Financial pressures from indebtedness of Mexican states: Potential risks for the Mexican economy[†]

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1. Introduction

Sub-national fiscal and financial operations are common in decentralized countries and they are justified in efficiency grounds. However, fiscal deficit and debt of lower levels of government could represent important risks to national macroeconomic policy. High levels of local expenditure and debt may put pressure on aggregate demand, inflation, interest rates, sovereign risk, and, in extreme cases, could also represent a source of systemic risk to the financial system. The prevalence of these strains may decrease the ability of the federal government to elaborate precise economic projections and, in general, to implement its fiscal policy. For this reason, countries need to have institutional mechanisms to control and monitor the evolution of sub-national governments' financial positions. Moreover, timely, standardized, and reliable disclosure of data about the financial obligations of local and state governments is crucial to assess whether they represent a risk to macroeconomic stability and would permit voters, involved institutions, and the market to give an adequate and opportune response to such risks.

To discuss these issues, we present a study case based on Mexican sub-national governments (SNGs), i.e. states and municipalities. Although the level of sub-national debt is still low, in the last fifteen years, SNGs in Mexico have increased their expenditure and debt, especially since the end of 2008 (the amount of debt increased from 1.6% of GDP in 2008 to 2.5% in 2010). In order to explain this trend, we explain the most recent and important modifications to: a) the Law of Fiscal Coordination (LCF, for its acronym in Spanish) which set up the rules under which the revenue-sharing system works in Mexico, and b) the credit laws that set up the conditions under which credit institutions can lend to SNGs. In general, these changes increased the number of financing options for SNGs and improved their borrowing conditions. This could be explaining the recent upward trend observed in sub-national debt.

By means of a frequently used in the literature debt sustainability indicator (IMF (2002) and Burnside (2005)) that permits to identify potential financial problems of SNGs, we describe the evolution of the financial obligations of sub-national governments and evaluate whether they will be sustainable in the following years. Our analysis shows that debt is sustainable for most of the states, but raises a warning signal for at least 4 out of the 30 states analyzed, which have accelerated the accumulation of outstanding debt in the last two years. Although currently this situation could not be risky for macroeconomic stability, it could raise concerns in the near future. The paper concludes highlighting the need for reliable data, as many states do not report all its debt items neither to regulator authorities nor to its citizens. We also emphasize the need to create and track indicators or statistics in a timely and standardized manner to capture the real evolution of sub-national financial obligations that permit a correct diagnosis of the financial position of SNGs.

The present work is divided in 4 sections besides the introduction. In the next section, we discuss the economic risks associated to unrestrained SNGs' debt and the existing mechanisms to control it. The third section describes the institutional framework of SNGs' borrowing in Mexico and its main changes in the last decade. Following, we describe the methodology used in this paper and explain the main results when applied to Mexican SNGs. We conclude discussing the main challenges that Mexico faces regarding regulation and disclosure of information related to SNGs' debt and further research agenda.

2. Sub-national debt: Risks and control

In this section, we will discuss why SNGs´ debt and expenditure are variables that policy makers and economic agents should monitor permanently. First, we discuss possible economic consequences and risks of unchecked SNGs public finances. And then we explain the available instruments that countries could use to limit SNGs debt.

Even though SNGs are not directly responsible of macroeconomic stability, higher decentralization of

expenditure, revenue and debt may, in fact, hinder the attainment of macroeconomic policy objectives.[1] This is because SNGs may not have the incentives to implement such policies and they may diminish the capability of the federal government to achieve macroeconomic objectives through fiscal policy. For instance, because of political reasons, SNGs may increase taxes right after elections and increase expenditures before elections regardless of the timing of the business cycle or federal macroeconomic policies.[2]

When decentralization leads to SNGs having many expenditure responsibilities and if they face growing citizens' public goods demand, it is natural that SNGs require issuing debt in order to meet their obligations and population needs. However sub-national debt requires certain conditions for being sustainable and for not posing macroeconomic risks. Variables such as costs of borrowing, level of interest rates, use of loans, social and economic returns of the investments, guarantees of loans, terms and maturity of credit are key in order to assess the viability of SNGs debt.

Furthermore, it is important to discuss the potential risks implied by allowing SNGs to increase expenditure (regardless of how it is financed, whether through taxes or debt). First, SNGs debt and spending may generate pressures on macroeconomic variables, such as aggregate demand (through investment, transfers and current expenditure which may be used to increase wages) or the balance of payments (Ter Minassian, 1999), which may have an effect on inflation and the exchange rate. Moreover, if public expenditure is financed through debt held by the private sector, the demand for financial funds increases, pushing interest rates upward. Even more, lending to SNGs may reduce the availability of resources to be borrowed by the private sector. This raises important efficiency concerns, particularly if returns of private investments are higher than the social return of public expenditure financed through debt. This is more likely to happen if states spend borrowed resources in ill conceived projects, current expenditure, or if there is no accountability and transparency on how they spend such resources. Even in that case, private lenders may prefer to lend to public entities than private agents if they perceive that local lending is guaranteed by public funds or there is a bailout program (implicit or not) from the federal government.

The lack of institutions (or inability of existing ones) to ensure the sustainability of sub-national debt poses a serious risk for macroeconomic stability as this "depends on the overall aggregate exposure to risk and a critical element of the latter is the borrowing of all the component jurisdictions" (Ahmad, *et al.* (2006) pp. 413 and 414). Default risks increase the risk premium that the country faces, increasing the cost of funding for national and SNGs as well as the private sector and diminishing the effectiveness of monetary policy. Moreover, if SNGs debt is high, the financial system may potentially face a systemic risk if an important share of its assets is concentrated on SNGs debt. Under this scenario, SNGs default could cause a financial crisis if states suspend debt payments, making difficult to the lender bank to fulfill their obligations with other clients or banks. Finally, bailouts from the federal government may endanger its own fiscal position and encumber its attempts to achieve macroeconomic stability.

If bailout is the expected outcome in the event of SNGs default, an incentive to over-borrow exists as default costs can be absorbed by the whole country.[3] Furthermore, an expected federal rescue plan could increase lending to SNGs regardless of the quality of the borrower's projects. From the point of view of the federal government (Bevilaqua (2002)), it may rescue states from financial troubles if any of the following holds: i) it cares about the states' population welfare; ii) there are political benefits; iii) there is a risk of negative externalities for the rest of the country (e.g. systemic risk, high interest rates); or, iv) it cannot stand against political pressure from powerful local governments.

Given the risks associated to SNGs borrowing mentioned above, there exists a consensus in the need to

[1] It is important to balance the economic effects of fiscal decentralization because literature has also pointed out important gains, in particular, in efficiency as SNGs should identify better public goods demand of tax payers.

[2] As an example of this situation, in the eighties and nineties sub-national governments in Argentina and Brazil incurred in high deficits in times when the federal governments were trying to implement adjustment plans to reduce macroeconomic instability (See Proud'homme (2006) and Bevilaqua (2002)).

[3] In addition, even in the absence of federal bailout, it is important to consider that the costs of debt contracted today, it will perhaps be paid later by future generations, which introduces the topic of intergenerational fairness to the debate.

control and limit the capacity of indebtedness of lower tiers of government. In this sense, Ter-Minassian and Craig (1997) (see also Ahmad, *et al.* (2006)) propose a typology of four different ways to control sub-national debt issuance. The main objectives of local debt limitations are "to preserve macroeconomic stability and safe guard local public finances" (Ahmad *et al*. (2006) p. 414); avoid federal bailouts and avoid the common pool problem.[4] The first control is market discipline, which is supposed to increase the costs of borrowing and deny access to financing to SNGs with problems to repay their debt. In order to be effective in restraining SNGs borrowing, there are certain requirements that need to be satisfied. First, markets need to be free and open in such way that there is no regulation (reserve or portfolio composition requirements) on financial intermediaries that privilege lending to the governments. Second, lenders and economic agents must have adequate information on the amount of outstanding debt and repayment capability of the states.[5] Third, lenders should not perceive that bailout is possible. Finally, borrowers need institutional capacity to respond to market signals before reaching the point of exclusion from new borrowing.

Given that the market mechanism has proved to not work properly, many countries use other debt controls. The first of these checks is cooperation between local and federal governments to set the limits to sub-national debt. The second and most widespread check is rules-based controls. In this case, sub-national debt is controlled through the imposition of fiscal rules embodied in laws or the Constitution. As these rules are a constraint on the fiscal behavior of the different tiers of government, they represent a device to increase credibility on the macroeconomic objectives as they guarantee that fundamentals are predictable. In order to have rules that work properly, they need to be well designed, enforceable and not negotiable. Rules may be applied to a variety of variables such as: limits on debt; deficit targets; expenditure and; debt repayment capability. In addition, laws can limit debt to certain uses (golden rule) such as infrastructure and prohibition of borrowing from specific sources (such as state banks or central banks). Important advantages of rules-based controls are their ability to provide transparency and evenhandedness, as well as to avoid uncertainty regarding the bargaining process between central and local authorities, which may be influenced by short term objectives rather than macroeconomic stability. The key point of rules is to have the ability to measure and monitor the debt generation and other liabilities. Conditions to have successful rules are (Ter-Minassian and Craig (1997) and Ahmad, *et al.* (2006)): i) clear and uniform accounting standards for government entities; ii) elimination or reduction of off-budget operations; iii) comprehensive definitions of debt; iv) information systems that provide timely and reliable data on all phases of expenditure; and, v) reducing governmental ownership of firms.

Last check refers to administrative controls pertain to the ability of the federal government of directly managing, to some extent, SNGs financing. The forms of these controls are: i) annual limits on the overall debt of individual jurisdictions; ii) review and authorization of individual borrowing operations; and iii) centralization of all public financing, with on-lending to state and local governments for specific purposes. These controls not only include the authorization of loans, but also its monitoring.

Among the arguments in favor of central control, we find that, first, debt policy is linked to other macroeconomic objectives (e.g. monetary and exchange rate policies, foreign reserves accumulation) that

[4] This happens when a project is financed through a common pool of taxes but benefits mostly a jurisdiction, so this jurisdiction ends up paying a small fraction of its cost. "This lack of full internalization of the costs of the project will result in excessive spending and create a clear incentive for the regions to compete for federal transfers that enable them to finance region-specific projects out of a common pool. Ideally, regions would compete on the basis of the quality of their proposed spending projects. Alternatively, they could signal that they are in particular need of federal assistance by running large budget deficits or accumulating unsustainable debts, and hope that the central government grants will eventually bail them out"(Ahmad, *et al.* (2006), p.415). So, "if regional authorities under collect taxes, over spend or default on the debt, they expect the federal government to cover the financing gap" (*Ibid*) In addition, lenders anticipate bailouts and they view their investments protected by the federal government and they don't have incentives to screen the risks implied by lending to states.

[5] If the quality of information on debt obligations, current and expected expenditures, and revenues is poor, adequate monitoring and assessment of the financial position of the states is particularly difficult, situation which may be used by local politicians to borrow even more.

should be implemented nationally by the central government. In second place, better coordination when borrowing in foreign markets may represent better terms of financing than a fragmented approach. Third, a downgrade in debt rating for an individual state may have contagion on other states' ratings. Last, lenders may require guarantees from the federal government to charge lower interest rates to individual jurisdictions or, even to lend them. Under the approach of administrative controls, SNGs will have access to borrowing and it will have access to lower interest rates. On the other hand, among the arguments against central control we find that it may create the wrong incentives deriving in moral hazard problems. Since the central government guarantees local loans, the probability of a bailout in case of local default increases. Central discretion may also reduce efficiency of loans because SNGs have better information than the central government regarding where resources are more productive. Finally, financial decisions could be taken at discretion of central government, with political criterion rather than efficiency and economic considerations.

Many countries have established rules-based control of SNGs debt in order to prevent unbalances in the overall public fiscal position. A very successful case was Brazil with the approval of the Responsibility Fiscal Law in 2000. This law was a response to three federal bailouts of state governments' debt in the eighties and nineties, in which the fiscal position of the states contributed to one of the most severe macroeconomic crisis in Brazilian history. The law established ceilings on personal spending and debt, established a golden rule according to which the net borrowing cannot surpass capital spending, mechanisms to ensure the prohibition of federal bailout were implemented; "increased the role given to the judiciary and the penal system in the enforcement of certain of its provisions, mandating prison sentences for illegal efforts to issue bonds and stipulating the dismissal of a mayor or governor if debt limits of personnel expenditure ratios are exceeded" (Ahmad, *et al.* (2006) p. 410); among other measures. The next section will discuss the institutional evolution of Mexico in terms of SNGs indebtedness in the last decade in order to discuss their risks in the future.

3. Some aspects of Mexican federalism: actual situation

3.1. Sub-national government sources of income

Mexico is a federal republic made up of three levels of government: the federal or central government, 32 state governments, and more than 2500 municipalities. In 1995 the country started a significant decentralization process. In particular, the number of shared responsibilities, i.e. those financed by the federal government but provided by SNGs, included areas such as education, health, social development, among others (see Hernández, Díaz and Gamboa (2007)). There are three main sources of income for SNGs: a) own income sources, b) federal transfers, and c) financing. These three sources are interrelated as financing depends on which sources of income SNGs rely on to guarantee the repayment of the loans they contract.

i. SNGs own income sources

In Mexico, there are two main types of own income sources: taxes and fees. The most important taxes for state governments are on wages, on lodging, on personal property transfers, and on vehicle ownership. The tax with the broadest tax base is on payroll. However, most of the states rely heavily on federal transfers because their own income resources represent a small fraction of their total revenues (around 10% as of 2008[6]). In the case of municipalities, the most important tax, in terms of the amount they collect, is the property tax. Another important source of income for local governments is service provision fees, such as the water service provision fee. However, municipal tax and fee collection efforts are very low: using data from 2008 they only account for 23% of their total revenues.

Even though the levels of own income sources are low compared to federal transfers, they constitute a somewhat stable stream of income and have been used as collateral and payment source in some states.

ii. Federal transfers to SNGs

Through the National System of Fiscal Coordination (SNCF, for its acronym in Spanish), created in 1980, states and municipalities voluntarily gave up their right to levy taxes such as value-added tax,

[6] We used data from 2008 for many of the calculations in section3 since more recent data is not yet publicly available.

corporate tax or personal income tax in their jurisdictions. In turn, the federal government is responsible for collecting revenues from these main taxes and to redistribute the revenues tax collection among SNGs. In other words, the SNCF is a revenue-sharing system. According to this system, the amount of resources transferred to the states depends on the size of the federal-sharing collection fund (RFP, for its acronym in Spanish) composed by all federal fiscal collection revenues, oil and mining extraction fees less some deductions and exclusions (see Hernández, Díaz and Gamboa (2007)).[7]

As of 2008, the federal transfers that SNGs received were equivalent to 73% of the RFP and represented around 87% of their total revenues. These transfers are divided into: general revenue-sharing fund or *participaciones* (Branch 28), incentives, decentralization agreements, and contribution funds or *aportaciones* (Branch 33).

Table 1 Own income and federal transfers to sub-national governments in 2008[1/]. As percentage of total SNGs income[2/]

	SNGs	States	Municipalities	States' % of SNGs total
Own income sources	13	10	23	69
Taxes	6	4	11	65
Fees	7	6	12	72
Total federal transfers[3/]	87	90	77	85
General revenue-sharing fund	37	37	39	82
Contribution funds	46	49	35	87
Other federal transfers	4	4	3	85

Source: Authors' calculations using data from INEGI.

1/ We excluded Distrito Federal and Tlaxcala from the analysis because debt issued by Distrito Federal is considered Federal debt and Tlaxcala is not allowed to issue long run debt and its short run debt is small compared to other states.

2/ Total SNGs income is defined here as own income plus total federal transfers.

3/ Total federal transfers is the sum of general revenue-sharing transfers, contribution funds and other federal transfers.

It is clear from Table 1 that the two largest items are the general revenue-sharing fund and the contribution funds. As of 2008, the general revenue-sharing fund represented 37% of the total revenues for SNGs. Beginning in 1998, Branch 33 was created to combine all ear-marked funds transferred to SNGs. Currently, there are eight contribution funds that compose Branch 33.[8] All contribution funds summed up account for 49% of the total revenues for SNGs.

Contribution funds differ mainly from revenue-sharing transfers in that the former are composed by resources transferred to SNGs to be spent in specific goals established by law. Another important difference between these two budgetary items that will be crucial to understand the recent level of outstanding SNGs' debt is that contribution funds, except FAIS and FAFEF, cannot be used as collateral or to pay debt whereas the general revenue sharing fund can be used for both purposes. This is because contribution funds are ear-marked whereas revenue sharing transfers can be used for whatever purpose the SNGs consider more appropriate.

iii. SNGs Financing options

According to the National Constitution (Article 117), sub-national governments, i.e. states and municipalities, can borrow only for productive public investments, only in Mexican pesos and only from Mexican credit institutions in national territory, Mexican individuals, or Mexican corporations.[9] The three main borrowing sources for SNGs are: a) development banks, b) commercial banks, and c) stock certificate

[7] For more about the deductions and exclusions please refer to article 2 of the LCF.

[8] The eight funds are: Contribution Fund for Basic and Normal Education (FAEB), Contribution Fund for Health Services (FASSA), Contribution Fund for Social Infrastructure (FAIS), Contribution Fund for the Strengthening of Municipalities and Federal District (FORTAMUN-DF), Contribution Fund for Multiple Purposes (FAM), Contribution Fund for Public Security of the States and *Distrito Federal* (FASP-DF), Contribution Fund for Technological and Adult Education (FAETA), and Contribution Fund for the Strengthening of Federal Entities (FAFEF).

[9] LCF, article 50, first paragraph.

issuances.[10]

As of December 2010, the most important creditors to SNGs were commercial banks which hold around 62% of the total financial obligations by SNGs. Another 21% of the debt is contracted with development banks and the rest corresponds to the stock market. When total SNG debt is classified by debtor, state governments are responsible for approximately 75% of total financial obligations. The amount of debt corresponding to municipal governments is 14% and the rest is held by local public organisms such as Potable Water and Sewer Systems, Housing Institutions, among others.

The current breakdown by creditor and debtor has not always been the same. For example, SNGs were not allowed to issue stock certificates until 2001, and only after the modifications to the LCF in 2006 many municipalities were unable to borrow financial resources. In the next two sections we briefly describe the principal modifications to both credit laws and the LCF between 1995 and 2009 that could account for part of the recent composition of the financial position of SNGs. In other words, it is important to understand the regulatory framework that allowed SNGs to increase their debt in recent years.

3.2. Changes to the Fiscal Coordination Law that affected borrowing conditions and options for SNGs

Before 1995, all debt issued by SNGs was backed up by the federal government. In December of 1995, article 9 of the LCF was reformed to modify the arrangements through which states can issue debt. Before the modifications, this article established that the Ministry of Finance (SHCP,[11] for its acronym in Spanish) was ultimately responsible for paying the financial obligations of SNGs using revenue-sharing transfers. In case of default by a SNG, repayment should be made according to the chronological order of the debt registration before SHCP. This was equivalent to SHCP bailing out states (see Hernández, Díaz, and Gamboa (2007)). According to the reformed article 9 of the LCF, SNGs are now responsible for choosing which resources will be destined to debt repayment and which mechanisms to use for this purpose, all this according to the state laws and with no interference from the federal government (Aregional.com (2002)). In case of threat of default, financial institutions are not allowed to ask SHCP to discount the debt from the federal revenue-sharing transfers corresponding to the defaulter state or municipality.

It is true that the LCF establishes that in case of certain violations to the SNCF, the SHCP can affect the revenue-sharing transfers corresponding to the violator state. However, debt default is not considered among those violations. Thus, bail out is not anymore explicitly considered in the LCF.

Another modification to the LCF that affected borrowing conditions and options for SNGs is the one that allowed SNGs to affect other budgetary items, besides the general revenue-sharing fund, to repay debt. Since 2001, 25% of the resources assigned to each state through the Program to Support the Strengthening of Federal Entities, later institutionalized as Contribution Fund for the Strengthening of Federal Entities (FAFEF), can be used for debt services. Although this is an important modification, FAFEF is not as big as *participaciones*. This contribution fund only represents approximately 1.4 % of the RFP per year. However, this reform could, in principle, increase the amount of debt that states can issue since they could use these resources to pay back such debt (Aregional.com (2010)). Similar to the modification mentioned previously, since 2006, the LCF authorizes both states and municipalities to employ up to 25% of the annual resources that SNGs receive from the Contribution Fund for Social Infrastructure (FAIS). Municipalities that had very limited access to credit have been the main beneficiaries from this modification (Aregional.com (2007)).

Finally, although it did not involve modifications to the existing laws, in 2009 both states and SHCP signed an agreement that allowed states to increase their levels of debt. That year, the Fund for the Stabilization of Revenues of Federal Entities (FEIEF, for its acronym in Spanish) had to be used to compensate the drastic reduction on the RFP that resulted from the financial crisis.[12] However, the resources

[10] A stock certificate is a bond issued through the stock market for financing purposes.
[11] *Secretaría de Hacienda y Crédito Público*.
[12] The Fund for the Stabilization of Revenues of Federal Entities was created in 2006 as part of the Federal Budget and Fiscal Responsibility Law with two purposes: to support state infrastructure expenses through federal revenue surplus

kept in FEIEF were insufficient to compensate for the reduction, estimated in 65,000 million pesos, of the federal transfers to the SNGs.[13] Therefore, SHCP and the SNGs agreed on a risk-free bond issuance by the federal government using part of FEIEF resources as collateral. To guarantee the repayment of the debt, a trust fund was created to administrate the multiplied resources by contracting debt with different banks using as guarantee the federal government bonds. Through this mechanism, SNGs obtained greater resources, backed up by the federal government, in exchange of their resignation to a fraction of their present and future FEIEF revenues (Aregional.com (2009)).

3.3. Changes to the credit laws that affected borrowing conditions and sources for SNGs

The National Securities and Exchange Commission (CNBV,[14] for its acronym in Spanish) is responsible for setting up the conditions under which credit institutions can lend to SNGs. In 1999, as part of the government's response to avoid the devastating effects of another crisis like the one started in 1994, the CNBV modified the rules regarding the capitalization requirements for banks. These changes specified that SNGs must have a credit risk factor associated to them and that such credit risk factor should reflect their credit ratings. The risk factor could go from 20% to 150%, determining the percentage of resources that a credit institution must keep in reserves as a fraction of the amount borrowed by a state. In particular, the highest risk value corresponded to credits that were not registered on the Register for Liabilities and Loans of Federal Entities (*Registro de Obligaciones y Empréstitos de las Entidades Federativas*), henceforth Register, administered by the Ministry of Finance (SHCP, for its acronym in Spanish) and for SNGs that were not rated by an authorized credit rating agency. Since debt or credit ratings are opinions about the probability and risk associated to the capacity or intention of repayment by the due date (Aregional.com (2001c)), SNGs that were planning to borrow or to have outstanding debt started a process to improve their public finances since debt ratings became crucial to obtain better borrowing terms and conditions, lower interest rates, and longer maturity periods. (Aregional.com (2001a)).

In June of 2001, the CNBV reformed the Securities Law (*Ley del Mercado de Valores*) to permit SNGs to issue stock certificates (*certificados bursátiles*) or participation certificates (*certificados de participación*).[15] This reform clearly expanded the number of funding sources for SNGs. The two most important requirements to issue stock certificates are: two ratings by authorized credit rating agencies and collateralization with a portion of a stable flow of income such as the revenue-sharing transfers. To guarantee repayment, the state must allowed the aforementioned resources to be transferred from SHCP to a Master Trust for Administration and Payments (*Fideicomiso Maestro de Administración y Pagos*) which cannot be repealed (Aregional.com (2001b)). The creation of a master trust fund has become a very significant tool to obtain financing especially for SNGs with low debt ratings. This type of contract allows SNGs with low debt ratings to access the stock market, diversifying its financing sources.

In 2004 the CNBV introduced changes to the banking regulation that could explain the sudden increase in bank loans to SNGs between 2003 and 2005. In general, these changes implied that credit ratings were to be assigned to each loan instead of rating the whole SNG. The main changes to the regulations were the following. First, loans below 300,000 pesos must be analyzed with respect to their condition (restructured or not), credit rating, and guarantee.[16] Second, the loans above 300,000 pesos must be secured by a provision requirement according to at least one credit rating of the state. This percentage of provision requirement for loans to sub-national governments decreased from 20%-150% to 0.5%-100% range. Finally, the risk level associated to each credit was adjusted according to the structure and mechanisms that determine the repayment. Moreover, the credit transaction could be penalized if it was restructured or if the level of risk associated to a state is only based on one –and not two– credit ratings (Aregional.com (2005a)).

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and to create a reserve that can be used in case of an unexpected reduction of the RFP (Aregional.com (2008)).

[13] Approximately 2,145 million Euros.

[14] *Comisión Nacional Bancaria y de Valores*.

[15] A participation certificate is a loan claim to part of the yields generated through a trust fund.

[16] This amount is approximately 18 thousand Euros.

These modifications introduced since 2001, expanded the private credit supply for SNGs. Local governments could choose between two borrowing sources: bank loans or stock certificates issuances. These reforms also improved the conditions under which SNGs could borrow between these two sources through competition among prospective lenders (Aregional.com (2005b)).

Lastly, in 2009 the CNBV made modifications to the methodology used to evaluate and allocate credit among SNGs. Among other things, these changes were oriented to reduce the regulatory costs of short run loans. For example, credits with maturity of less than 180 days are exempt of the risk adjustment that the law requires to all loans when its repayment is guaranteed with revenue-sharing funds or similar flow of funds and are registered before the corresponding fiscal authorities. Moreover, for credits with maturity of less than 180 days and with federal-revenue sharing resources as guarantee, the level of total reserves that the financial institution must keep as deposit can be reduced by 15%. Another important change was related to the expiration date of credit ratings. The law establishes that credit ratings expire after 24 months; however, after the modification to the law, credit ratings that assign a risk factor above 20% (the risk factor assigned to unrated credits) are exempted from such expiration rule.

3.4. Debt evolution

We describe the evolution and some characteristics of the financial obligations from SNGs over the last ten years. The amounts of these obligations as percentage of gross state domestic product (GSDP), at federal entity level are shown in Table 2. In average for 2001-2007 the total financial obligations represented around 1.5 percent of GDP. However, since 2008 this ratio started growing, reaching 2.5 percent. This growth was mainly a response to SNGs' need to look for resources due to the decrease in the share of Federal revenues SNGs received in 2009. Focusing on those states whose obligations' growth, since 2008, was more dynamic, Quintana Roo, Tamaulipas, Veracruz, Nayarit, Coahuila, Nuevo León, and Baja California Sur stand out as states whose financial obligations growth, between December 2008 and December 2010, represented at least 1.5 point of their respectively GSDP in 2010. Also for most of these states their financial obligations reached in December 2010 more than 3 percent of their respective GSDP -excluding Coahuila, Tamaulipas and Baja California whose financial obligations reached 2.1, 2.5, and 2.6 percent, respectively-.

Moreover, there are some states for which stocks of financial obligations represent a relatively big share of the total financial obligations from the SNGs analyzed. More than 70 percent of total financial obligations is concentrated in 10 states, and within these ten states, only five of them concentrate 50 percent of these obligations. However, these data could give a miss idea about the importance of the debt from these states. If we consider not only the participation in total financial obligations, but if we take into account the dynamic of the debt for these states, in the last two years, we can appreciate that the flows of the debt for the 10 most indebted states is relatively small. Dimensioning the relative importance of these states, if we look at their participations in the total GDP, data show that these are relatively important; nevertheless, remember that we are not considering the Distrito Federal in our analysis, entity with the biggest share of GDP (see Table 2). In summary, in the last two years the debt of some states grew, however, in some cases the relative participation of these states' obligations in the total financial obligations or in GDP is relatively small.

The recent dynamic of these liabilities could be explained, partially, by the growth of the financial obligations from SNGs with commercial banks. The participation of these financial intermediaries, in almost 4 years, grew 15 points going from near to 47 in 2007 to close to 62 percent of total financial obligations in December 2010 (see Figure 1a). Data show, too, relative changes in the financing composition in last four years, while commercial banks' loans grew; the participation of bond issuance decreased its share in 8 percent. This behavior could imply a bigger exposure for commercial banks with SNGs, which, in a stress scenario, could generate pressures for the financial system.

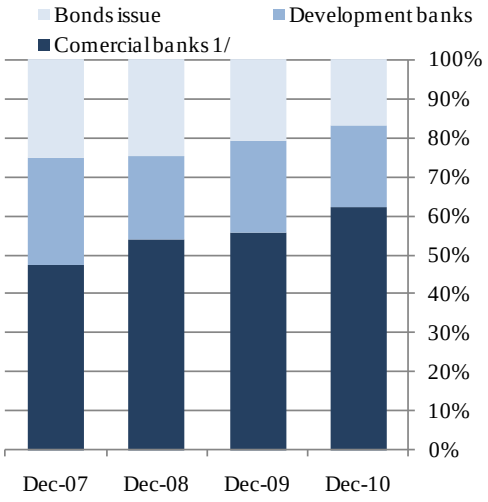
Table 2 Financial obligations. As percentage of GSDP [1/]

	Stocks										Flows		% of total financial obligations [2/]	% participation on GDP 2010 [2/]
	percent of State GDP													
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010 [1/]	2001-2010	2008-2010	2010	2010
Quintana Roo	1.2	1.5	1.5	1.8	1.5	1.3	1.5	1.6	2.2	5.3	4.1	*3.7*	3.8	1.8
Tamaulipas	0.4	0.2	0.3	0.5	0.3	0.2	0.4	0.4	1.6	2.5	2.0	*2.1*	3.8	3.8
Veracruz	0.5	1.2	0.6	1.0	0.9	1.2	1.4	1.7	1.7	3.4	2.9	*1.7*	8.2	5.8
Nayarit	0.4	0.3	0.2	0.6	0.7	0.9	1.0	2.2	3.2	3.9	3.5	*1.7*	1.2	0.8
Coahuila	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.5	0.4	2.1	1.7	*1.6*	3.2	3.6
Nuevo León	2.3	2.1	1.6	1.5	1.8	2.2	2.1	2.0	3.0	3.5	1.1	*1.5*	13.0	9.1
Baja California Sur	2.3	2.1	1.6	1.3	1.3	1.2	1.1	1.1	3.0	2.6	0.3	*1.5*	0.8	0.8
Chihuahua	0.7	0.6	0.6	0.5	0.5	2.1	1.9	1.7	3.6	3.1	2.4	*1.4*	4.8	3.8
Sonora	3.6	3.5	3.2	2.8	2.7	2.5	2.5	3.9	3.9	5.1	1.5	*1.2*	6.6	3.1
Jalisco	1.4	1.6	1.2	1.2	1.4	1.4	1.2	1.7	2.8	2.7	1.3	*1.0*	8.4	7.8
Guerrero	1.7	1.5	1.7	1.9	1.4	1.6	1.4	1.1	1.9	1.9	0.2	*0.8*	1.4	1.8
Michoacán	0.2	0.1	0.9	0.7	1.3	1.2	2.5	2.4	2.7	3.1	3.0	*0.7*	3.8	3.0
Baja California	0.9	1.0	1.2	1.3	1.5	1.5	1.8	1.9	2.7	2.6	1.7	*0.7*	3.6	3.4
San Luis Potosí	0.9	1.5	0.9	1.8	1.3	1.5	1.4	1.3	2.1	2.0	1.1	*0.7*	1.8	2.3
Guanajuato	0.3	0.3	0.4	0.5	0.6	0.5	0.8	0.9	1.5	1.5	1.2	*0.6*	2.9	4.7
Hidalgo	0.7	1.0	1.3	1.1	1.9	1.7	1.5	1.4	2.2	2.0	1.3	*0.6*	1.5	1.9
Yucatán	0.2	0.7	0.9	0.7	0.5	0.6	0.3	0.5	1.3	1.0	0.8	*0.5*	0.7	1.7
Morelos	0.6	0.6	0.9	0.9	0.9	0.7	0.5	0.4	0.3	0.9	0.3	*0.5*	0.5	1.4
Puebla	0.5	0.5	1.2	1.1	1.0	1.0	1.7	1.6	1.6	2.1	1.6	*0.5*	3.5	4.1
Chiapas	1.1	1.0	0.6	0.7	0.9	0.5	3.2	3.3	4.3	3.4	2.3	*0.1*	3.1	2.2
Colima	0.8	1.1	1.3	1.0	1.3	1.7	1.6	1.8	2.1	1.9	1.1	*0.1*	0.5	0.6
Campeche	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	*0.0*	0.1	6.2
Querétaro	1.5	1.4	1.3	1.2	1.1	1.0	1.0	0.9	1.1	0.9	-0.6	*0.0*	0.8	2.3
Tabasco	0.9	0.8	0.3	0.2	0.3	0.2	1.4	0.5	0.5	0.5	-0.4	*0.0*	0.9	4.2
Durango	2.0	1.8	1.9	2.4	2.4	2.2	2.1	2.2	2.6	2.2	0.2	*0.0*	1.4	1.6
México	5.1	5.6	4.8	4.2	4.0	3.6	3.4	3.2	3.2	3.2	-1.9	*0.0*	14.6	11.2
Zacatecas	0.0	0.5	0.7	0.6	0.5	0.3	0.2	0.7	0.6	0.6	0.6	*-0.1*	0.3	1.1
Sinaloa	2.8	2.9	2.2	1.9	2.4	2.2	2.1	1.9	1.9	1.7	-1.0	*-0.2*	1.9	2.6
Aguascalientes	0.3	0.5	0.9	0.7	1.2	0.9	2.0	2.0	2.3	1.8	1.5	*-0.2*	1.0	1.3
Oaxaca	0.3	0.4	0.5	0.4	0.4	1.0	2.5	2.6	2.6	2.2	1.9	*-0.4*	1.8	1.9
Total [2/]	**1.7**	**1.7**	**1.4**	**1.3**	**1.4**	**1.4**	**1.6**	**1.6**	**2.1**	**2.5**	**0.8**	***0.9***		

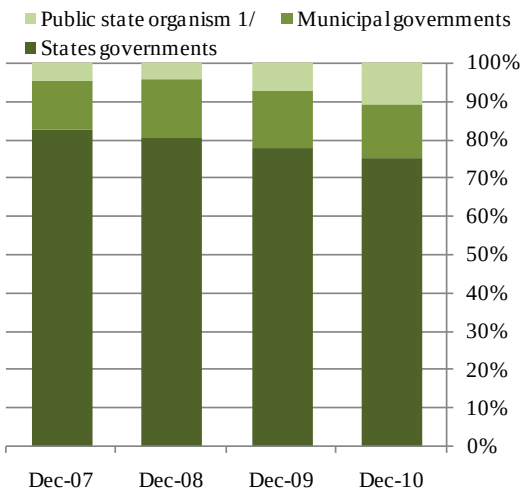
Source: SHCP and authors' estimations. The data are sorted according the flows between 2008 and 2010.
1/ GSDP estimated for 2010, using the entities participation in the total GDP from 2009.
2/ Excludes data from Distrito Federal and Tlaxcala.

Figure 1 Structure of total financial obligations

a) By Creditor



b) By Debtor



Source: ARegional with data from SHCP.
1/ These public organisms have own legal personality and own patrimony. Excludes debt from state's organism without own legal personality and municipal's organism.

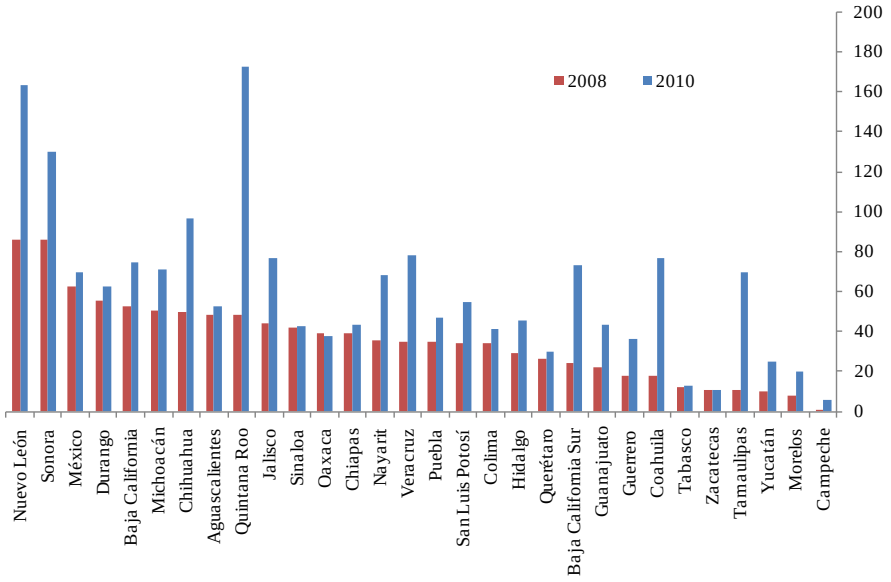
If we breakdown the data according to the kind of debtor (states governments, municipal governments and public state organisms), the data show that the main debtors are state governments (79 percent of total obligations in average during the last four years). However, the participation of these governments has

decreased as a result of the growing participation of the debt guaranteed by own revenues from public state organisms, which passed from 5 to 11 percent of total financial obligations between December 2007 and December 2010.[17] Additionally, the financial obligations from municipalities are relatively small and these have remained close to 15 percent of total financial obligations (see Figure 1b).

For most states the maturity of the financial obligations from SNGs is more than 10 years, in fact for four states the maturity reaches more than 20 years. On average, maturity is 13 years. This fact can reflect the relatively favorable conditions under which these obligations were contracted; however the data show some cases where the maturity is relatively short. The latter could represent a financial pressure if the level of the obligations from these SNG represents a large proportion of their payment capability.[18]

As mentioned in section 3.3, the LCF was modified allowing SNGs the use of up to 25% of funds related with FAIS and FAFEF as guarantee or for repayment of their debt. To better approximate the capacity of payments and indebtedness of the SNGs, we construct a measure of total revenues from federal entities. It is defined as federal revenue shares to federative entities plus 25% of funds from FAIS and FAFEF.[19] Figure 2 contains a state breakdown of the total financial obligations as percentage of our broad measure of state revenues. It allows us to look into the SNGs' debt behavior during the last two years in a different way. It shows that during this period, generally, all SNGs raised their indebtedness, however highlights states as Quintana Roo or Tamaulipas or Coahuila, whose debt in December 2010 registered relatively high levels with respect to their revenues. In these cases, this growth in the indebtedness could generate pressures for the public finances and as a result, in a stress scenario, this could result in problems to provide public services.

Figure 2 Total financial obligations as percent of total state income [1/]



1/ Total state income includes: federal revenue sharing to federative entities plus 25% of funds from FAIS and FAFEF.

4. Indebtedness of sub-national governments

4.1. Methodology and data

Literature concerning the analysis of fiscal sustainability at the sub-national government level is scarce. At country level the IMF (2002) proposed an analytical framework for fiscal sustainability analysis, Ianchovichina *et al.* (2006), based on IMF framework, is the first paper, to our knowledge, that tries to apply a methodology of fiscal sustainability to analyze the economic behavior of a state (Tamil Nadu, India).

[17] These public organisms have own legal personality and own patrimony. In this sense, they can borrow independently of the state government. These financial obligations, excludes the debt from state's organism without own legal personality and municipal's organism.

[18] Data is available upon request.

[19] A broad measure of SNG's payment capacity should include own revenues, however, these information is not available for some states.

Taking as reference the analytical framework for fiscal sustainability analysis proposed by the IMF and considering the modifications proposed by Ianchovichina *et al.*, we apply this methodology to 30 federal entities (states) in Mexico -including their municipalities.[20]

Before showing the results, we need to explain very briefly the basic theoretical framework of the fiscal sustainability analysis (FSA). It starts considering the sub-national government's inter-temporal financing constraints which depend on the debt of past periods, debt interest payments, which depend on interest rate, and the primary balance. For purposes of analysis the FSA is done in terms of a variable that denotes the government's ability to pay, it is usually represented by the GDP. In this case, the different variables are considered as percentage of the gross state domestic product (GSDP). Taking as reference Ianchovichina *et al.* (2006), we use the equation 1 to assess debt sustainability under different scenarios.

$$b_t = \frac{1+r_t}{(1+g_t)}\, b_{t-1} - x_t \qquad (1)$$

According to equation 1, the sustainability of the sub-national government's fiscal policies (debt from SNGs as percentage of GSDP, denoted as *b*) depends on the primary fiscal balance as percentage of GSDP (*x*), the real interest rate (*r*), and sub-national economic growth (*g*). Note that *r* depends on the nominal interest rate and inflation. To avoid an opportunistic behavior, under this theoretical framework it is assumed that *r* is bigger than *g*. This assumption implies that SNGs will always do an additional fiscal effort to pay their debt.[21]

Basically, the data used in this paper come from two sources. The data on expenditures and revenues are from National Institute of Statistics and Geography (INEGI for its acronym in Spanish), the data on federal revenue shares to federative entities (*participaciones*), revenues from federal contributions under specific items (FAIS and FAFEF) and the information of financial obligations from states and municipalities (banks and bonds) are from SHCP.[22]

For 2000-2009 GSDP data came from the INEGI, and for 2010 the GSDP was constructed using the total GDP and assuming that the entities have the same participation in the total GDP as in 2009. Finally, as mentioned above, SNGs have the possibility to access financing through bank loans and bond issuance. Normally this debt has long maturity. For this reason, real interest rates were calculated based on the rates of treasury certificates (Cetes) and fixed rate bonds (data from Banco de Mexico), considering all different maturities of both instruments.[23] It is worth noting that these interest rates are the reference rates for Federal Government's bond issuance and bank loans, in this sense our assumption about interest rate is relatively conservative, since we implicitly assume that the SNGs have the same level of risk as the Mexican Federal Government. Additionally, in some of our simulations (not reported due to paper length constraints), to deal with the restriction about the inequality of r and g mentioned above (r > g), we assume that the interest rate is bigger than the maximum growth rate of GSDP.

Our concept of the primary fiscal balance was constructed with data of the Statistics of States and Municipalities Public Finance from INEGI. It considers all those concepts which are not explicitly related with federal economic programs. In this sense our definition of revenues excludes: federal contributions to

[20] In the analysis we do not consider Tlaxcala because according their State Debt Law, the government just can take short run debt, which is not captured into Register (data of Tlaxcala are cero). Distrito Federal is excluded because its debt is guaranteed by Federal Government.

[21] Although the methodology of the IMF (2002) is consistent, there are alternative approaches. Specifically, Coronado (2009) proposes an approach which includes the tracking of financial conditions from SNGs and their fiscal behavior. It includes two kinds of indicators, one related to solvency (outstanding debt over current revenues and present debt value over current revenues) and another about liquidity of sub-national finances (debt service over current revenues and interest over current revenues). These indicators are meant to capture different aspects of the financial behavior of SNGs regarding their capability to generate resources. However, due to the unavailability of public information concerning interest and debt service, we cannot implement it in our analysis.

[22] These federal funds were described on the previous section.

[23] The maturities of the treasury certificates are: 28, 91, 182 and 364 days. And the maturities of the fixed rate bonds are: 3, 5, 10, 20 and 30 years.

states and municipalities (Branch 33 and 25), fund from decentralization agreements and reassignment agreements; and our definition of expenditures excludes: transfers and subsidies. Then specifically the revenues include: taxes, rights and products, exploitations, contributions for improvements, federal revenue sharing and other revenues. Expenditures include: personal services (wages), materials and inputs, acquisitions of durable goods and real estate, general services and other expenditures. The reason for considering only these concepts is that the others funds, like federal contributions, do not depend on the Sub-national government's financial behavior, they result from decisions taken at federal level.

As for the assumptions for the sensibility analysis, in some cases we assume historical average from 2000 to 2009 to simulate the behavior of the primary balance. Nevertheless for several states information on revenues and expenditures is not available for 2009; keeping this in mind, for these cases we adjust the historical mean of primary balance taking data up until 2008. The states with the data sample from 2000 to 2008 are: Coahuila, Querétaro, Quintana Roo, Sonora, Tamaulipas, and Zacatecas.

It is worth mentioning the characteristics of the state financial obligations' data registered in the Register. First, the LCF disposes that the registration is not mandatory for the states. Furthermore, the Register considers credits and bond issues guaranteed with federal revenue shares and/or own revenues from the entities.[24] Nevertheless the SNGs can register financial obligations without this kind of guaranty. These obligations usually have long maturities, then, these financial obligations from SNGs are not a broad concept of the outstanding federal entities debt. In other words, the data from Register could exclude some short term debt from SNGs; in this sense these data are not the total outstanding SNG's debt.

On the other hand, in Mexico the statistical information of debt at federative entity level is scarce or in some cases inexistent. Additionally, between the sources of data, there are differences in methodological aspects which complicate the analysis of the financial behavior of the SNGs. Despite the potential problems of information, the data from Register on SHCP is the only publicly available information with a breakdown by state, for this reason we use it in our analysis.

4.2. Results

As we mentioned above, taking as reference the analytical framework for fiscal sustainability analysis proposed by the IMF (2002) and by the paper of Ianchovichina *et al.* (2006), we construct some indicators for debt sustainability. Following equation 1, we estimate the evolution of the SNGs financial obligations for five years, until 2011. In the first scenario (A), as Ianchovichina *et al.* and Burnside (2004) suggest, we assume that there are three variables (r, g and x) and we use their historical average (2000-2009), the results are presented in Table 3. Under this scenario, twelve states registered an increase in their debt, eight of them have relatively sustainable debt paths, as , they reached levels under, or close, to 5 percent of their respectively GSDP; and the remaining four states show debt paths that could be problematic in a stress scenario. It is worth noting that the literature does not mention an explicit threshold at which the indebtedness could turn into a problem (Coronado (2009)). However, if we consider an *ad-hoc* threshold of 10 percent of GSDP for our analysis, according to this simulation, the SNG's financial obligations could represent more than 10 percent or their respective GSDP for Coahuila, Michoacán, Puebla and Veracruz. Noting that, the last two states -Michoacán and Veracruz-, could reach the ten percent threshold in 2012.[25]

Scenario B was constructed assuming a rise in the interest rate that would negatively affect the behavior of primary balance and growth of the GDP. Then, as proposed Burnside (2004) and Ianchovichina *et al.* (2006), we assume that the interest rate from 2011-2015 to have a shock (plus 1 standard deviation over their historical average), this shock is going to be reflected in a negative shock in the growth of GSDP and primary balance (minus 1 standard deviation over their historical average).[26]

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[24] Regulations of the Article 9 of the LCF established that debt's registration is not mandatory.

[25] To deal with the restriction r > g, we considers an additional exercises in which we define in 5.2 percent the historical mean of real interest rate. The results of it are consistent with the results show in Table 3, Table 4 and Table 5. Then, this alternative exercises denotes the robustness of our results even when we probably underestimate the debt behavior in tables reported.

[26] In papers from Burnside (2004) and IMF (2002) suggests apply two standard deviation in both senses. Then, in our

Table 3 Debt sustainability scenario A. As percentage of GSDP [1/]

	Historical mean [2/]			Financial obligations of SNG (b)					
	Real interest rate (r)	Real growth of GSDP (g)	Primary balance (x)	Dec-2010	2011	2012	2013	2014	2015
	%		% of GSDP [1/]	% of GSDP [1/]					
Aguascalientes	3.99	4.03	1.43	1.80	0.38	-1.05	-2.47	-3.90	-5.32
Baja California	3.99	1.60	0.70	2.57	1.94	1.29	0.62	-0.06	-0.75
Baja California Sur	3.99	5.16	2.79	2.56	-0.26	-3.05	-5.81	-8.54	-11.24
Campeche	3.99	0.05	-0.23	0.05	0.28	0.52	0.78	1.04	1.31
Chiapas	3.99	1.78	-0.23	3.40	3.71	4.02	4.34	4.67	5.00
Chihuahua	3.99	0.86	1.21	3.06	1.95	0.79	-0.39	-1.62	-2.88
Coahuila	3.99	1.50	-1.65	2.11	3.81	5.55	7.34	9.16	11.04
Colima	3.99	2.16	2.31	1.88	-0.40	-2.72	-5.08	-7.48	-9.92
Durango	3.99	2.03	0.33	2.19	1.91	1.61	1.32	1.01	0.70
Guanajuato	3.99	2.50	0.11	1.52	1.43	1.34	1.25	1.16	1.06
Guerrero	3.99	1.03	0.17	1.94	1.82	1.70	1.58	1.45	1.32
Hidalgo	3.99	1.74	1.76	1.96	0.24	-1.51	-3.30	-5.13	-7.01
Jalisco	3.99	1.62	0.21	2.65	2.51	2.36	2.21	2.05	1.89
México	3.99	2.32	1.64	3.17	1.58	-0.03	-1.67	-3.34	-5.03
Michoacán	3.99	1.32	-4.97	3.11	8.16	13.35	18.68	24.14	29.75
Morelos	3.99	1.89	1.91	0.87	-1.02	-2.95	-4.91	-6.92	-8.97
Nayarit	3.99	2.25	1.68	3.88	2.26	0.62	-1.05	-2.75	-4.48
Nuevo León	3.99	2.99	0.59	3.47	2.91	2.35	1.78	1.20	0.62
Oaxaca	3.99	1.53	0.56	2.23	1.73	1.22	0.69	0.15	-0.40
Puebla	3.99	1.95	-1.63	2.07	3.74	5.44	7.18	8.96	10.77
Querétaro	3.99	3.43	1.27	0.91	-0.35	-1.62	-2.90	-4.18	-5.47
Quintana Roo	3.99	3.91	1.43	5.31	3.88	2.45	1.02	-0.42	-1.85
San Luis Potosí	3.99	2.62	0.98	1.95	1.00	0.03	-0.95	-1.94	-2.95
Sinaloa	3.99	2.38	1.42	1.74	0.35	-1.07	-2.50	-3.96	-5.45
Sonora	3.99	2.39	1.87	5.15	3.36	1.54	-0.31	-2.19	-4.09
Tabasco	3.99	3.30	2.17	0.50	-1.67	-3.86	-6.06	-8.27	-10.50
Tamaulipas	3.99	2.39	0.60	2.46	1.90	1.32	0.74	0.15	-0.45
Veracruz	3.99	2.61	-3.11	3.44	6.60	9.79	13.03	16.32	19.65
Yucatán	3.99	3.43	-0.69	0.99	1.69	2.39	3.10	3.81	4.52
Zacatecas	3.99	4.34	2.24	0.59	-1.65	-3.88	-6.11	-8.32	-10.53
Total	**3.99**	**2.00**	**0.28**	**2.44**	**2.20**	**1.97**	**1.72**	**1.47**	**1.22**

Source: Authors' simulation based in equation 1.

1/ GSDP estimated for 2010, using the entities participation in the total GDP from 2009.

2/ Historical mean taking the period 2000-2009. Due revenues and expenditure data not availability for Coahuila, Querétaro, Quintana Roo, Sonora, Tamaulipas and Zacatecas, the historical mean of primary balance correspond to period 2000-2008.

The results of these exercises are in Table 4, it shows that in ten states, the financial obligations of SNGs, according to our forecasts, follow relatively sustainable paths. For four states the debt reaches a level above 5 percent but smaller than 10 percent, in these cases the debt could be a problem under a bad scenario. And for six states, in 2015, their indebtedness represents more than 10 percent of their respective GSDP, three states for which these liabilities reach more than a quarter of their respective GSDP stand out. For the latter states, the debt path could be unsustainable under a stress scenario. Note that in three cases (Chiapas, Michoacán and Veracruz), the SNGs financial obligations reach the threshold of ten percent in only two years. Again, as in the results from scenario A, clearly this situation could generate pressures to the provision of public services for the SNGs in a stress scenario.

The last scenario considered (scenario C) considers the same assumptions as scenario B for the variables in 2011 and for the rest of the years forecasted (2012-2015) the variables take their historical average. An exercise from Ianchovichina *et al.* (2006) is similar to our scenario C. They assume, as we do, an initial variation in the variables, the effect of it is eliminated during the next periods; to do this they take a set of interest rates' forecasted from World Bank and do assumptions over the behavior of GSDP and primary balance. Table 5 shows results of this exercise.

analysis probably we underestimate the debt path.

Table 4 Debt sustainability scenario B. As percentage of GSDP [1/]

	Historical mean [2/]			Financial obligations of SNG (b)					
	Real interest rate (r)	Real growth of GSDP (g)	Primary balance (x)	Dec-2010	2011	2012	2013	2014	2015
	%		% of GSDP [1/]	% of GSDP [1/]					
Aguascalientes	3.99	4.03	1.43	1.80	1.13	0.40	-0.39	-1.26	-2.20
Baja California	3.99	1.60	0.70	2.57	2.49	2.41	2.31	2.20	2.08
Baja California Sur	3.99	5.16	2.79	2.56	0.56	-1.56	-3.79	-6.14	-8.61
Campeche	3.99	0.05	-0.23	0.05	0.49	1.00	1.58	2.25	3.01
Chiapas	3.99	1.78	-0.23	3.40	6.88	10.78	15.15	20.07	25.58
Chihuahua	3.99	0.86	1.21	3.06	2.72	2.33	1.91	1.44	0.92
Coahuila	3.99	1.50	-1.65	2.11	4.35	6.79	9.47	12.40	15.60
Colima	3.99	2.16	2.31	1.88	0.12	-1.86	-4.08	-6.57	-9.36
Durango	3.99	2.03	0.33	2.19	2.62	3.09	3.60	4.16	4.77
Guanajuato	3.99	2.50	0.11	1.52	2.84	4.29	5.86	7.57	9.43
Guerrero	3.99	1.03	0.17	1.94	2.86	3.88	5.00	6.24	7.60
Hidalgo	3.99	1.74	1.76	1.96	1.00	-0.06	-1.24	-2.55	-4.02
Jalisco	3.99	1.62	0.21	2.65	3.05	3.50	3.99	4.53	5.12
México	3.99	2.32	1.64	3.17	2.97	2.74	2.50	2.22	1.93
Michoacán	3.99	1.32	-4.97	3.11	9.39	16.32	23.96	32.39	41.69
Morelos	3.99	1.89	1.91	0.87	-0.46	-1.91	-3.49	-5.21	-7.08
Nayarit	3.99	2.25	1.68	3.88	3.84	3.79	3.74	3.69	3.62
Nuevo León	3.99	2.99	0.59	3.47	3.85	4.27	4.73	5.24	5.80
Oaxaca	3.99	1.53	0.56	2.23	3.51	4.89	6.41	8.05	9.85
Puebla	3.99	1.95	-1.63	2.07	4.37	6.92	9.75	12.90	16.40
Querétaro	3.99	3.43	1.27	0.91	0.08	-0.83	-1.82	-2.91	-4.11
Quintana Roo	3.99	3.91	1.43	5.31	4.87	4.40	3.88	3.31	2.69
San Luis Potosí	3.99	2.62	0.98	1.95	1.56	1.13	0.67	0.15	-0.40
Sinaloa	3.99	2.38	1.42	1.74	1.20	0.61	-0.04	-0.76	-1.54
Sonora	3.99	2.39	1.87	5.15	4.30	3.36	2.32	1.18	-0.09
Tabasco	3.99	3.30	2.17	0.50	1.01	1.56	2.16	2.80	3.50
Tamaulipas	3.99	2.39	0.60	2.46	2.58	2.72	2.87	3.04	3.22
Veracruz	3.99	2.61	-3.11	3.44	7.93	12.80	18.09	23.82	30.05
Yucatán	3.99	3.43	-0.69	0.99	3.21	5.62	8.23	11.06	14.12
Zacatecas	3.99	4.34	2.24	0.59	0.44	0.28	0.12	-0.06	-0.25
Total	**3.99**	**2.00**	**0.28**	**2.44**	**2.65**	**2.88**	**3.13**	**3.41**	**3.72**

Source: Authors' simulation based in equation 1. Assuming a positive shock over the historical average of real interest rate (plus one standard deviation), and negative shock over historical average or growth of GSDP and primary balance (minus one standard deviation).
1/ GSDP estimated for 2010, using the entities participation in the total GDP from 2009.
2/ Historical mean taking the period 2000-2009. Due revenues and expenditure data not availability for Coahuila, Querétaro, Quintana Roo, Sonora, Tamaulipas and Zacatecas, the historical mean of primary balance correspond to period 2000-2008.

Under this scenario, eight states have a sustainable debt path (their indebtedness is under or close to 5 percent of GSDP), the debt from another two states, could generate problems given a deterioration of circumstances. Again our results denote the existence of potential problems for four entities whose historical average of primary balance is negative and fairly high, and their debt in 2010 is relatively high. Specifically, we can observe a relatively very fast growth of indebtedness for Michoacán and Veracruz.

Noting that in all of our scenarios, consistently, the states which denote problems with the debt growth are: Coahuila Michoacán, Puebla and Veracruz. Then, it is clear that for the SNGs of these states a deeper analysis of their indebtedness is necessary to try to identify possible pressures for the financial system and for the public finances of these states. Finally the results of different exercises about the sustainability of the debt reveal that maybe in the short term, the total debt from SNGs could not be a problem for the fiscal sustainability of the sub-national governments, however for some states, in the midterm, dynamics of their financial obligations, under some circumstances, could generate pressures for both, sub-national public finance and the financial system.

Table 5 Debt sustainability scenario C. As percentage GSDP [1/]

	Historical mean [2/]			Financial obligations of SNG (b)					
	Real interest rate (r)	Real growth of GSDP (g)	Primary balance (x)	Dec-2010	2011	2012	2013	2014	2015
	%		% of GSDP [1/]	% of GSDP [1/]					
Aguascalientes	3.99	4.03	1.43	1.80	1.13	-0.29	-1.72	-3.14	-4.57
Baja California	3.99	1.60	0.70	2.57	2.49	1.86	1.21	0.54	-0.14
Baja California Sur	3.99	5.16	2.79	2.56	0.56	-2.25	-5.02	-7.75	-10.46
Campeche	3.99	0.05	-0.23	0.05	0.49	0.74	1.00	1.27	1.55
Chiapas	3.99	1.78	-0.23	3.40	6.88	7.26	7.65	8.05	8.45
Chihuahua	3.99	0.86	1.21	3.06	2.72	1.59	0.43	-0.77	-2.01
Coahuila	3.99	1.50	-1.65	2.11	4.35	6.10	7.90	9.74	11.63
Colima	3.99	2.16	2.31	1.88	0.12	-2.19	-4.54	-6.93	-9.37
Durango	3.99	2.03	0.33	2.19	2.62	2.34	2.06	1.77	1.47
Guanajuato	3.99	2.50	0.11	1.52	2.84	2.77	2.70	2.63	2.56
Guerrero	3.99	1.03	0.17	1.94	2.86	2.77	2.68	2.59	2.49
Hidalgo	3.99	1.74	1.76	1.96	1.00	-0.73	-2.51	-4.32	-6.18
Jalisco	3.99	1.62	0.21	2.65	3.05	2.92	2.78	2.64	2.49
México	3.99	2.32	1.64	3.17	2.97	1.38	-0.24	-1.89	-3.56
Michoacán	3.99	1.32	-4.97	3.11	9.39	14.61	19.97	25.47	31.12
Morelos	3.99	1.89	1.91	0.87	-0.46	-2.38	-4.33	-6.33	-8.37
Nayarit	3.99	2.25	1.68	3.88	3.84	2.22	0.58	-1.09	-2.79
Nuevo León	3.99	2.99	0.59	3.47	3.85	3.29	2.73	2.17	1.60
Oaxaca	3.99	1.53	0.56	2.23	3.51	3.03	2.55	2.06	1.55
Puebla	3.99	1.95	-1.63	2.07	4.37	6.08	7.84	9.63	11.45
Querétaro	3.99	3.43	1.27	0.91	0.08	-1.18	-2.46	-3.74	-5.02
Quintana Roo	3.99	3.91	1.43	5.31	4.87	3.45	2.02	0.58	-0.85
San Luis Potosí	3.99	2.62	0.98	1.95	1.56	0.60	-0.37	-1.36	-2.35
Sinaloa	3.99	2.38	1.42	1.74	1.20	-0.20	-1.62	-3.07	-4.54
Sonora	3.99	2.39	1.87	5.15	4.30	2.50	0.66	-1.20	-3.09
Tabasco	3.99	3.30	2.17	0.50	1.01	-1.16	-3.34	-5.54	-7.75
Tamaulipas	3.99	2.39	0.60	2.46	2.58	2.02	1.45	0.87	0.28
Veracruz	3.99	2.61	-3.11	3.44	7.93	11.14	14.40	17.71	21.05
Yucatán	3.99	3.43	-0.69	0.99	3.21	3.92	4.63	5.35	6.08
Zacatecas	3.99	4.34	2.24	0.59	0.44	-1.80	-4.03	-6.25	-8.47
Total	**3.99**	**2.00**	**0.28**	**2.44**	**2.65**	**2.42**	**2.18**	**1.95**	**1.70**

Source: Authors' simulation based in equation 1. Assuming in 2011 a positive shock over the historical average of real interest rate (plus one standard deviation), and negative shock over historical average or growth of GSDP and primary balance (minus one standard deviation), for the rest of years (2012-2015) we assume historical averages of the variables.

1/ GSDP estimated for 2010, using the entities participation in the total GDP from 2009.

2/ Historical mean taking the period 2000-2009. Due revenues and expenditure data not availability for Coahuila, Querétaro, Quintana Roo, Sonora, Tamaulipas and Zacatecas, the historical mean of primary balance correspond to period 2000-2008.

Following the IMF (2002) methodology to analyze whether SNGs debt is sustainable, we found that, under certain restrictive assumptions, indebtedness for four Mexican states could represent potential risks for their public finances. This conclusion arises from the analysis of three different scenarios where we assume different paths for: i) real interest rate, ii) GSDP growth, and iii) SNGs' primary balance.

Throughout the analysis, we faced important challenges. The most important is the fact that there is no complete public information about the levels of SNGs debt and its borrowing conditions. Another problem is that the available data is neither standardized across states nor sources. Moreover, data on SNGs financial obligations is, sometimes, not available readily. Regarding the methodological framework, is worth noticing that the results depend on the initial values for debt and primary balance. However, even with these limitations, these simple exercises provide important insights about the possible SNGs debt paths in the near future.

In future extensions of this paper, we will apply other methodologies that consider uncertainty and set up thresholds to determine which states could face difficulties paying their debt. Other important questions that we believe are important to analyze are: i) which the determining factors are of the recent fast indebtedness for some states?; and ii) why the financial intermediaries do not respond to the warning signal implied by the recent upward trend in the debt levels of certain states.

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