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Financing Infrastructure and Monitoring Fiscal Risks at the Subnational Level

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Abstract

This paper explores the building blocks of an institutional framework to govern borrowing by subnational entities to finance infrastructure investment. The framework should help in achieving sustainable financing of development needs and sound management of fiscal risks. Based on international experience, the authors suggest a minimum set of indicators for monitoring fiscal and debt developments. Recognizing the different nature and operations of the subnational entities, they propose specific indicators for special purpose vehicles and the government's general budget. The paper outlines an analytical framework to inform policy decisions concerning subnational debt limits, which are country-specific and should not be mechanically applied. Basic notions underpinning medium-term macro-fiscal frameworks and debt sustainability analyses provide effective guidance for identifying prudent levels of subnational debt. The authors argue that developing fiscal and debt indicators and setting borrowing limits should be part of a broader strategy to put in place an adequate fiscal architecture to coordinate and monitor the budgetary and borrowing policies conducted by individual subnational governments. Consistent with this general principle, they explore several areas of subnational public finance and management that need to be addressed with adequate governance structures and policy choices.

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Table of Contents

Introduction 1

I. Fiscal rules and debt limits 2

II. Strategic considerations for developing and monitoring subnational debt indicators 5

III. Subnational debt indicators 12

III-A Summary of the proposed debt indicators 12

III-B Subnational debt indicators – further considerations for subnational government general budgets 13

III-C Subnational debt indicators – further considerations for SPVs 16

IV. Analytical tools for monitoring subnational debt indicators and determining debt thresholds 17

IV-A Determining threshold values for subnational debt indicators – Basic principles 19

IV-B Determining threshold values for subnational debt indicators – Model details 21

IV-C Determining threshold values for subnational debt indicators – Numerical simulations 23

V. Conclusions 24

References 30

Boxes

Box 1: International practice on debt indicators and limits 13

Box 2: International practice on guarantees 15

Box 3: International experience on SPV regulation 17

Figures

Figure 1: A Subnational DSA Model – Local Government General Budget 27

Figure 2: A Subnational DSA Model – SPVs 28

Figure 3: Baseline Scenario 29

Figure 4: High Investment But Rapidly Increasing Debt 29

Figure 5: Conservative Debt But Low Investment 29

Introduction

In a context of economic growth and urbanization, subnational governments in developing countries face large infrastructure investment needs and their corresponding financing needs. However, the global financial crisis of 2008-2009 has had a profound impact on subnational finance across countries, as a result of slowing economic growth, rising cost of borrowing, and deteriorating primary balances. Beyond the crisis, structural trends of decentralization and urbanization are likely to continue with force, requiring massive infrastructure investments.[2]

According to Canuto and Liu (2010a), pressures on subnational finance are likely to continue—from potentially higher cost of capital, the fragility of global recovery, refinancing risks, and sovereign risks. Many SNGs have created special-purpose vehicles (SPVs) to undertake infrastructure investments.[3] Such vehicles can play an important role in developing infrastructure networks that cut across the boundaries of subnational administrations. But the special-purpose vehicle operations carry inherent risks. Without a transparent governance and financial structure, SPVs can become a means of circumventing borrowing limits, and the contingent liabilities of their creators.

Debt financing to support public infrastructure investments arises from not only the large sunk cost required for upfront investments but also the need to ensure inter-generational equity. Debt instruments match the maturity terms with the economic life of assets being financed. The experience of China and the United States with respect to subnational infrastructure development illustrates the importance of debt instruments in providing intermediation between savings and investments.[4]

With debt comes the risk of insolvency. Fiscal rules on borrowing by both SPVs and subnational governments would help ensure that debt finances capital expenditure and that repayment capacity is sufficient to service debt going forward. A main concern is thus to develop an effective institutional and regulatory framework under which subnational governments can mobilize resources from the capital markets to finance infrastructure and support economic growth and urbanization. This framework should ensure a sustainable financing of development needs and a sound management of fiscal risks.

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[2] See Canuto and Liu (2010a) for an analysis of the impact of the global financial crisis on subnational finance. At national level, estimations of future infrastructure investment requirements vary greatly by income level. Estache and Fay (2010) discuss methodologies for quantifying these requirements and estimate that low-income countries should spend 12.5 percent of GDP on investment and maintenance to meet demand, whereas lower-middle income and upper-middle income countries should spend 8.2 percent and 2.3 percent, respectively.

[3] On undertaking infrastructure investments, in addition to SPVs largely owned by subnational governments, SPVs can also take the form of partnership with private financiers and operators. This paper focuses on SPVs related to infrastructure investments, leaving aside other types of SPVs such as a school district, a hospital system, and a national government mortgage financing company.

[4] Infrastructure investment as share of GDP has been over 10 percent per annum in China for the last two decades, with subnational governments playing a dominant role in urban infrastructure. Borrowing from the financial system has been important in supporting infrastructure investment (Liu, 2008). In the United States, bond instruments account for 60 percent of subnational infrastructure financing, with the remaining funding coming from taxation and grants (Peterson, 2005). For a detailed analysis of the development of subnational debt instruments, see Maco (2001).

An important aspect of the aforementioned framework is the monitoring of subnational debt and the establishment of debt limits to guide subnational entities' investment and borrowing plans. In particular, debt indicators and limits are useful to monitor borrowings and repayment capacity. But there is a trade-off in establishing debt limits: setting the thresholds too tight can hamper growth by severely restricting subnational infrastructure investment; while too relaxed thresholds can endanger macroeconomic and financial stability by encouraging excessive subnational borrowing. Given the macroeconomic and fiscal risks stemming from setting debt limits too high or too low, or even from not setting any limit whatsoever, the policy decisions on this regard should be properly informed.

Various research papers examine the core components of a regulatory framework comprising *ex ante* fiscal rules and *ex post* insolvency system.[5] On the *ex ante* fiscal rules, Liu and Waibel (2008) compare various indicators on deficit and debt limits across countries. This paper adopts a less descriptive and more normative stance by exploring a set of indicators to monitor fiscal and debt development at the subnational level, and presenting an analytical framework to inform policy decisions concerning debt limits. It pays particular attention to the importance of specific country context, the dynamic interactions of key determinants of debt sustainability, and the fiscal risks arising from debt-financed infrastructure investment. It also touches upon other key aspects of an institutional and regulatory framework suitable to govern subnational infrastructure financing and manage fiscal risks.

In addition to fiscal risks arising from debt-financed infrastructure investment, there are risks stemming from contracts for public-private partnerships (PPPs), which are outside the scope of this paper. Measuring and managing risks from PPP contracts requires a different framework that can partition risks between public and private interests. Macroeconomic policies, foreign exchange movements, the regulatory framework for tariffs, and the operational design, all influence the appropriate partition of the risks.[6]

The paper is divided into five sections. Section I presents the rationale for using fiscal rules and debt limits as part of governance structures. Section II discusses five strategic considerations for developing debt indicators in developing countries, and suggests some indicators suitable for SPVs and the subnational government's general budget. Section III explores further considerations of what will be required to implement thresholds for the indicators. Section IV develops an analytical framework to establish debt thresholds and assess debt sustainability, which could then provide a sound basis for policy decisions on debt limits. Section V concludes.

I. Fiscal rules and debt limits

Limits on government debt, as part of fiscal rules, should be established ensuring consistency with sound public finances and economic growth. A fiscal rule is defined as a permanent constraint on fiscal policy, expressed as a summary indicator of fiscal performance, such as the

[5] See Canuto and Liu (2010a), Liu and Waibel (2008, 2009).

[6] In developing countries, the value of PPP investments grew at an average annual rate of 28 percent between 1990 and 1997, followed by a slowdown after the East-Asian crisis. Growth resumed in 2003 and PPP investments reached over $15.4 billion in 2008 (Estache, 2010). For a review of fiscal risks stemming from public guarantee of PPP, see Irwin (2007) and Irwin and Mokdad (2010).

government budget deficit, borrowing, debt stock, or a major component thereof (Kopits and Symansky, 1998). The rationale for fiscal rules can be found in countries reacting against the deterioration of their public finances induced by deficit-prone discretionary fiscal policy. The strongest case for imposing fiscal rules is based on political-economy arguments: the rules aim at increasing the credibility of fiscal and borrowing policies by correcting the bias of short-sighted governments to accumulate public debt at the expense of future generations as well as the associated time-inconsistency issues. Of course, the benefit of gaining credibility must be weighed against the cost of losing discretion. Ultimately, striking a balance between gains and losses will depend on the country-specific circumstances in which the fiscal rules would operate.[7]

The rationale for setting debt limits for subnational governments is rooted in the potential free riding behavior among government units and the moral hazard and political pressure when subnationals default. Subnational governments might incur in debt excessively on the belief that, in the event of their own resources being insufficient to service debt, they may access a larger common pool of public resources administered by the central government, i.e. they face incentives for free-riding behavior. Financial markets lending to subnational governments may fail to impose discipline when private creditors themselves expect the central government to guarantee subnational debts and thus their own claims (Canuto and Liu, 2010a; Liu and Webb, 2010). Debt limits coupled with credible non-bail-out clauses can help impose discipline on fiscal and borrowing policies at the subnational level. As the experiences of Brazil and other countries suggest, the credibility and reputation of the non-bailout commitment by the central government is key to prevent moral hazard and opportunistic behavior by subnationals.

Debt limits for subnational governments must take into account the fiscal space available for the total public sector, i.e. national and subnational. For any given resources available to repay the total public debt, the borrowing space is ultimately split between national and subnational entities. This split should ideally reflect the relative position of both levels of government in terms of taxation capacity and expenditure responsibility, particularly concerning infrastructure investments, as well as the institutional arrangements for sharing resources.

Empirical research finds that government debt does affect economic performance through several real and financial channels, and, more importantly, that these effects tend to be negative (positive) at high (low) levels of debt. In particular, at low debt levels, government borrowing is an adequate means for financing growth-enhancing expenditures such as public infrastructure. When the government is able to tax the prospective growth dividend of such expenditure (mobilizing resources from the private economy to the fiscal budget), it will be possible to afford the cost of servicing debt without experiencing destabilizing budgetary and financial pressures in the future. Government borrowing may contribute to growth and macroeconomic stability by

[7] Drawing on international experience, Kopits (2001) examines the merits for and against fiscal rules and identifies three broad lessons. First, governments with a strong reputation for fiscal prudence do not need to be constrained by rules. Second, in countries lacking such a reputation, fiscal rules can indeed provide a useful policy framework that is conducive to macroeconomic stability and growth. Third, to enhance their usefulness, fiscal rules need to meet the criteria identified by Kopits and Symansky (1998): an ideal fiscal rule should be well-defined, transparent, simple, flexible, adequate relative to the final goal, enforceable, consistent, and supported by sound policies, including structural reforms if needed.

allowing the use of active fiscal policies to cope with cyclical fluctuations and global shocks (e.g. automatic stabilizers and ad hoc stimulus).

On the other hand, at high debt levels, public indebtedness tends to hamper economic growth through crowding out effects on private investment (associated with higher interest rates, debt overhang problems, etc.) and the imposition of heavy tax burdens that distort incentives to produce and invest.

Several academic and policy-oriented studies report total public debt thresholds laying somewhere in the range of 80-90 percent of GDP, which would draw the line between growth-enhancing effects of government debt and growth-hampering ones. Reinhart and Rogoff (2010) analyze 44 industrialized and developing economies over two centuries and find that the GDP growth rate for countries whose debt exceeds 90 percent of GDP is lower than that for low-debt countries. Kumar and Woo (2010) focus on 38 industrialized and emerging economies in a more recent period (1970-2007) and also conclude the debt threshold is around 90 percent of GDP. Caner, Grennes, and Koehler-Geib (2010) find a lower threshold at 77 percent of GDP based on the period 1980-2008. These studies differ in terms of samples and statistical techniques used, but they all reach a similar conclusion: the total public debt thresholds are fairly high as share of GDP. In addition, the studies report little correlation (if any) between growth and debt for low-debt countries, thus implying that, provided the thresholds are not breached and adequate institutions are in place, debt financing can safely be used to expand investment and boost economic growth.

The total public debt thresholds estimated in empirical studies, nevertheless, must be interpreted with caution and complemented with a country-specific analysis of growth determinants and fiscal arrangements. The studies indicated above rely heavily on cross-country evidence that might overlook the specific circumstances of a given country, especially those associated with growth determinants, fiscal arrangements, revenue structure, and financing terms. It might then be possible to find a different threshold value for a certain country if one focuses on its own time series for growth, debt, and other control variables. It is a challenge to translate thresholds established by empirical studies into debt limits guiding borrowing policies. In practice, debt limits are often set by historical averages, regional averages, or relying on econometric studies that provide estimates of debt levels that seem compatible with growth and macroeconomic stability.

‘Indicative’ (not legally-binding) total public debt thresholds were introduced in the European Union to coordinate fiscal policies and budgetary adjustment across member states, as part of multilateral policy coordination and surveillance arrangements. The European Union Maastricht Treaty builds an elaborated institutional architecture designed for the purposes of coordinating fiscal and borrowing policies from individual member states and monitoring their compliance with commitments made when joining the Union. It is explicitly acknowledged that states are sovereign entities in terms of policy decision-making, but the arrangements for coordination and monitoring are in the interest of all member states to address the externalities and feedback effects emanating from their policies (e.g. states borrowing too much could impose higher financial costs for the whole Union, or eventually require fiscal assistance from other states like Greece did).

As part of this broad institutional and political context, the Treaty establishes specifically that countries should conduct sound fiscal policies that either keep total public debt below 60 percent of GDP (for low-debt countries) or ensure a gradual convergence of debt towards that indicative threshold (for high-debt countries). The numerical thresholds for debt (60 percent of GDP) and deficit (3 percent of GDP) are 'indicative' because member countries are not legally obliged to meet them; however, there are other legally-binding obligations triggered by a failure to meet them (e.g. the obligation of undertaking a fiscal consolidation program agreed with other member countries).

Monitoring debt indicators and establishing debt thresholds require assessing the links between macroeconomic and fiscal developments as well as clarifying several definition and operational issues. In the case of the European Union, the 60 percent debt-to-GDP ratio was the historical average value for France and Germany in the 1970s and 1980s, when the two countries had reached advance-economy status (starting from the World War II devastation), developed a solid Welfare State, and avoided major debt and financial crises along the way. The Treaty implicitly deems that such a figure would be compatible with growth, macroeconomic stability, and fiscal solvency in all member states, given the historical experience of the two most successful members. In monitoring the debt indicators and thresholds, member countries and Eurostat have agreed on the definition of total public debt, which includes all liabilities of the national and subnational governments, but excludes state-owned enterprises that are financially self-sustained and run on commercial basis (i.e. charging goods and services provided, and borrowing on market terms). As a consequence of the global crisis and the bailouts to financial institutions, efforts have been recently made to incorporate the contingent liabilities absorbed by all levels of government into the debt definition.

II. Strategic considerations for developing and monitoring country-specific subnational debt indicators

Countries differ in terms of why it is necessary to monitor debt indicators and establish debt limits on subnational governments. In some developing counties, the excessive indebtedness incurred by subnational governments in the past has raised solvency and liquidity issues and thus warranted the imposition of very restrictive debt limits. In others such as China, instead, with low sovereign debt, large domestic savings, rapid economic growth, and fast urbanization, the main concern is to develop an effective institutional and regulatory framework under which subnational governments can mobilize resources from the capital markets to finance large-scale infrastructure investment to support growth and urbanization. Subnational debt indicators and limits should be seen as part of that broad framework and not just simply as means for restricting future new borrowing for its own sake.

To develop country-specific subnational debt indicators and limits, it is important to bear in mind five strategic considerations concerning: (i) the overall fiscal space available for both national and subnational government entities; (ii) the importance of assessing financing development needs and the existing contingent liabilities; (iii) the possibility of distinguishing between subnational governments' general budget and financially-viable special purpose vehicles (SPVs) in order to monitor differentiated debt indicators; (iv) the necessity of designing analytical tools and models (e.g. a macro-fiscal framework and a debt dynamics analysis) to help explore

appropriate threshold values constraining debt indicators as well as to monitor compliance of budgetary and borrowing plans with the debt limits; and (v) the importance of gradually build a broad fiscal architecture for policy coordination and surveillance, and not just establish mechanic rules isolated from any institutional foundation. Each of these five considerations is discussed in detail below.

First, it is important to develop subnational fiscal indicators and debt limits within the overall context of the total public debt. Based on cross-country empirical evidence that high levels of total public debt are pervasive for economic growth, authorities might consider the use of fiscal rules and debt limits to prevent the public debt from exceeding that threshold. With the fiscal space available for the public sector being limited by the threshold, it follows that the level of sovereign debt matter for determining a limit on subnational debt. A growth-based total public debt threshold for a certain country could be estimated and might differ from the values found in empirical studies (80-90 percent of GDP) reported in section I. For the purpose of the illustration, however, let us assume it is around 70 percent of GDP – a figure between the EU's 60 percent indicative debt threshold and the empirical studies' lower bound of 80 percent. If the existing sovereign debt is relatively low at 30percent of GDP, there would be a maximum space for subnational debt and other quasi-public agency debt of 40 percent of GDP.[8] The space for further subnational borrowing to finance infrastructure investments going forward will depend on the accurate estimates of the existing stock of subnational debt and other quasi-public agency.

However, given the potential evolvement of a country's sovereign debt and the need to manage fiscal risks, the subnational debt limits might have to be fixed at a level below what the fiscal space currently available for subnational governments might suggest. The fiscal space for subnational debt in the years to come will depend, *inter alia*, on how the level and structure of the sovereign debt evolves. For example, as some middle-income countries move towards a high-income status, the expansion of social safety nets managed at the national level (e.g. healthcare and pensions associated with an aging population) is likely to affect the dynamics of the sovereign debt as a proportion of GDP.[9] In addition, the total fiscal space for subnational debt might suddenly narrow as unexpected events can trigger the transfer of liabilities from state-owned and private entities to the government budget. In this regard, a lesson drawn from the recent global financial crisis, where in several countries private-sector balance sheets have been put on the public-sector domain (e.g. US, UK, Iceland, Ireland), is that not only public but also private debts and sources of contingent liabilities should be monitored carefully.

It is thus sensible to monitor the *aggregate* total subnational debt-to-GDP ratio, covering the total liabilities of subnational entities. Monitoring the total subnational debt-to-GDP ratio would

[8] SPVs and other public investment vehicles with self-sustaining financing would be excluded from this 70% of total public debt limit.

[9] It will be helpful to analyze the sustainability of the sovereign debt as it impacts the fiscal space for subnational debt. In any country and for all levels of government, debt sustainability is determined without exception by three key variables: economic growth, cost of borrowing, and fiscal policies determining the primary balance. For instance, cost of borrowing could increase as the result of tighter monetary policy to manage inflation. The pressure on primary balance may rise due to increasing outlays on social safety nets, health care, pensions, and other expenditures relating to the changing demographics. The debt sustainability analysis would focus on whether projections of sovereign debt meet solvency conditions – often derived from the intertemporal budget constraint or from a certain debt target. If rapidly-increasing paths for sovereign debt were identified, the analysis would inform the fiscal measures necessary to restore sustainability.

seek to ensure that the fiscal space for total public debt can be appropriately divided between the central government, on the one hand, and all the subnational governments, on the other. In our view, a limit on the total subnational debt stock – scaled by a broad measure of income-generation capacity of the whole economy such as GDP - should be applied only at the aggregate subnational level and monitored by national authorities. Monitoring compliance with such a limit would help achieving some degree of coordination among the major subnational governments in terms of their borrowing policies.[10]

Second, the debt indicators and limits imposed on individual subnational governments should be consistent with the developmental goals pursued by the authorities and the containment of fiscal risks. The subnational debt limits would help ensure sustainable borrowing by subnational governments going forward, given their existing financial relations with SPVs (e.g. contingent liabilities). Debt limits are not supposed to prevent subnational entities from borrowing but to make sure that prospective indebtedness only finances capital investments (not operating spending, which should be covered by ordinary revenues) and that returns to investment are sufficient to afford the cost of capital.

It is therefore essential to estimate the order of magnitude of the financing needs that local governments will face to undertake infrastructure investment projects, and to quantify the contingent liabilities from SPVs. Two issues should then be addressed:

(i) How much new borrowing subnational governments require to finance their development needs, say, for instance, to achieve a total urban infrastructure investment amounting to a target, for example 10 percent of GDP per year over the next 10 years.[11]

(ii) What is the magnitude of the subnational governments' existing contingent liabilities emanating from loss-making non-financially-viable SPVs. Efforts should be made to collect information on SPVs' debt as well as other sources of contingent liabilities.

Third, monitoring subnational debt requires the use of quantitative indicators and the setting of their corresponding threshold values. Drawing a clear distinction between subnational governments' general budget and financially-viable SPVs would allow for using differentiated debt indicators, reflecting the specific nature and purpose of these entities. Concerns about subnational debt typically refer to solvency, liquidity, and capacity to finance capital expenditures, and in practice there are standard, widely-used indicators to monitor each of these three issues. In some countries, solvency and liquidity might not be perceived as pressing issues

[10] Theoretically, it would be possible to apply a limit to each *individual* subnational government's debt-to-GSDP ratio, where GSDP is the gross subnational domestic product and represents a measure of income-generation capacity of the local economy. This would implicitly allocate the limit on *aggregate* total subnational debt-to-GDP ratio among the individual subnational governments, according to the relative size of their local economies. Nevertheless, in our view, a limit on the *individual* subnational government's debt-to-GSDP ratio misses two relevant issues: the heterogeneity in the cost of borrowing facing local government depending on their solvency and risk prospects (discussed later in this section); and the imperfect relationship between GSDP and the revenue effectively appropriated by the local governments (discussed in section III.B).

[11] As mentioned in the Introduction, at national level, estimations on future infrastructure investment requirements vary greatly by income level. Private participation in infrastructure alleviates the burden on subnational public finances and can be encouraged through PPP. In practice, however, low-income and lower-middle income countries facing a chronic financing gap have witness a substantial drop in private investment during the crisis and hence additional funding must be sourced from the public sector for the recovery to sustain.

because the current debt levels are low, the sources of finances are relatively stable, and government revenues are growing. However, solvency and liquidity problems might arise in relation to the non-financially-viable SPVs, the magnitude of contingent liabilities borne by subnational entities, and the financially-weak regions.[12] On the other hand, as stated above, the main concern with subnational debt is the extent to which it can be used to finance infrastructure investment going forward. In this context, monitoring could focus on indicators tracking the nature of expenditures being financed through debt, while the debt limits could be 'golden rules', e.g. the restriction that the operating balance must be zero over the cycle, meaning that in the medium-term indebtedness only finances capital expenditures.[13] In any case, given the different nature and purpose of the subnational entities, the debt indicators and limits used to monitor the general budget must be different from those used to monitor financially-viable SPVs.

SPVs

Companies and special vehicles created by subnational governments with the sole purpose of undertaking infrastructure projects should be allowed to borrow on market terms as much as these projects require and their returns can afford to repay. It would be the investors' assessment of return-risk profiles, which typically includes an appraisal on how much debt a company of certain characteristics operating in a certain sector can sustain, that ultimately set the debt limit for the investment company. For instance, SPVs in the United States carry out infrastructure investment at the subnational level. They undertake projects, charge the services provided and borrow against the operational revenue stream, and report corporate-like transparent balance sheet and financial statements.[14] Borrowings from the New York-New Jersey Port Authority, an independent joint endeavor by the two states, are not subject to the debt limits of either the New York State or the State of New Jersey, but are subject to the additional debt tests and other contractual criteria established in the borrowing contracts set by the market.

In the case of developing countries, as market participants' learning should be nurtured initially before they can operate effectively, it is advisable to establish debt limits on financially-viable SPVs: at minimum, a **'golden rule'** to ensure borrowing only finances capital expenditures, and an indicative **debt-to-revenue ratio** (preferably revenue net of operating expenditures) that would vary across infrastructure sectors and ensure operations are profitable enough to repay direct debt.

[12] Solvency is an issue when subnational entities are already highly indebted and experience severe difficulties to service debt for a protracted period of time (e.g. Brazilian states in the 1990s). Solvency indicators refer to both the overall debt burden originating the full stream of debt service (principal plus interests) going forward and the resources available for repayment: e.g. debt-to-GSDP or debt-to-revenue. Liquidity is a concern, instead, when subnational entities are solvent but nevertheless they experience difficulties in servicing debt. The difficulties to access stable financing sources do not result from the borrowing entity being openly insolvent but from lending counterparts having problems of their own (e.g. banks being under funding stress, coordination failures among bond holders, and financial market volatility). In anticipation of the possibility of facing these difficulties, the risk of refinancing should be *ex ante* managed and mitigated by the subnational governments. Liquidity indicators then focus on both the short-term debt service obligations and the resources available for repayment if it were not possible to roll over maturing obligations: e.g. debt service-to-GSDP or debt service-to-revenue.

[13] Operating balance is defined as total revenue minus current expenditures, or alternatively, as the overall budget balance plus capital expenditures.

[14] SPVs providing social services such as the school districts can also issue debt in the United States.

As the governance structures, accounting rules, and market disclosure regimes for SPVs are still being developed, the central government will need to carefully monitor the debt of all SPVs, not only those non-financially-viable but also those who can access market financing on their own financial strength. The principle that all SPVs' liabilities must be monitored is motivated by the fact that they ultimately constitute sources of contingent liabilities for the central and local governments, who may be called to assume responsibility if the SPVs' financial conditions deteriorate.

Subnational government general budget

Expenditure mandates and revenue sources of a subnational government's general budget are much broader than those of individual SPVs. The general budget undertakes a range of expenditures (e.g., health, education, social safety nets) in contrast to for example an SPV operating in the energy sector. Similarly, the revenue sources include own revenues, shared revenues, earmarked transfers from the central government, and block grants. In fact, the budget systems largely differ across countries and their specificities should be properly addressed when designing subnational debt indicators for monitoring purposes.[15]

At the subnational level, SPVs in developing countries are expected to continue to be an important vehicle for borrowing to finance infrastructure investment. If subnational governments are legally permitted to access the market for debt financing, their direct borrowing will need to be monitored and governed by fiscal rules. It would then be advisable to establish debt limits on the subnational government general budget: at minimum, a **'golden rule'** (as also proposed for SPVs) and an indicative **debt service-to-own revenue ratio**. The next paragraphs elaborate on the case for establishing these two limits and discuss some related strategic issues concerning what the purpose of subnational borrowing is and what an appropriate measure of repayment capacity by local governments is.

A 'golden rule' could be imposed on the general budget if subnational governments still retain responsibility for certain capital expenditures beyond those transferred to SPVs. The 'golden rule' is useful to ensure that subnational borrowing does finance public investments and is not diverted to other uses. To be effective, however, it should be accompanied by a sound framework for public investment project appraisal (including cost-benefit analysis) and transparent accounting practices (to avoid creative accounting as well as misclassifications between current and capital spending).

The debt service-to-own revenue ratio is a useful indicator to monitor the borrowing capacity of the *individual* subnational government through its general budgets. Any limit imposed on this indicator should be applied uniformly to each individual subnational government's general budget, i.e. all subnational governments should face the same quantitative limit on their debt service-to-own revenue ratio. Doing so, the local governments enjoying lower cost of borrowing and higher capacity to collect own revenues would be allowed to use relatively more debt financing to support infrastructure investment. On the other hand, the local governments facing high borrowing costs and difficulties to mobilize resources would have to seek for other means

[15] Despite of the country heterogeneity in terms of budget systems, the public-finance accounting identities are conventional and hence apply universally to all countries and to all levels of government. For instance, it is always true that the difference between total expenditures and total revenues defines the budget deficit and must be financed through borrowing or asset depletion or both.

to finance infrastructure investment, e.g. lagging regions or small rural governments could receive financial support from the national government through explicit capital transfers or other earmarked subsidies. Imposing a limit on the debt service-to-own revenue ratio, therefore, would ensure that local governments have a minimum financial capacity to afford debt servicing and create incentives to increase revenue collection at the local level – since additional revenue allows for both increasing operating primary expenditures and contracting additional debt.[16]

The debt service-to-own revenue ratio intends to reflect the subnational government's repayment capacity (denominator) in relation with the current debt service obligations (numerator). An issue arises naturally in this regard: what revenue items adequately reflect debt-servicing capacity and thus should be included in the denominator under the label of 'own revenue'? An exhaustive classification of revenue items as 'own revenue' or 'non-own-revenue' would require a detailed case-by-case analysis of all revenue sources available to a subnational government. But a few general principles can guide the identification of revenues that truly represent debt-servicing capacity for the subnational government:

(i) A revenue item to be included in the denominator as 'own revenue' should constitute a source of funds whose expected availability over an extended period of time would justify incurring into debt today and assume debt service obligations over the future. This principle would then exclude one-off revenues – such as privatization receipts and land leasing - from the 'own revenue' definition.[17]

(ii) The subnational government should be able to appropriate the revenue item regularly on the basis of a well-defined legal framework. Accordingly, the 'own revenue' definition would include both the taxes collected at local level based on local tax laws, and the taxes collected by the central government but transferred regularly to subnational governments on the basis of well-defined co-participation or revenue-sharing agreements.

(iii) The subnational government should have control over the use of funds provided by the revenue item. This principle would then exclude earmarked transfers by the central government from the 'own revenue' definition, as the use of funds is restricted by the purpose of the transfers.

The intergovernmental fiscal reforms in many developing countries have made progress in defining subnational government own and shared revenues. A key issue is whether transfers from the central government should be counted as part of revenues in the debt service-to-own revenue ratio. The basic principles indicated above suggest that the inclusion will depend on whether such transfers are predictable, regular, and non-earmarked. Given the fiscal transfers system and the complexity of off-budget revenues, it will be useful to undertake further efforts to identify and characterize the revenue sources available to subnational governments for the purpose of defining the capacity to service debt.

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[16] The subnational government general budget bears fiscal risks from the contingent liabilities of the non-financially-viable SPVs, and hence its own resources might also be needed to cover SPVs' losses and financial gaps. The relationship between the limits on the aggregate total subnational debt-to-GDP ratio and the individual subnational government's debt service-to-own revenue ratio is explored in section IV.

[17] If the revenue originated in privatizations and land leasing were saved and invested in a well-managed fund, the flow of cash returns yielded by that fund would constitute 'own revenue' because it is the return of an investment and not the result of an asset sale or leasing.

Fourth, it is necessary to develop basic analytical tools and models for monitoring subnational debt indicators. In particular, a sound analytical framework should inform policy decisions aimed at establishing country-specific numerical debt limits for the general budget – for instance, the debt service-to-own revenue ratio must be no more than xx percent.[18] Although the numerical thresholds for debt indicators used in other countries can provide some references[19], they should not be mechanically adopted without considering a country's specific context. There is a trade-off in establishing subnational debt limits: setting the thresholds too tight can hamper growth by severely restricting subnational infrastructure investment; while too relaxed thresholds can endanger macroeconomic and financial stability by encouraging excessive subnational borrowing. Given the macroeconomic and fiscal risks stemming from setting debt limits too high or too low, the policy decisions on this regard should be properly informed.

A basic analytical framework is necessary to determine a range of country-specific numerical thresholds that can later inform policy decisions concerning debt limits on the subnational government general budget and SPVs. In general terms, the analytical exercise applies to a representative (stylized) local government and calibrates thresholds iteratively so that the subnational borrowing projected going forward meets two conditions: the projected borrowing is sufficient to finance the estimated infrastructure investment needs, given other financing sources and the medium-term macroeconomic and fiscal outlook; and the projected borrowing is judged feasible given the actual opportunities provided by financial markets and the pressures exerted by other spending responsibilities (e.g. safety nets, education, operation and maintenance of infrastructure assets). Section IV provides a detailed description of the analytical framework.

Fifth, developing debt indicators could be part of a broader strategy to put in place an adequate fiscal architecture to coordinate and monitor the budgetary and borrowing policies conducted by individual local governments, recognizing fiscal autonomy as well as externalities and feedback effects. International experience has shown that certain arrangements are effective in this regard:[20]

(i) The development of a medium-term macro-fiscal framework (MTMFF) that ensures consistency between the macroeconomic outlook and the budgetary and borrowing plans of subnational governments. The MTMFF must rely on a proper classification and accounting of expenditures, revenues, existing direct debt instruments, contingent liabilities, and cash flows between the subnational governments and their SPVs. The MTMFF must be tailored to a country's budgetary system.

(ii) Discussion and surveillance of the budgetary and borrowing plans of subnational governments, to ensure transparency and monitor compliance with debt limits as well as with long-term fiscal sustainability criteria.

[18] The specific numerical value xx percent is referred to as the 'numerical threshold', which is eventually imposed as a debt limit.

[19] Box 1 in section III.B presents international experience concerning debt limits.

[20] The European Union has adopted some of these arrangements but they are not to blame for fiscal problems observed during the crisis. It is only in Greece that the European fiscal framework failed to contain excessive public deficit and borrowing. Ireland and Spain, on the contrary, had the public sector running surpluses and it was the private sector which overborrowed. Subsequently, once the crisis contracted economic activity, the combination of falling revenues, fiscal stimulus, and financial bailouts led to severe deterioration of public finances.

(iii) The development of an early-warning system to identify gross budgetary imbalances early in time and help prevent potentially-destabilizing public-finance trends at the subnational level.

III. Subnational debt indicators

III-A Summary of the proposed debt indicators

Following the strategic guidelines discussed in section II, we propose a minimum set of five indicators to monitor debt and associated fiscal risks:

(i) The **total subnational debt-to-GDP ratio**, in order to monitor the aggregate debt of all subnational entities.
(ii) The **debt service-to-own revenue ratio**, applied uniformly to each individual subnational government general budget, in order to ensure financial capacity to service debt and provide incentives for own revenue collection.
(iii) A **'golden rule'** (e.g. operating balance must be zero, preferably over the cycle) applied to both SPVs and subnational government general budgets, in order to promote debt-financed infrastructure investment.
(iv) An **infrastructure sector-specific debt-to-revenue ratio** (preferably revenue net of operating expenditures), applied to financially-viable SPVs, requiring operations to be sufficiently profitable in cash terms to repay SPVs debt obligations; the industrial sector-specific norms observed in the developed countries such as U.S. could provide a basic guideline but efforts to estimate country-specific norms need to be made.
(v) The **guarantees** extended by subnational governments to SPVs and other subnational entities, which are a source of contingent liabilities.

The five indicators discussed above will help ensure sustainable subnational borrowing, contain fiscal risks, and manage contingent liabilities. In addition, the central government could establish a self-selective process: only those subnational governments that have undertaken fiscal and governance reforms and received a market-based credit rating, can access the market borrowing. If market-based credit ratings are not yet ready, the central government could design a credit rating system and monitor compliance with the debt limits.[21]

It is important to note that countries differ significantly on the constitutional framework assigning powers between tiers of the government. In a federal country such as the United States, states have sovereign power and decide their own borrowing framework. There is no monitoring role given to the federal government. In India and the United States, states have considerable authority over the fiscal affairs of their local governments, while in Brazil, municipalities have legislative power under the constitution but the fiscal responsibility law governs all three tiers of

[21] Brazil's Fiscal Responsibility Law had set a limit of 200 percent on the debt-to-net current revenue ratio (current revenue net of certain national government transfers). Some states and small municipalities that were well below this limit believed that they would be able to borrow until 200 percent of their revenues without problems and took the threshold as a floor and not as a ceiling. Such a behavior should be prevented, and this justifies imposing pre-requisites on subnational borrowing like the availability of credit ratings.

the government. Therefore, who has the authority in deciding and monitoring the specifics of the fiscal rules and debt limits will depend on the country's constitutional and legal framework.

III-B Subnational debt indicators – Further considerations for subnational government general budgets

Subnational government general budgets could be monitored using indicators (i), (ii), and (iii), which are in line with international practices (see Box 1 below), and the guarantees indicated in (v) should be adequately quantified and monitored. Some further considerations on the definition and operationalization of the indicators are in order, concerning measures of repayment capacity, fiscal risks associated with land financing, arrears, and guarantees.

Box 1: International practice on debt indicators and limits

US states mainly follow golden rules constraining the operating balance to be zero, thus debt must be used to finance capital expenditures. Rules governing subnational borrowing vary across states and depend on the type of debt issued, the revenues used as collateral, and the type of government entity issuing debt. Markets play a key role in fiscal surveillance.

Brazil's Fiscal Responsibility Law sets a limit of 200 percent on the debt-to-net current revenue ratio (current revenue net of certain national government transfers), so there is a legal limitation on the amount (not the use) of new debt flows. It also imposes a limit of 11.5 percent on the debt service-to-net current revenue. Debt restructuring agreements between federal and state governments established a comprehensive list of fiscal targets.

Colombia's extensive legislation on government debt established a traffic-light system to regulate subnational borrowing. States in the red-light zone, with the debt-to-current revenue ratio above 80 percent and the interests-to-operational savings ratio exceeding 40 percent, are prohibited to borrow.

India imposes a ceiling on budget deficit-to-GSDP ratio of 3 percent for all states and requests them to gradually close the current deficit. In addition, those whose debt service exceeds 20 percent of revenue are deemed to be at 'debt stress' and the national government closely monitors all new borrowings.

Poland sets a limit of 60 percent on the debt-to-revenue ratio, restricting the amount of indebtedness, and a limit of 15 percent in the debt service-to-revenue ratio. As soon as the local government debt exceeds 55 percent of revenue, however, the debt service must be reduced below 12 percent of revenue.

Source: Liu (2010), Liu and Waibel (2008)

Own revenue should be the preferred measure of debt service capacity. While the total subnational debt-to-GDP ratio refers to the economy-wide GDP as the relevant measure of aggregate repayment capacity, the debt service-to-own revenue ratio focuses on own revenue of subnational governments. International experience indicates that there are a number of reasons for using own revenues, not local GSDP, as the relevant measure of repayment capacity by local

governments. First, it is own revenue that actually provides financial resources to the subnational governments to service debt. Second, measures of GSDP at local level are often inaccurate, if available at all. Third, local GSDP might not be sufficiently correlated with the tax bases relevant for own revenue collection (e.g. taxes on housing properties valued at historical costs). Furthermore, local GSDP can also exhibit little correlation with total revenue (i.e. both own revenue and transfers from the national government), especially when the intergovernmental transfer system puts strong emphasis in regional equity and then the transferred amounts are not proportional to the local GSDP of each state. Similarly when the local GSDP is resource-based but the resource-related taxes are collected by the national government and then share among all states.

Concerns about the cyclicality of revenue collection are tempered in countries where strong growth trends prevail over cyclical fluctuations. In any case, it is possible to utilize historical averages of revenue ratios over recent years (say, the last three) to determine a cyclically-corrected representative measure of repayment capacity. Efforts to identify and assess sources of subnational own revenue should be made, taking into account the specificities of local government budget structure.

Land leasing revenue and privatization receipts should be separated from genuine own revenues generated by subnational governments. In particular, while the later finance operating expenditures, the proceeds resulting from the former two sources should finance capital expenditures or be saved in fiscal funds (useful to support active policies to cope with cyclical fluctuations and global shocks). Land leasing and privatization are widespread means to raise revenue by subnational governments. Land leasing could be assimilated to an asset sale since the use of land is ceded for several years in exchange for an upfront payment. Inventories of land owned by municipalities or other government entities are basic to leasing operations. To ensure transparency, all information on public land inventories, public land valuations, and land contributions to public-private joint ventures should be conducted through standardized instruments and be reflected in the budget. To prevent excessive land leasing, regulations may require subnational governments to certify that land is not needed for public purposes and prohibit any transfer of surplus land to other government entities or private developers, except on a fully disclosed contract basis.

Land leasing and privatization proceeds should ultimately finance investment or be accumulated in a fund, as with any other revenue of a ‘one-off’ nature. Establishing a specialized institution that could receive land-leasing and privatization proceeds and allocate them according to pre-defined budgetary rules, within multi-year planning, would greatly improve transparency and budget management.[22]

Arrears should be monitored closely and included into the definition of subnational debt covered by the debt limits through transparent accounting practices. Arrears are indeed pending

[22] There is also a possibility of using land to collateralize loans and bonds issued by local governments, but it implies large fiscal risks to the extent that land values are uncertain and volatile. Regulation on potential lenders should then prevent excessive borrowing with land collateral, e.g. rules could set minimum collateral/loan ratios for land-backed loans and prescribe that for land collateral must be valued at current market prices. Special regulation, in addition, should address issues of land price volatility and the dependence of land values on the completion of major infrastructure and development projects. For more discussion on managing fiscal risks of land financing, please see Peterson and Kaganova (2010).

obligations with suppliers, workers, or other creditors, and must be accounted for at face value as part of the subnational debt stock when computing the total subnational debt-to-GDP ratio. A strong incentive for subnational governments not to incur arrears would result from including the full amount of arrears originated in any given year as part of the debt service falling due the next year, when computing the debt service-to-own revenue ratio.

Guarantees should be also monitored and included into the subnational debt definition, with the associated fiscal risk quantified. Guarantees can play a useful role in bridging financing for projects that have public policy justifications or whose underlying economic values are not fully recognized by markets. There are incentives for risky borrowers to seek guarantees and for inter-related public entities to support one another obfuscating the financial risks being assumed, but these do not warrant prohibiting guarantees altogether. Indeed, the fiscal risks of guarantees can be mitigated and managed as any other risk: e.g. private companies may be prohibited from getting guarantees; guarantees extended by subnational governments to SPVs' borrowing contracts should be treated as contingent liabilities and fully disclosed to the public in financial statements.[23] In addition, the expected losses from guarantees being called must be quantified (possibly using analytical models) and incorporated, partially or totally, into the subnational debt stock. International practices reported in Box 2 can be useful in this regard.

Box 2: International practice on guarantees

France sets a number of prudential rules regulating guarantees and contingent liabilities. For subnational governments, annual debt service including those paid on loans guaranteed cannot exceed 50 percent of operating revenue; no single borrower may benefit from a guarantee exceeding 5 percent of operating revenue; and guarantees cannot exceed 50 percent of the debt of the entity receiving the guarantee. If extending guarantees, subnational governments are required to deposit cash with the central government, which carries out all payments subject to a legality control.

Poland imposes on local governments that the debt service including that related to guarantees extended to their public enterprises (regardless of whether they are called or not) cannot exceed 15 percent of revenue.

India's states have differentiated regulations for guarantees, but the most common ones are capital guarantees offered by the state as a share of revenue or GSDP.

Source: Liu (2010)

[23] International experience indicates, although implicit guarantees may not be recognized by legislation as contingent liabilities for subnationals, the private lenders do and with a reason: in the event of several subnational SOEs experiencing large-scale financial problems, some form of public intervention could be triggered by political and social considerations and thus the general budget would be absorbing losses (i.e. 'too-big-to-fail' and 'too-many-to-fail' phenomena).

III-C Subnational debt indicators – Further considerations for SPVs

Financially-viable SPVs could be monitored using indicators (iii) and (iv). However, further considerations on the regulation of SPV's borrowing should be taken into account, as discussed in the remaining of this section.

SPVs should be granted ample space for borrowing to support infrastructure, but regulation and monitoring are needed as well to complement market discipline. SPVs perform their purpose well when both market-based criteria guide financial decisions and an effective regulatory framework is in place.

All SPVs' debts should be counted as public debt, but if a SPV is financially self-sustainable (except for the initial capital injection from the government), then its debt limit should not be the same as the one discussed above for the subnational government general budget.[24] A regulatory, sector-specific value for the operating revenue-to-debt service ratio should be established, and the rates and tariffs charged for services provided by the SPV must be adjusted accordingly to ensure such value is met, i.e. a rate covenant. For instance, in the US, a typical rate covenant for a water/sewerage utility is to set rates so that projected annual operating revenues exceed 1.25 times the total debt service over a certain time horizon. Compliance with historical and projected ratios is actually a legal requirement for the issuance of additional debt. In addition to the operating revenue-to-debt service ratio, Box 3 provides international experience on other aspects of SPV regulation.

The purpose and legal arrangements of a SPV have implications for fiscal risk management. Consider a SPV managing a PPP that is purely an off-budget fund and receives some dedicated revenues (e.g., gasoline tax) to finance a particular type of investment (e.g., roads), but not viable financially on its own and requires annual budgetary support in addition to the initial equity injection. The simplicity of such a legal entity makes it possible to consolidate the fund into the general government balances for the treatment of fiscal risk. Thus, the fiscal rules on the budget should allow for an adequate level of investment, maybe using a golden rule or a limit on the overall fiscal balance permitting some deficit. A SPV established as a company providing infrastructure services (e.g., water) or constructing and maintaining a physical asset (e.g., toll road) is more involving. If the government has a large ownership share in the SPV, fiscal risk assessment requires detailed information from balance sheet and income statements, and risk mitigation might involve setting specific thresholds for investment and indebtedness. If the SPV is mainly privately-owned, it seemingly poses less risk on public finances. A number of factors would indeed determine the true exposure of budget to the SPV's performance and hence the extent of contingent liabilities: the quality of local bankruptcy law and legal framework that should induce market discipline; the existence of explicit government guarantees (partial or full) on the company's debt; the moral hazard associated with the public interest in assuring no disruptions in service, etc.

[24] In the EU framework, the limit on debt at 60 percent of GDP excludes the liabilities of entities created by subnational governments that are financially-viable and independent.

Box 3: International experience on SPV regulation

Bonds and loans should be payable from a special fund where revenues generated by the SPV's investments or a special tax collection are deposited. The special fund avoids that the funds for debt repayment be diverted to the subnational government's general budget or commingled in such manner as to lose their separate identity.

Restrictions on the sale of property assets related to the operation of the SPV must be established to ensure that the remaining property assets are sufficient to meet the SPV's liabilities.

SPV must follow sound accounting standards (e.g. GAAP) and disclose annual financial statements which are independently audited.

A legal opinion needs to be issued for each bond issuance, certifying that the bonds comply with existing regulations and the issuer has legally-binding obligations to service the debt incurred. If applicable, the legal opinion should also indicate the existence of any rate covenant and special fund to repay debt.

Regulations can be imposed also on the lenders financing SPVs to contain the risk of non-performing loans and excessive lending. For instance, lenders must set aside risk-adjusted capital reserves, with higher (lower) reserves required for less (more) creditworthy SPVs, so that the relationship between the markets' lending and credit risk assessment are reinforced through regulatory action.

Source: Liu (2010)

IV. Analytical tools for monitoring subnational debt indicators and determining debt thresholds

Subnational debt thresholds seek to ensure subnational indebtedness is both sufficient to finance infrastructure investment expenditure and consistent with debt sustainability. It is then natural to help determine these thresholds by using analytical tools that are standard in the assessment of debt sustainability, namely a macro-fiscal framework and a debt dynamics model. The basic elements of these analytical tools are described in the following paragraphs.

For any level of government in any country, the stock of its debt (measured as a share of GDP, GSDP, revenue, or any other variables associated with repayment capacity) depends on four key variables: (i) the public debt stock inherited from the past, which results from past borrowing choices; (ii) the primary balance, associated with the current fiscal policies and institutions concerning taxation, spending patterns, and schemes for revenue-sharing between different government entities; (iii) the cost of borrowing, represented by the average interest rate charged on the inherited public debt stock; and (iv) the growth rate of the repayment capacity-related variable, e.g. the growth rate of GDP, GSDP, or revenue.

Thus, in practice, a standard debt dynamics model applied to a subnational government would postulate a basic equation to determine the subnational debt-to-GSDP ratio:

$$D_t = \underbrace{D_{t-1}}_{\substack{Inherited \\ debt}} + \underbrace{PD_t}_{\substack{Primary \\ deficit}} + \underbrace{\frac{i_t}{1+\hat{Y}_t} D_{t-1}}_{Interest\ cost} - \underbrace{\frac{\hat{Y}_t}{1+\hat{Y}_t} D_{t-1}}_{Growth-dividend}$$

where D_t denotes the debt-to-GSDP ratio at end of year t, PD_t is the primary deficit as share of GSDP, i_t is the average interest rate paid on the inherited subnational debt stock (determining the interest costs of carrying debt), and $\hat{Y}_t$ is the growth rate of nominal GSDP (determining the growth-dividend).[25]

As the equation above indicates, an outlook for both macroeconomic and fiscal variables is necessary in order to help determine debt thresholds compatible with debt sustainability and to analyze subnational debt dynamics. The debt ratio depends on past and current decisions made by the subnational government, especially its past borrowings choices and its current fiscal policies and institutions. But the equation also indicates that the debt ratio is affected by macroeconomic variables on which the subnational government has certainly much less control, such as monetary policy-determined interest rates and GSDP growth. In fact, macroeconomic variables are key determinants of the debt ratio over and above the policy choices made by the subnational government. For instance, a sharp increase in the cost of borrowing or a severe slowdown in national economic growth can lead to a jump in the subnational debt-to-GSDP ratio regardless of how conservative a local government could be in terms of running primary surpluses and seeking limited borrowing from its financing sources.

The macroeconomic and fiscal variables involved in the debt dynamics equation are neither isolated nor determined independently. On the contrary, they often depend on each another and several interactions and feedback effects between them are observed in practice. For instance, the national and subnational revenues depend on the nation-wide and regional-wide level of economic activity, respectively; the growth rates of output depend on infrastructure investment expenditure (which is part of the primary balance in the equation above); the resource transfers between a local government's general budget and its SPVs depend on the financial positions of both entities; etc. An analytical framework modeling these interactions and feedbacks over a certain projection horizon is referred to as a macro-fiscal framework. Since the construction of a macro-fiscal framework adapted to the specificities of a subnational government allows for an adequate representation of causal relationships between variables affecting the subnational government's debt ratio, such a framework is actually a pre-requisite for the determination of debt thresholds and the analysis of subnational debt dynamics.[26]

[25] For further technical details, see Ley (2009), Biraschi and Pradelli (2009), and Ianchovichina, Liu, and Nagarajan (2007).

[26] Section IV.B presents a more sophisticated version of the debt dynamics equation that incorporates key interactions and feedback effects for the purpose of determining subnational debt thresholds.

IV-A Determining threshold values for subnational debt indicators – Basic principles

Analytical tools, especially a macro-fiscal framework and a subnational debt dynamics model, are necessary to inform policy decisions concerning the threshold values that would restrict subnational debt indicators. The determination of appropriate debt thresholds for local governments involves a number of steps:

(i) Establishing a medium-term macro-fiscal framework for a representative (stylized) local government, which models key relationships between macroeconomic and fiscal variables involved in the debt indicators (numerator and denominator) and projects these variables into a prospective time horizon (say 10 years); projections should include economic growth, cost of borrowing, interaction of currency and interest rate movements, and potential global shocks such as rising food and commodity prices.

(ii) Establishing medium-term infrastructure capital expenditures, which should be consistent with the city's master plan for urbanization, thus implying coordination of national and subnational efforts.

(iii) Establishing a medium-term framework for other critical expenditure items including operation and maintenance (O&M, needed to ensure physical assets built today would be functional tomorrow), education, health, social protection, subsidies for the poor, and expenditures associated with demographics. [27]

(iv) Estimating medium-term non-debt resources available to finance the infrastructure investment expenditures identified in step (ii), such as own revenues, transfers from the central government, and sustainable asset-backed revenues, given the macroeconomic and fiscal outlook elaborated in step (i). The availability of such non-debt resources must meet the requirement of a balanced operating budget, i.e. the 'golden rule'.

(v) Estimating the debt financing required to bridge the gap between the infrastructure investment expenditures (step (ii)) and the available non-debt resources (step (iv)), where the required indebtedness is basically calculated as a residual term.

(vi) Undertaking a debt dynamics analysis to project the local government's debt going forward that results from the required net addition of debt calculated in step (v), under realistic assumptions on the financing terms applicable to that additional debt (e.g. tenure and interest rates, which have implications for projecting the future debt service associated with the additional debt).

(vii) On the basis of expert judgment and practical experience, assessing whether the required net addition of debt (step (v)) can actually be absorbed by financial markets and whether other spending responsibilities (step (iii)) are properly met (i.e. key social services such as education are not displaced by the infrastructure investment expenditures). The assessment concerning financial markets' capacity and willingness

[27] For example, the future operation and maintenance expenditures associated with capital investments will need to be monitored.

to absorb further subnational debt involves also the cost at which financing could be made available. A non-distorted cost of capital should be considered, excluding for instance implicit guarantees from the central government that would reduce interest rates as markets discount not only the repayment capacity of the subnational entity but the sovereign's resources.

(viii) If the assessments in step (vii) are negative, the infrastructure investment plan must be reconsidered altogether because it is not compatible with financial and/or policy considerations, and thus the process involving steps (ii) to (vii) should be repeated for a new plan that possibly envisages a reduced scale of investment projects.

(ix) If the assessments in step (vii) are positive, instead, the infrastructure investment plan turns out to be consistent with financial and policy constraints and therefore it is possible to move forward to step (x).

(x) Identifying the threshold values not breached by the debt path projected in step (vi) (say for variables such as the debt service-to-revenue ratio), which would constitute numerical debt limits consistent with both the achievement of infrastructure investment expenditures (step (ii)) and the opportunities and pressures associated with financial markets and political objectives (step (vii)).

While it is not realistic to calculate 'the exact numerical value for the debt threshold', the above efforts can help evaluate upper and lower bounds for thresholds based on expert judgment about medium-term macroeconomic scenarios, infrastructure financing needs associated with urbanization, and debt service capacity. As the steps described above indicate, the numerical thresholds are calibrated so that the budgetary and borrowing policies consistent with them (in the sense that the debt projections meet the thresholds under a baseline outlook) are also consistent with the development-driven financing needs and other financial and policy considerations. The resulting capacity to service debt must leave sufficient budget room to accommodate other expenditure demands including schools, health, and operation and maintenance of infrastructure assets.

Although local governments might not be legally allowed to borrow, they could borrow through the creation of SPVs. The above steps (i) to (x) apply regardless of whether the local governments borrow themselves or through their SPVs. As long as SPVs are not self-sufficient in finance, their debts will necessarily be contingent liabilities of the local governments. Differentiated modeling frameworks could be developed to establish specific debt limits for a subnational government's general budget and SPVs.

The determination of debt thresholds for a representative local government can also add a constraint on the total subnational debt-to-GDP ratio, as well as quantify the risk stemming from contingent liabilities. Debt thresholds can be subject to a constraint on the total subnational debt-to-GDP ratio, i.e. it is possible to calibrate the numerical thresholds so that the aggregate subnational debt as share of GDP remains below the limit monitored by the central government (as discussed in section II).

Furthermore, the medium-term macro-fiscal framework (step (i)) and the debt dynamics analysis (step (vi)) can easily incorporate random shocks to model risks associated with contingent

liabilities resulting from guarantees by local governments to their SPVs as well as from the budgetary pressures that non-financially-viable SPVs might exert in the future. By running stochastic simulations in such a model, it is possible to estimate probabilities of debt limits being breached unexpectedly as probabilistic events trigger contingent liability calls. A stochastic framework is also useful to calibrate the debt limits so that those probabilities remain within a range of acceptable fiscal risk exposure.

The analytical tools discussed above would also be useful to monitor the local governments' budgetary and borrowing plans, and to assess whether they comply or not with the debt limits (as discussed in section II, fifth strategic consideration). The analytical tools can be used not only to determine the subnational debt thresholds but also to monitor fiscal and debt developments at the subnational level. Once the threshold values are determined, the benchmark macro-fiscal framework – possibly adapted to local specificities and outlooks – can be applied to assess whether a local government's budgetary and borrowing plans meet the thresholds over, say, a two- or three-year projection horizon. A priori, budgetary and borrowing plans are more likely to meet debt limits when a local government enjoys high expected growth rates, low interest rates, and budget surpluses going forward. Of course, if debt limits are breached over the projection horizon, the local government's plans will have to be revised accordingly.

In monitoring fiscal and debt developments at the subnational level, the analytical tools would allow addressing three relevant issues concerning fiscal and borrowing policies by local governments. First, the implications of current decisions on taxation and spending on future budgetary and financing needs (which is of importance when discussing fiscal reforms at the subnational level). Second, the fiscal risks emanating from a number of contingencies that can potentially impact subnational debt, such as contingent liabilities being called, global shocks hitting output growth unexpectedly, poor performance of non-financially-viable SPVs that would seek for support from the general budget, etc. (which is of importance for identifying *ex ante* risk-mitigating actions and *ex post* loss-containment actions). Third, the subnational government's capacity to meet current and future financial obligations originated for the purpose of funding budget deficits and servicing debt (which is relevant when setting fiscal policy and financing strategies, as well as evaluating subnational debt sustainability).

IV-B Determining threshold values for subnational debt indicators – Model details

Figures 1 and 2 illustrate the basic analytical structure of a medium-term macro-fiscal framework and a subnational debt dynamics model for a representative local government, comprising both the general budget (figure 1) and the financial statements of SPVs (figure 2). Figure 1 for the local government's general budget has three distinct building blocks: revenue, expenditure, and the debt (instrumented through loans and bonds) that finances the budget deficit. Figure 2 for the (consolidated) SPVs has four distinct building blocks: revenue, expenditure, debt, and the resource transfer between SPVs and their local government.

As discussed previously, the macro-fiscal framework models the interactions and feedbacks between key macroeconomic variables (e.g., output growth, interest rates) and the relevant subnational public-finance variables (revenue, expenditure, primary balance) over a ten-year projection horizon. The framework generates a broad set of mutually-consistent projections for

these variables using appropriate functional forms.[28] The subnational debt dynamics model, in turn, relies on basic public-finance accounting identities to project the evolution of debt over time associated with the macro-fiscal projections.

The analytical structure starts with exogenous parameters, initial conditions, and exogenous projections (represented by orange objects) and postulates simple functions and public-finance identities (indicated with arrows) in order to calculate endogenous variables (represented by blue objects, with debt instruments –loans and bonds- indicated in yellow). There are four relevant macro-fiscal interactions being modeled by making assumptions on certain key parameters:

(i) Current GSDP, own revenues, and SPVs sales income are linked through assumptions on the subnational tax rate and the elasticity of SPVs' sales income with respect to GSDP.[29]

(ii) Interactions between current GDP and transfers from national government to subnational entities are modeled using the national tax rate and the co-participation rate (i.e., the share of revenue collected at the national level and then transferred to local governments).[30]

(iii) Current infrastructure investment expenditure and future O&M are linked through assumptions on the elasticity of O&M with respect to infrastructure investment expenditure.

(iv) Interactions between current infrastructure investment expenditure and future growth rate of local GSDP (given the developmental objectives that should guide the determination of subnational debt limits) are modeled using the elasticity of GSDP growth with respect to growth of infrastructure investment expenditure.[31]

In addition, the analytical structure models interactions between the general budget and the SPVs' financial statements, which might reflect a variety of resource transfers between them (represented by the green object): e.g. SPVs' corporate profits transferred to the local government, budget support provided to loss-making SPVs, guarantees being called that oblige the local government to transfer resources to SPVs, etc. For most possible interactions, the resource transfer is likely to have an effect on the gross financing needs of the local government and hence on its debt stock.

Incorporating interactions and feedbacks between macroeconomic and fiscal variables, as well as between the general budget and the SPVs' financial statements, the debt dynamics equation

[28] The functional forms could be postulated *ad hoc* or estimated statistically, depending on the complexity of the model and the availability of data. Stochastic features can also be introduced to take uncertainties on board, especially in relation with contingent liabilities and claims.

[29] As SPVs are consolidated in the model, we assume that the GSDP is a good proxy for the several determinants of sales in each specific sector where an individual SPV operates. The model can be extended to represent different groups of SPVs (e.g. power, water services) and thus incorporate a broader set of determinants of sales (e.g. population growth, per capita income levels).

[30] For the sake of simplicity, the model assumes an aggregate of taxes collected by the central government and shared among local governments, with a unique co-participation rate. In practice, there is a wide spectrum of taxes and the sharing schemes applied to them differ. The model can be extended to represent different taxes and their corresponding co-participation rules.

[31] As the model uses an aggregate measure of economic activity at local level (i.e. GSDP) and a homogeneous infrastructure investment expenditure, we assume a single elasticity value linking growth and investment. The model can be extended to represent heterogeneous investments (e.g. power, roads) whose effects on growth differ.

discussed at the beginning of section IV becomes much more involving. For instance, the local government's debt-to-GSDP ratio is determined by the following equation:

$$D_t = \underbrace{D_{t-1}}_{\substack{Inherited \\ debt}} + \underbrace{IE_t + CPE_{t(IE_{t-h})} - OR_{t(Y_t)} - TR_t}_{\substack{Primary \\ deficit}} + \underbrace{\frac{i_t}{1+\hat{Y}_{t(IE_{t-h})}} D_{t-1}}_{Interest\ cost} - \underbrace{\frac{\hat{Y}_{t(IE_{t-h})}}{1+\hat{Y}_{t(IE_{t-h})}} D_{t-1}}_{Growth-dividend} + \underbrace{RT_t}_{\substack{Resource \\ transfer}}$$

where D_t denotes the debt-to-GSDP ratio at end of year t, IE_t is infrastructure investment expenditure, CPE_t is current primary expenditure (whose O&M component depends on past infrastructure investment expenditures), OR_t is own revenue, TR_t is transferred revenue, RT_t is resource transfer between the local government's general budget and SPVs, i_t is the average interest rate paid on the inherited subnational debt stock (determining the interest costs of carrying debt), and $\hat{Y}_t$ is the growth rate of nominal GSDP Y_t (determining the growth-dividend).

IV-C Determining threshold values for subnational debt indicators – Numerical simulations

Using the analytical framework presented in Figures 1 and 2 and some numerical values for exogenous variables,[32] we constructed three hypothetical scenarios that capture the trade-offs between infrastructure investment expenditure, economic growth, and indebtedness that are at the core of discussions on subnational debt limits:

(i) A baseline scenario with infrastructure investment expenditure as 10 percent of annual GSDP, leading to an annual growth rate of nominal GSDP of 13 percent, and with sustainable subnational debt (i.e. non-explosive subnational debt-to-GSDP ratio and non-explosive debt service-to-own revenue ratio).

(ii) An alternative scenario with much higher infrastructure investment expenditure (increasing above 10 percent of annual GSDP), leading to a higher annual growth rate of nominal GSDP (around 13.6 percent), but with rapidly rising subnational debt (i.e. fast rising subnational debt-to-GSDP ratio and debt service-to-own revenue ratio).

(iii) An alternative scenario with conservative indebtedness (i.e. decreasing ratios of subnational debt-to-GSDP and debt service-to-own revenue), but with much lower infrastructure investment expenditure (decreasing below 10 percent of annual GSDP) leading to lower annual growth rate of nominal GSDP (around 12.4 percent).

For each of the three scenarios, projections of infrastructure investment expenditure-to-GSDP, subnational debt-to-GSDP, and debt service-to-own revenue are presented in Figures 3, 4, and 5, respectively. The reported results, of course, depend heavily on the assumed numerical values and functions, and therefore should be adapted to a country's specificities. Nevertheless, they

[32] The exercise is partly based on subnational debt sustainability analyses conducted by the World Bank in Brazil, India, and Poland. The assumed baseline with an infrastructure investment rate at 10 percent of GDP is only illustrative. China is perhaps among the few developing countries that have achieved such a high rate for the last two decades (Liu, 2008).

effectively illustrate the nature and uses of the analytical framework that could guide the determination of debt thresholds for subnational governments and entities.

V. Conclusions

Countries could use fiscal rules to monitor subnational fiscal and debt developments as part of a framework governing subnational governments' borrowing to finance infrastructure investment. This framework should not prevent borrowing at the subnational level but ensure a sustainable financing of development needs and a sound management of fiscal risks.

Research grounded in empirical evidence suggests total public debt hampers economic growth when it exceeds 80-90 percent of GDP. Such a threshold can provide a guideline to set limits on the total public debt and thus define the overall fiscal space available for both central and subnational governments. Debt limits on subnational debt should take into account not only the current explicit liabilities but also the fiscal risks associated with contingent liabilities and the new borrowings that would be needed to cope with structural demographic and economic trends (e.g. the aging population, the widening of social safety nets) The subnational debt needs to be closely monitored and well informed policy decisions need to be made concerning debt limits.

We suggest a minimum set of indicators for monitoring fiscal and debt developments at the subnational level: (i) the **total subnational debt-to-GDP ratio**, in order to monitor the aggregate debt of all subnational entities; (ii) the **debt service-to-own revenue ratio**, applied uniformly to each individual subnational government general budget, in order to ensure financial capacity to service debt and provide incentives for own revenue collection; (iii) **'golden rules'** applied to both SPVs and subnational government general budgets, in order to promote debt-financed infrastructure investment; (iv) **infrastructure sector-specific debt-to-revenue ratios**, applied to financially-viable SPVs, requiring operations to be sufficiently profitable in cash terms to repay SPVs debt obligations; and (v) the **guarantees** extended by subnational governments to SPVs and other subnational entities, which are a source of contingent liabilities. A country's constitutional and legal framework will dictate which public entity has the authority in establishing and monitoring the specifics of these indicators.

In principle, all subnational governments that have infrastructure investment responsibilities should be allowed to borrow. Nevertheless, recognizing the different nature and purpose of the subnational entities, we make a distinction between SPVs and the subnational government's general budget and propose specific indicators for each of them. SPVs responsible for infrastructure investment projects can charge the services provided and borrow against the operational net revenue stream. Thus, financially self-sufficient SPVs could be allowed to borrow on market terms as much as their infrastructure investment projects require and their returns can afford to repay. Regulation might reinforce market discipline on SPVs by setting 'golden rules' and limits on infrastructure-specific debt-to-revenue ratios. On the other hand, the subnational government's general budget is subject to several fiscal and policy responsibilities - including support to non-financially-viable SPVs and other entities. Thus, monitoring debt and establishing debt limits should aim at ensuring that borrowing is for financing capital expenditure and that repayment capacity is sufficient to service debt. 'Golden rules', limits on

debt service-to-own revenue ratio, and surveillance of guarantees would be instrumental to these purposes.

We also suggest an analytical framework that can inform policy decisions concerning the establishment of subnational debt limits. Although the numerical thresholds for debt indicators used in other countries can provide references, they should not be mechanically adopted. Basic tools and models can help determine country-specific numerical thresholds for debt indicators on the subnational government's general budget. The analytical framework applies to a representative (stylized) local government and calibrates thresholds iteratively so that, on the one hand, the indebtedness projected going forward under the thresholds is sufficient to finance the estimated infrastructure investment needs (given other financing sources and a specific macroeconomic and fiscal outlook), and, on the other hand, such an indebtedness is judged feasible given the actual opportunities provided by financial markets and the pressures exerted by other spending responsibilities (e.g. safety nets, education, maintenance and operation).

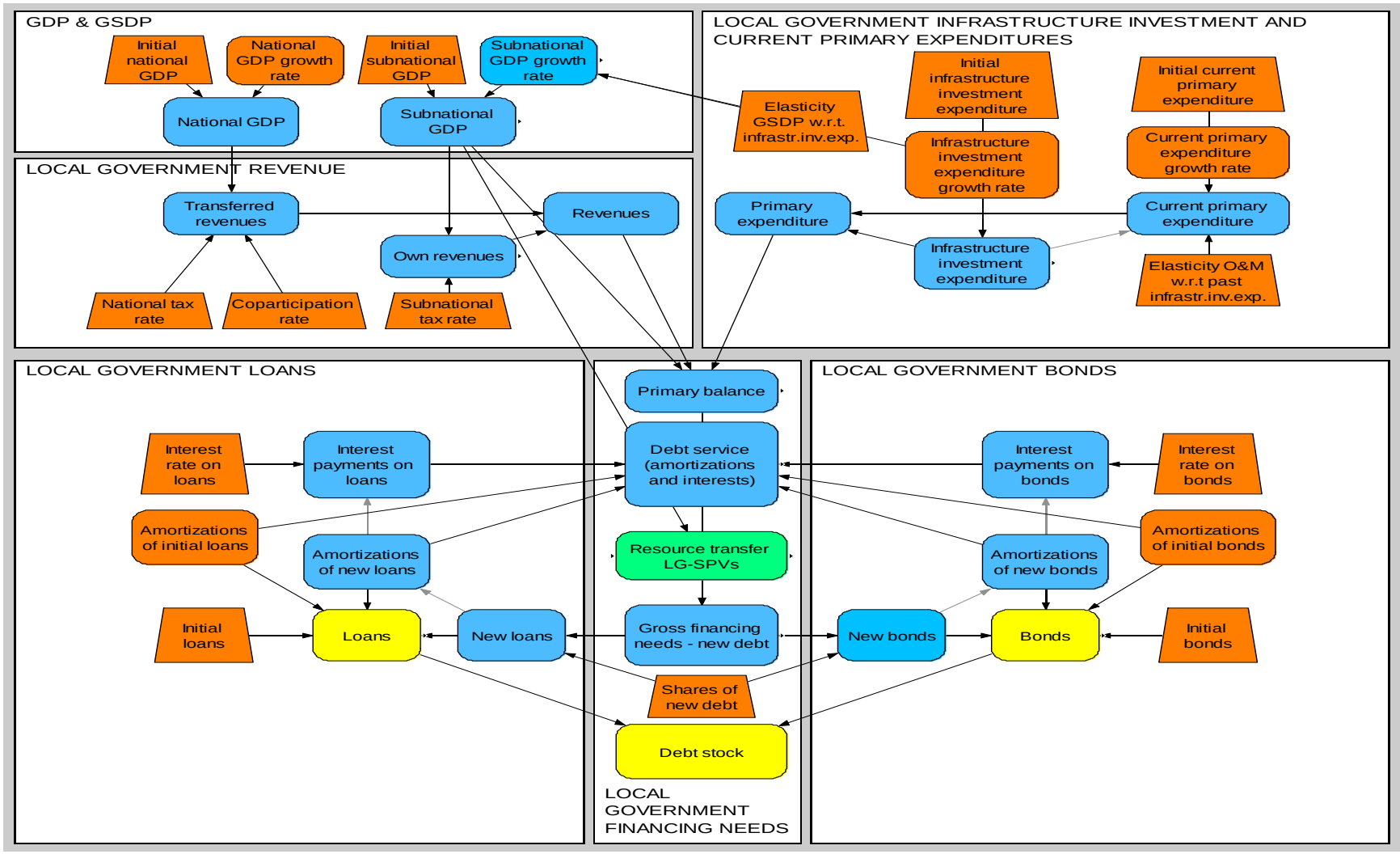
Although it is not realistic to identify the precise debt threshold values, the analytical framework can help identify upper and lower bounds to inform the setting of debt limits. Equally important, applying the analytical tools will help develop a medium-term macro-fiscal framework for local governments, which must be linked to the multi-year development plan. The process of constructing the medium-term macro-fiscal framework helps subnational governments build capacity in public expenditure and fiscal management, as shown by the experiences of US, Brazilian and Indian states. It also helps reinforce the importance of medium-term budgeting of operation and maintenance expenditures, which are essential to preserve the value of capital investment.[33]

Developing debt indicators and setting debt limits should be part of a broader strategy to put in place an adequate fiscal architecture to coordinate and monitor the budgetary and borrowing policies conducted by individual subnational governments. Consistent with this general principle, we explore several areas of subnational public finance and management that need to be addressed with adequate governance structures and policy choices: (i) a proper classification and accounting of expenditures, revenues, existing direct debt instruments, contingent liabilities, and cash flows between the subnational governments and their SPVs; (ii) a sound framework for public investment project appraisal and transparent accounting practices with regard to capital spending; (iii) a regulatory framework for land leasing, privatization and the use of central government transfers by the subnational governments; (iv) a regulatory framework on the SPVs' borrowings; (v) a medium-term macro-fiscal framework that ensures consistency between the macroeconomic outlook and the budgetary and borrowing plans of subnational governments; (vi) the discussion and surveillance of those planes to ensure transparency and monitor compliance with debt limits and long-term fiscal sustainability criteria; and (vii) an early-warning system to identify gross budgetary imbalances early in time and help prevent potentially-destabilizing public-finance trends at the subnational level. The extensive list of issues makes it apparent that

[33] Local government officials often have incentives to undertake new capital investments at the expense of operation and maintenance expenditures, as new roads and bridges can visibly demonstrate political achievements. Without proper operation and maintenance expenditures, nevertheless, the debt financing requirement for future capital replacement will be much higher. The medium-term budgeting and fiscal framework can shed light on trade-offs between undertaking new investments and preserving the existing capital adequately.

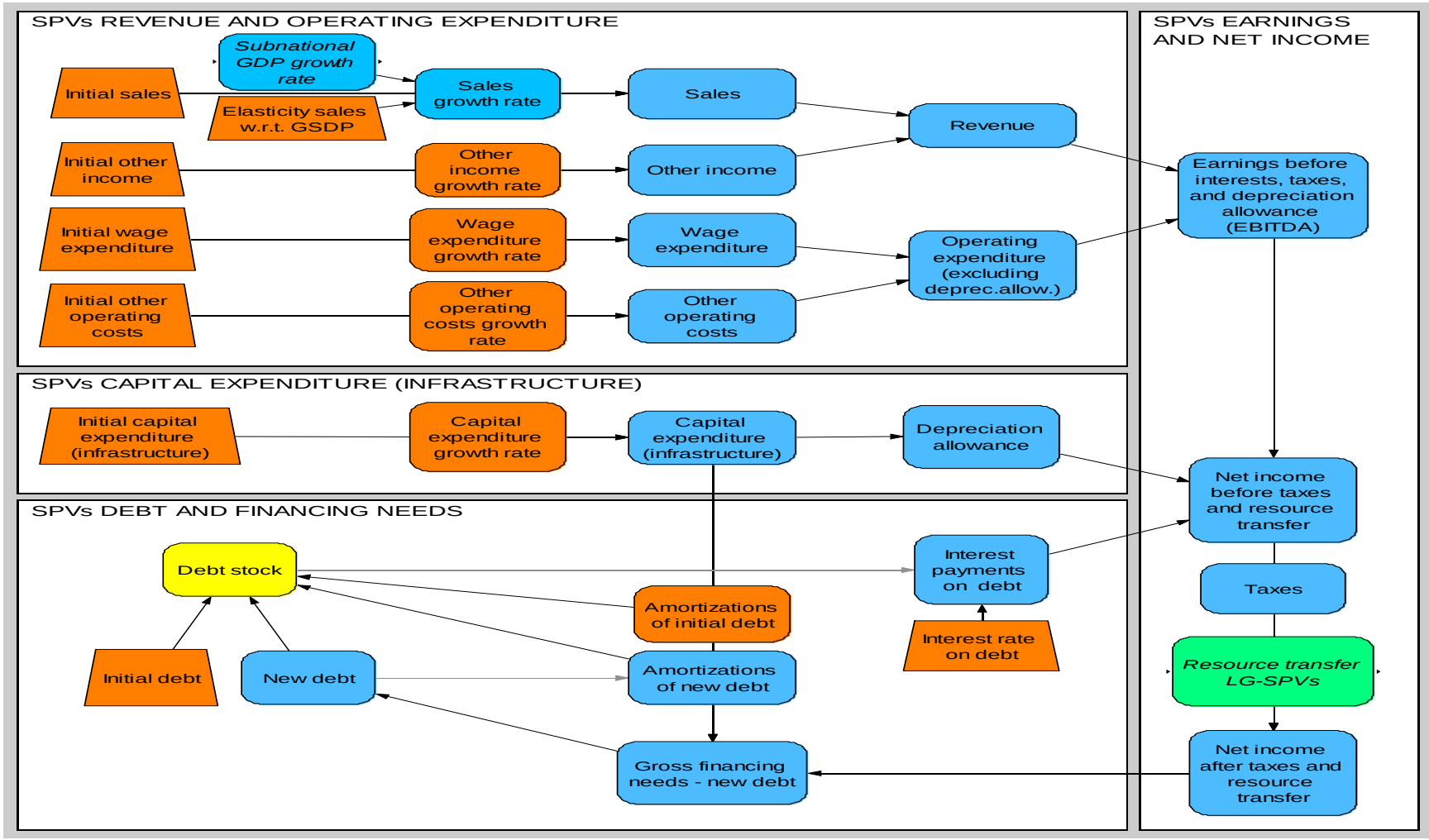
subnational debt indicators and limits are not isolated policy tools and should be embedded into the building of fiscal institutions and regulations.

Figure 1: A Subnational DSA Model – Local Government General Budget [34]



[34] Exogenous parameters, initial conditions, and exogenous projections are represented by orange objects. Functions and public-finance identities are indicated with arrows. Endogenous variables are represented by blue objects, with debt instruments indicated in yellow. The resource transfer between the local government's general budget and SPVs is the green object.

Figure 2: A Subnational DSA Model – SPVs [35]



[35] Exogenous parameters, initial conditions, and exogenous projections are represented by orange objects. Functions and public-finance identities are indicated with arrows. Endogenous variables are represented by blue objects, with debt instruments indicated in yellow. The resource transfer between the local government's general budget and SPVs is the green object.

Figure 3: Baseline Scenario

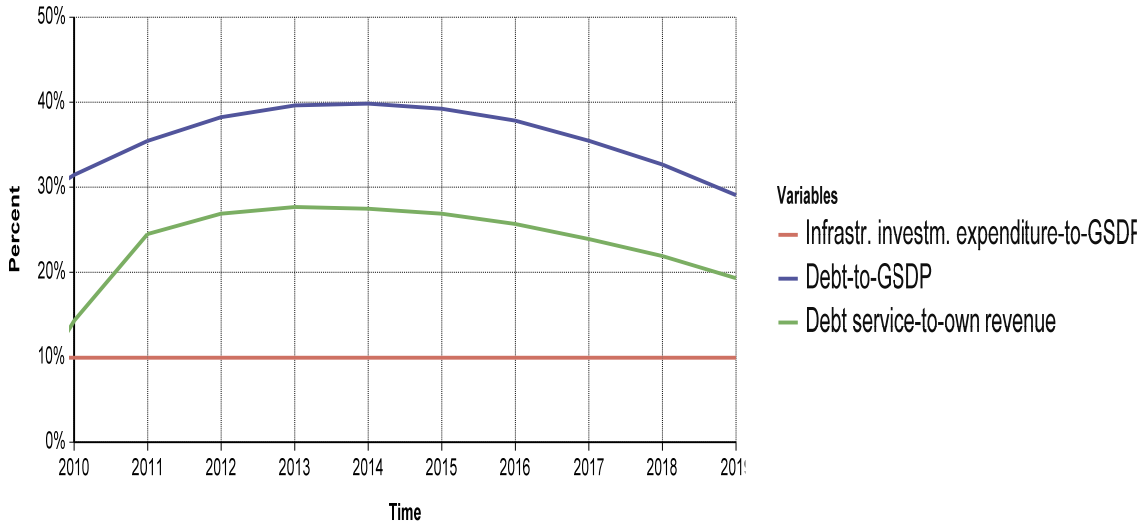


Figure 4: High Investment But Rapidly Increasing Debt

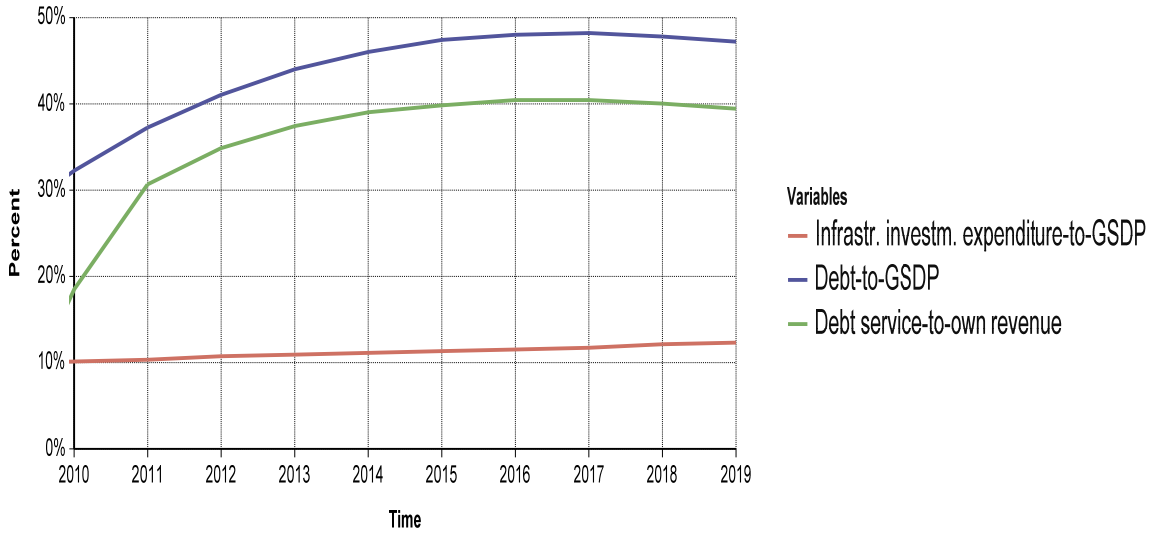
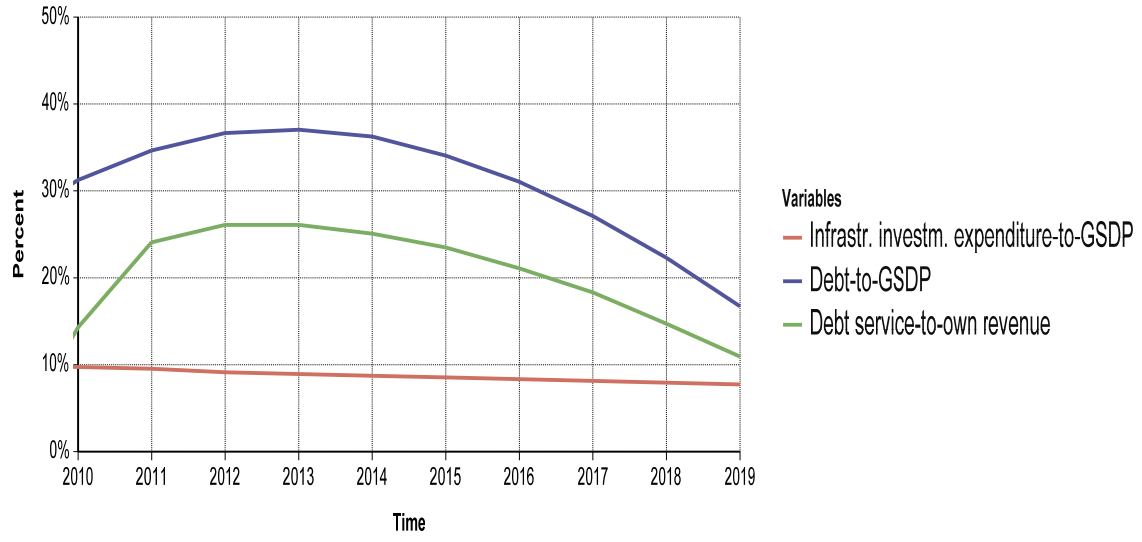


Figure 5: Conservative Debt But Low Investment



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