expenditure Responsibilities. In ADB (Ed.), *Fiscal Transition in Kazakstan*. Manila, Philippines: Asian Development Bank.

- Martinez-Vazquez, J. (2005). Making fiscal decentralization work in Vietnam. *International Studies Program Working Paper 05 -13*.
- Martinez-Vazquez, J., & Boex, J. (2001). *Russia's transition to a new federalism*: World Bank Institute.
- Martinez-Vazquez, J., & Boex, J. (2005). The design of equalization grants: theory and applications. *World Bank Institute and Andrew Young School of Public Policy, Georgia State University*.
- Martinez-Vazquez, J., & McNab, R. M. (2006). Fiscal decentralization, macrostability and growth. *Hacienda Pública Española*(4), 25-49.
- Masciandaro, D., & Tabellini, G. (1987). Monetary regimes and fiscal deficits: a comparative analysis. *Federal Reserve Bank of San Francisco*, 125-152.
- Mikayilov, E. (2007). Intergovernmental Fiscal Transfers in Azerbaijan: Role of Tax-Sharing in Local Government Financing. *Economic Research Center, Central European Initiative*.
- Mikesell, J. L. (2007). Fiscal Administration in Local Government: An Overview. In A. Shah (Ed.), *Local Budgeting*. Washington D.C.: The World Bank.
- Milinković, D. (2008). An Organized House a Strong Community - Local Self-Governance in Denmark. In Z. Zlokapa (Ed.), *Block By Block - It's good to Build Well - Models of Organization of Local Self-Governance*. Banja Luka: Enterprise Development Agency – EDA.
- Mochida, N. (2008). Subnational Borrowing in Japan: from "Implicit Guarantee" to Market Discipline and Fiscal Rule. *CIRJE Discussion Papers No. F-541*.
- Montiel, P. (2003). *Macroeconomics in emerging markets*: Cambridge University Press.
- Nam, C. W., & Parsche, R. (2001). Municipal Finance in Poland, the Slovak Republic, the Czech Republic and Hungary: Institutional Framework and Recent Development. *CESifo Working Paper No. 447*.
- Neyapti, B. (2010). Fiscal decentralization and deficits: International evidence. *European Journal of Political Economy*, 26(2), 155-166.
- Nikolov, M. (2005). Country Report: An Assessment of Fiscal Decentralization Reform in Macedonia. *Fiscal Decentralization in Transition, Economies: Case Studies from the Balkans and Caucasus*.
- Nikolov, M. (2006). Country Report: Local Government Borrowing In Romania. In M. Nikolov (Ed.), *The Future of Local Government Finance: Case studies from Romania, Bulgaria*

- and Macedonia*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Noel, M. (2000). Building Sub-national Debt Markets in Developing and Transition Countries: A Framework for Analysis, Policy Reform, and Assistance Strategy. *The World Bank Policy Research Working Paper No. 2339*.
- Oates, W. E. (1972). *Fiscal Federalism*. New York: Harcourt Brace Jovanovich
- Oates, W. E. (1993). Decentralization and Economic Development. *National Tax Journal*, XLVI(2), 237-243.
- OECD. (1999). *Taxing Powers of State and Local Government*.
- OECD. (2006). Promoting pro-poor growth: infrastructure. *DAC Guidelines and Reference Series*.
- OECD. (2007). *OECD Economic Surveys: Belgium*.
- OECD. (2008). *OECD Territorial Reviews: Portugal*.
- OECD. (2009a). *OECD Economic Surveys: Belgium*.
- OECD. (2009b). *OECD Territorial Reviews: Chile*.
- Olivera, J. H. (1967). Money Price and Fiscal Lags: a Note on Dynamics of Inflation. *Banca Nazionale del Lavoro Quarterly Review*, 258-267.
- Peterson, G. (1998). *Measuring local government credit risk and improving creditworthiness*. Washington D.C.: The World Bank
- Peterson, G. (2003). Banks or bonds? Building a municipal credit market. In Y. H. Kim (Ed.), *Local Government Finance and Bond Markets*. Manila, Philippines: ADB
- Peterson, G., & Hammam, S. (1998). *Building local credit systems*. Washington D.C.: The World Bank.
- Pettersson-Lidbom, P., & Dahlberg, M. (2005). An Empirical Approach for Estimating the Causal Effect of Soft Budget Constraints on Economic Outcomes. *Institute of Governmental Studies, University of California, Berkeley*
- Plekhanov, A., & Singh, R. (2007). How should subnational government borrowing be regulated? Some crosscountry evidence. *IMF Staff Papers*, 53(3), 426–452.
- Ploštajner, Z. (2008). Small and Smaller, What is The Smallest? - Local Self-Governance in Slovenia In Z. Zlokapa (Ed.), *Block By Block - It's good to Build Well - Models of*

- Organization of Local Self-Governance*. Banja Luka: Enterprise Development Agency – EDA.
- Polillo, S., & Guillén, M. F. (2005). Globalization pressures and the state: The global spread of central bank independence. *American Journal of Sociology*, 110(6), 1764-1802.
- Poterba, J. M. (1994). State responses to fiscal crises: The effects of budgetary institutions and politics. *Journal of Political Economy*, 102(4), 799-821.
- Poterba, J. M. (1995). Balanced budget rules and fiscal policy: Evidence from the states. *National Tax Journal*, 48, 329-329.
- Poterba, J. M., & Rueben, K. (1999). State Fiscal Institutions and the US Municipal Bond Market. In J. M. Poterba and J. v. Hagen (Eds.), *Fiscal institutions and fiscal performance*. Chicago: The University of Chicago Press.
- Poterba, J. M., & Von Hagen, J. (Eds.). (1999). *Fiscal institutions and fiscal performance*: University of Chicago Press and National Bureau of Economic Research.
- Prud'homme, R. (1995). The Dangers of Decentralization. *The World Bank Research Observer*, 10(2), 201-220.
- Purfield, C. (2004). The decentralization dilemma in India. *IMF Working Paper WP/04/32*.
- Reid, B. G. (2003). Fiscal Management and Stabilization Policy in Federal Systems: The Experience of Argentina and Mexico. In P. Boothe (Ed.), *Fiscal Relations in Federal Countries: Four Essays*. Ottawa: Forum of Federations, 2003.
- Rodden, J. (2002). The dilemma of fiscal federalism: Grants and fiscal performance around the world. *American Journal of Political Science*, 46(3), 670-687.
- Rodden, J., & Eskeland, G. S. (2003). Lessons and Conclusions. In J. Rodden, G. S. Eskeland and J. Litvack (Eds.), *Fiscal Decentralization and the Challenge of Hard Budget Constraints* (pp. 431–466). Cambridge, Massachusetts: MIT Press.
- Rodden, J., & Wibbels, E. (2002). Beyond the fiction of federalism: Macroeconomic management in multitiered systems. *World Politics*, 54(4), 494-531.
- Rodden, J., & Wibbels, E. (2010). Fiscal Decentralization and the Business Cycle: An Empirical Study of Seven Federations. *Economics and Politics*, 22(1), 37-67.
- Roodman, D. (2006). How to do xtabond2: An introduction to difference and system GMM in Stata. *Center for Global Development Working Paper Number 103*.
- Roubini, N., & Sachs, J. D. (1989). Political and economic determinants of budget deficits in the industrial democracies. *European Economic Review*, 33(5), 903-933.



- Rutters, M. (2008). *Financial decentralisation of governance of Urban policy in France, the United Kingdom and the Netherlands*. Universiteit van Twente and Westfälische Wilhelms-Universität Münster, Enschede, Netherlands.
- Samuelson, P. A. (1954). The pure theory of public expenditure. *The review of economics and statistics*, 387-389.
- Savov, E. (2006). Intergovernmental Finance and Fiscal Equalization in Bulgaria. In G. Péteri (Ed.), *Fiscal Equalization in South Eastern Europe*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Schaltegger, C. A., & Feld, L. P. (2009). Are fiscal adjustments less successful in decentralized governments? *European Journal of Political Economy*, 25(1), 115-123.
- Setnikar-Canka, S., Vljaj, S., & Klun, M. (2000). Local Government in Slovenia. In T. M. Horváth (Ed.), *Decentralization: Experiments and Reforms*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Shah, A. (1995). Intergovernmental Fiscal Relations in Canada: An Overview. In J. Roy (Ed.), *Macroeconomic Management and Fiscal Decentralization* (pp. 233-255). Washington D.C.: Economic Development Institute of the World Bank.
- Shah, A. (2005). Fiscal Decentralization and Fiscal Performance. *World Bank Policy Research Working Paper 3786*.
- Shehu, S. (2006). Intergovernmental Finance and Fiscal Equalization in Albania. In G. Péteri (Ed.), *Fiscal Equalization in South Eastern Europe*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Shergelashvili, T., & Narmania, D. (2006). Fiscal Equalization in Georgia. In G. Péteri (Ed.), *Fiscal Equalization in South Eastern Europe*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Shome, P. (2002). *India's fiscal matters*: Oxford University Press.
- Sikken, B. J., & Haan, J. (1998). Budget deficits, monetization, and centralbank independence in developing countries. *Oxford Economic Papers*, 50(3), 493.
- Spahn, P. (1999). Decentralization, Local Government Capacity and Creditworthiness: Macroeconomic Aspects. *ECSIN Working Paper No.6, The World Bank, Washington, D.C.*
- Stansel, D. (2005). Local decentralization and local economic growth: A cross-sectional examination of US metropolitan areas. *Journal of Urban Economics* 57, 55-72

- Stein, E. (1999). Fiscal Decentralization and Government Size in Latin America. *Journal of Applied Economics*, 2(2).
- Stiglitz, J. E. (2000). Capital market liberalization, economic growth, and instability. *World Development*, 28(6), 1075-1086.
- Stipanović, B. (2006). Local Government Finance System and Fiscal Equalization in the Republic of Serbia. In G. Péteri (Ed.), *Fiscal Equalization in South Eastern Europe*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Swianiewicz, P. (2004). The Theory of Local Borrowing and the West-European Experience. In P. Swianiewicz (Ed.), *Local government borrowing: risks and rewards: a report on Central and Eastern Europe*. Budapest, Hungary: DFID and Open Society Institute.
- Tanzi V. (1978). Inflation, Real Tax Revenue and the Case for Inflationary Finance. *International Monetary Fund Staff Papers*, 25, 417-451.
- Tanzi, V. (2000). *On fiscal federalism: issues to worry about*. Paper presented at the Conference on Fiscal Decentralization, International Monetary Fund, November, 2000, Washington D.C.
- Tanzi, V. (2002). Pitfalls on the road to fiscal decentralization. In E. Ahmad and V. Tanzi (Eds.), *Managing Fiscal Decentralization*. New York: Routledge.
- Ter-Minassian, T. (1997a). Decentralization and Macroeconomic Management. *IMF Working Paper WP/97/155*.
- Ter-Minassian, T. (Ed.). (1997b). *Fiscal Federalism in Theory and Practice*. Washington, D.C.: International Monetary Fund.
- Ter-Minassian, T., & Craig, J. (1997). Control of subnational government borrowing. In T. Ter-Minassian (Ed.), *Fiscal Federalism in Theory and Practice* (pp. 156-172). Washington D.C.: International Monetary Fund.
- Thakor, A. V. (1991). Game theory in finance. *Financial Management*, 20(1), 71-94.
- Thöni, E., Garbislander, S., & Haas, D.-J. (2002). Local Budgeting and Local Borrowing in Austria. In B. Dafflon (Ed.), *Local public finance in Europe: Balancing the budget and controlling debt*. Cheltenham-Northampton: Edward Elgar Publishing.
- Thornton, J., & Mati, A. (2008). Fiscal Institutions and the Relation between Central and Sub-National Government Fiscal Balances. *Public Finance Review*, 36(2), 243.

- Tumanyan, D. (2006). Fiscal Equalization in Armenia. In G. Péteri (Ed.), *Fiscal Equalization in South Eastern Europe*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Vanags, E., & Vilka, I. (2000). Local Government in Latvia. In T. M. Horváth (Ed.), *Decentralization: Experiments and Reforms*. Budapest, Hungary: Local Government and Public Service Reform Initiative – Open Society Institute.
- Vinuela, J. (2000). *Fiscal Decentralization in Spain*: International Monetary Fund.
- Von Hagen, J., Bordignon, M., Grewal, B. S., Peterson, P., Seitz, H., & Dahlberg, M. (2000). Sub-national Government Bailouts in OECD Countries: Four Case Studies. *Research Network Working Paper R-399*.
- Von Hagen, J., and Eichengreen, B. (1996). Federalism, fiscal restraints, and European monetary union. *American Economic Review*, 86(2), 134-138.
- Waisanen, B. (2008). State Tax and Expenditure Limits. *The National Conference of State Legislatures*.
- Wasylenko, M. (1987). Fiscal decentralization and economic development. *Public Budgeting and Finance*, 7(4), 57-71.
- Watts, P. A. (2002). Local Government Capital Expenditure in England. In B. Dafflon (Ed.), *Local public finance in Europe: Balancing the budget and controlling debt*. Cheltenham-Northampton: Edward Elgar Publishing.
- Webb, S. B. (2002). The Australian Loan Council. *Research Note No. 43, Department of the Parliamentary Library, Parliament of Australia*.
- Webb, S. B. (2004). Fiscal responsibility laws for subnational discipline: the Latin American experience. *The World Bank Policy Research Working Paper No. 3309*.
- Webb, S. B., & Dillinger, W. (1999). Fiscal Management in Federal Democracies: Argentina and Brazil. *World Bank Research Working Papers*, 1(1), 1-38.
- Wehner, J., Kraan, D. J., & Richter, K. (2008). Budgeting in Estonia. *OECD journal on budgeting*, 8(2), 87-126.
- Wildasin, D. E. (1997). Externalities and bailouts: Hard and soft budget constraints in intergovernmental fiscal relations. *World Bank Policy Research Working Paper No. 1843*.
- World Bank. (1994). *World Development Report 1994, Infrastructure for Development*. Washington D.C.: World Bank.

World Bank. (2004). El Salvador - Public Expenditure Review. *Report No. 32856-SV*.

World Bank. (2010a). *El Salvador, Project Information Document, Report No. AB5517, Local Government Strengthening Project*

World Bank. (2010b). Public Expenditure Trends and Fiscal Sustainability. *Afghanistan Public Expenditure Review 2010*.