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What does the latest literature say on the strengths and weaknesses of the IMF's Debt Sustainability Analysis?

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1 Introduction

Debt sustainability is an essential aspect of good macroeconomic policies, but its precise definition is elusive and its assessment is challenging. Nonetheless, the Debt Sustainability Framework (DSF) is a standardized framework for conducting debt sustainability analysis (DSA) in low-income countries (LICs) jointly developed by the International Monetary Fund (IMF) and World Bank in 2005. The DSF consists of a set of indicative policy-dependent thresholds against which projections of external public debt over the next 20 years are compared in order to assess the risk of debt distress. It aims to help guide the borrowing decisions of LICs, provide guidance for creditors' lending and grant allocation decisions, and improve World Bank and IMF assessments and policy advice. Though the "DSF" and "DSA" are in fact distinct, this paper uses these terms interchangeably since the DSF is the framework within which the DSA is embedded, and as a result the strengths and weaknesses of the latter is a product of the former.

Since the release of the original version in 2005, the DSF has been subject to criticisms by external experts and NGOs. In responding to some of these criticisms, the DSF has been reviewed on three occasions: 2006, 2009 and 2012. The next review of the DSF by the Executive Boards of the Bank and the Fund is expected to be completed in 2015.

The help desk request is as follows "What does the latest literature say on the strengths and weaknesses of the IMF's Debt Sustainability Analysis?" In response, this paper critically reviews the literature to identify the strengths and weaknesses of the DSA as well as summarise the proposed modifications to the DSA to address these weaknesses. Overall, this literature review reveals that there are several areas where there is still considerable room for improvement. It is beyond the scope of this paper to comprehensively assess these proposed reforms, though where possible, their potential implications are noted.

The paper is structured as follows: Section 2 briefly describes the main features of the current DSA, Section 3 discusses its strengths, Section 4 reviews its weaknesses, Section 5 identifies the modifications that have been proposed to address these weaknesses, and Section 6 concludes with the main take away messages.

2 Main features of current DSA

This section briefly summarises the main features of the current DSA that is applied to an individual country within the DSF:

i. Analytical underpinning

External debt sustainability is a widely debated concept in the theoretical and empirical literature, which presents different approaches, depending on the economic targets and on the consideration of lender and borrower behaviour. The DSA is based on the borrower's approach and defines a sustainable level of debt if a country can meet its current and future external debt service obligations in full, without recourse to debt rescheduling or the accumulation of arrears and without compromising growth (IDA-IMF 2004a; 2004b). **It makes use of the debt indicator approach to measure the ability to meet current and future external debt service obligations** - ratios of debt stock relative to repayment capacity measures are indicators of the burden represented by future obligations of a country and thus reflect long-term risks to solvency, whereas the evolution of debt-service ratios provides an indication of the likelihood and possible timing of liquidity problems.

ii. Type of debt

The DSF has two components: an external DSA and a public DSA (Figure 1). The external DSA covers total external debt in the economy, owed by both the public sector and the private sector. The public DSA covers total debt of the public sector, both external and domestic. Public external debt, which is common to both DSAs, includes both external debt owed by the public sector and external debt guaranteed by the public sector. The DSF lumps these two elements together into what is referred to as public and publicly guaranteed (PPG) external debt. **The DSF does not capture private domestic debt.**

Figure 1: Type of debt



iii. Scaling factors (present value and discount rate)

Debt stock indicators in the DSF are in present value (PV) rather than nominal terms. Mathematically, the present value of debt is the discounted sum of all future principal and interest at a given discount rate. If the discount rate and the contractual interest rate of a loan are the same, then the PV is equal to (or close to) the face value. If, however, the contractual interest rate of the loan is less than the discount rate, then

the PV of the debt is less than the face value, implying that the loan has some degree of concessionality. The present value of debt is widely perceived as the more relevant indicator for LICs precisely because it takes into account the concessionality of the debt.

iv. Macroeconomic framework

A DSA starts with a macroeconomic framework—a set of interrelated projections of key macroeconomic variables from different sectors of the economy.¹ For most variables, the user is required to input both historical data (previous 10 years) and projected values (next 20 years). **Given that the assumptions in the macroeconomic framework determine the evolution of debt burden indicators in the baseline scenario, a DSA is only as good as the macroeconomic framework that underlies it (IMF, 2013b).** An unrealistic or incoherent macroeconomic framework will most likely lead to inaccurate and possibly misleading results in the DSA.

v. Baseline and stress tests

The DSA is built around a baseline scenario and stress tests. The baseline scenario represents the path of a country's debt that is deemed to be the most likely, derived from a series of assumptions and projections of key macroeconomic variables. Stress tests gauge the sensitivity of the baseline scenario to shocks and changes in assumptions, applying the same types of shocks (e.g., to real GDP growth, to exports, to the primary balance) across all countries.²

There are two types of stress tests: alternative scenarios and bound tests. Alternative scenarios are permanent modifications to key assumptions in the baseline scenario. Bound tests are temporary shocks that last one or two years, after which the modified variables return to their baseline values. There are a total of 16 standardized stress tests in the DSF.

vi. CPIA-based debt thresholds

Policy-dependent thresholds for external public debt are at the core of the DSF and guide the assignment of risk rating. The evolution of debt burden indicators in the baseline scenario and under stress tests is assessed against the relevant thresholds in the external DSA and the relevant benchmark in the public DSA to determine the external risk rating³ and the overall risk of debt distress. These thresholds are not uniform across all countries. Instead, they vary depending on the quality of a country's policies and institutions, reflecting the empirical observation that LICs with weaker policies and institutions are more likely to face repayment problems at lower debt ratios (Kraay and Nehru 2004, 2006). Countries with higher CPIA scores therefore face higher thresholds (see Table 1).

¹ See IMF 2013b, p. 22 for the full list of macroeconomic variables in the DSA template.

² The disadvantage of standardisation is that certain idiosyncratic vulnerabilities could be overlooked, or the magnitude of a potential shock could be underestimated. Staff may therefore wish to introduce customized scenarios to analyse country-specific risks.

³ Although the external DSA captures all external debt in the economy (both public and private, as discussed above), the risk rating is guided solely by the outlook for PPG external debt.

Table 1: PPG External Debt Thresholds & Public Debt Thresholds (as of November 2013)

Quality of policies & institutions (CPIA)	PV of PPG external debt in percent of			PPG external debt service in percent of		PV of total public debt in percent of
	GDP	Exports	Revenue	Exports	Revenue	GDP
Weak	30	100	200	15	18	38
Medium	40	150	250	20	20	56
Strong	50	200	300	25	22	74

vii. Risk rating

All DSAs include an external risk rating—an explicit assessment of a country's risk of external debt distress. The rating is based on an analysis of PPG external debt in the external DSA (Figure 1). Countries are assigned one of the following four risk ratings:

- a *Low risk*: All the debt burden indicators are well below the thresholds.
- b *Moderate risk*: Debt burden indicators are below the thresholds in the baseline scenario, but stress tests indicate that the thresholds could be breached if there are external shocks or abrupt changes in macroeconomic policies.
- c *High risk*: One or more debt burden indicators breach the thresholds on a protracted basis under the baseline scenario.
- d *In debt distress*: The country is already experiencing difficulties in servicing its debt, as evidenced, for example, by the existence of arrears.

Since the 2012 DSF review, the external risk rating is complemented by an assessment of the overall risk of debt distress, the latter of which is intended to highlight sources of risk that the former does not capture.

3 Strengths of current DSA

i. A source of cross country information

A standardised excel-based DSA template has been created for performing the DSA. Once the macroeconomic assumptions have been entered, the template automatically generates output tables that display debt and debt-service dynamics under the baseline scenario and summarises the results of standardized alternative scenarios and stress tests. This uniformity of the analyses in the current DSA allows comparisons across countries and over time. However, it also creates disadvantages in making the model less flexible for taking into account country specific features and circumstances.

ii. Transparency

As noted in Section 2, a DSA is only as good as the macroeconomic framework that underlies it. Transparency is therefore critical to allow users and reviewers to understand what lies behind the results and to carefully assess the realism of the assumptions. DSAs must explain all the main assumptions underlying the projections (and hence reasons for optimism where this is the case) and how these drive projected debt ratios and thus risk ratings, giving the opportunity to modulate these assumptions over time as circumstances dictate. However, one should bear in mind that the underlying complexity of these assumptions can still be concealed despite explicitly stating them (Wyplosz, 2007).

iii. Broadly satisfactory track record

Although suitably long data series do not exist to rigorously evaluate the accuracy of DSAs, a preliminary analysis suggests that DSA debt projections have not shown any evident bias (IMF and WB, 2012). For example, in DSAs produced in 2006 and 2007, projected levels of external public debt to GDP in 2010 fell short of actual 2010 levels in about half the cases and surpassed actual levels in the other half. In 60 percent of the cases, the difference between the actual level of debt in 2010 and the level projected in the baseline scenario of the 2006 or 2007 DSA was 10 percentage points or less.⁴

iv. Regular review process

The DSF is not static, and have in fact been reviewed and modified on three occasions since its official release in 2004-2005 to assess whether it remains adequate in light of changing circumstances in LICs. While the 2012 Review concluded that the DSF had performed relatively well and fulfilled its main objectives, it was perhaps the most comprehensive to date, leading to a number of modifications to strengthen DSAs in several important aspects as summarised in Box 1.

Box 1: Main changes to DSA from 2012 Review

- 1) New benchmarks for total public debt to GDP have been introduced to help determine when to conduct deeper analysis of public domestic debt;
- 2) Revised thresholds for debt service to revenue, the present value (PV) of debt to the sum of exports and remittances, and debt service to the sum of exports and remittances;
- 3) Revised guidance on how to incorporate remittances into DSAs has been updated;

⁴ Large differences between actual and projected debt levels in HIPC cases reflect uncertainty about the timing of debt relief when the projections were made. For non-HIPCs, the differences mostly reflect larger-than-anticipated macroeconomic shocks related to the global financial crisis.

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4) New "probability approach" for assessing debt sustainability in a limited number of borderline cases has been introduced. The approach uses country-specific information to help determine the risk of external debt distress; and

5) New assessment of the overall risk of debt distress for countries with significant vulnerabilities related to public domestic debt or private external debt, or both, to flag these risks.

Source: IMF, 2013b

4 Weaknesses of current DSA

i. Neglects the human development aspect of debt sustainability

The DSA's definition of debt sustainability is one of the many competing definitions of external or public debt sustainability. Civil society groups have criticised the DSA's definition for focusing purely on the financial side of debt burden, i.e. the "repayability" aspect, and neglecting the human development aspect (Caliari 2005; JDC 2012; Oddone 2005). A human development approach to debt sustainability would allow a population's human rights and basic needs - such as food, shelter, health and education - to be protected, and not undermined by their country's debt payments (Eurodad 2005; Gunter 2009). The central tenet of this approach is that developing countries should be able to set aside as much fiscal revenue as needed to meet human development goals (such as the Millennium Development Goals) and only then pay the remnant as debt service or debt stock.

ii. CPIA-determined debt burden thresholds are misleading

There is no disagreement in general terms that a country's policy and institutional environments affect significantly its debt carrying capacity and likelihood of debt distress. However, serious concerns have been raised over the legitimacy of the use of the CPIA for measuring and rating the quality of institutions and policies of LICs for determining the debt burden thresholds (Guillamont et al. 2010; Kanbur 2005; Nissanke 2010). More specifically, the CPIA is not regarded by some critics as an objective measure of the quality of policies and institutions, but a set of subjective scores (1–6 rating scores) by Bank staff, based on questionnaires organized with country teams at the World Bank (Nissanke and Ferrarini 2007; Nissanke 2010)⁵.

Moreover, the model specification used in studies in determining the CPIA debt burden thresholds has been criticised on a number of methodological grounds. For example, these studies use real GDP growth to capture both exogenous and endogenous shocks. However, real GDP growth are outcomes of various factors, including exogenous events/shocks, policies applied and institutions in place as well as other factors such as unpredictable aid flows which could randomly alleviate illiquidity problems and debt distress (Nissanke 2010, 2013). Thus, like CPIA, real GDP growth included in these models is likely to be 'contaminated' by much noise. An alternative measure of shocks which may be more appropriate is the Economic Vulnerability Index (EVI).

Results of earlier studies have also been challenged on account of possible estimation errors due to some important missing variables that explain the likelihood of debt distress (Nissanke 2010, 2013). In particular, despite the evidence that vulnerability to exogenous shocks were one of the most important determinants of the debt crisis and recognized even by the WB/IMF, they are only given significance as crisis predictors in the LIC DSF alternative scenarios prediction, being left out of the process of defining indicative thresholds.⁶ These findings weaken the central position assigned to the CPIA rating as a predictor of debt distress episodes. The empirical basis for the DSF therefore appears to be much less robust than claimed in the official papers produced by the IMF and World Bank, including the most recent review.

⁵ See also Van Waeyenberge (2007) for critical discussion on the political economy of the process through which the CPIA has been constructed and used at the World Bank.

⁶ Cohen et al. (2008) conducted simulation exercises on debt distress similar to the Kraay and Nehru study, and found that the likelihood of a debt crisis in low- income countries is indeed triggered by external shocks such as negative price shocks to earnings from exports of primary commodities as much as (if not more) the governance index developed by Kaufmann, Kraay and Mastruzzi (Kaufmann et.al 2005).

iii. Underplays the growth/development dividends from debt-financed investments

A recurring criticism of the DSF reviews is that it does not adequately capture the benefits of debt-financed public investment. Proponents of scaling up public investment maintain that productive investment, while increasing debt ratios in the short run, can generate higher growth, revenue, and exports, leading to lower debt ratios over time. Some argue that LIC DSAs, by failing to take sufficiently into account the assets and future income that public investment may generate, lead to overly pessimistic risk assessments (IMF & WB, 2012). This is partly because most of the general conclusions of the empirical literature caution against excessive optimism (IMF, 2013b) for the following reasons:

- Prolonged growth accelerations are rare.
- Even if individual projects have high rates of returns, the macroeconomic returns (notably the impact on GDP, government revenues, and exports) tend to be considerably lower than the rates of return on individual projects.
- The quality of policies and institutions has a large influence on the macroeconomic return of public investment.

Notably, while suitably long data series do not exist to systematically evaluate the criticism that growth projections in DSAs have been too conservative, staff analysis comparing actual versus projected GDP growth for the period 2004–2008 did not reveal a tendency to under-predict growth in countries with high levels of public investment (IMF & WB 2012). Yet, such a conservative position may require a careful reassessment in light of changing dynamics in African LICs over the past decade (Nissanke 2013). Indeed, financing investments to help countries achieve higher and sustained growth is at the core of the World Bank development model. Furthermore, if infrastructure investment successfully brings about a major shift in economic structures within a relative short period as happened in East Asia in the 1980s and 1990s, predictions made on historical data series may not be so informative.

iv. Stress tests are too mechanistic and standardised

Stress tests in the DSA have been criticised for being too standardized and deterministic (IMF, 2012). The DSAs simply first project one base scenario for debt indicators such as the debt- GDP ratio, then apply various stress tests to generate different scenarios, rather than applying updated econometric techniques allowing dynamic stochastic simulations. In addition, the stress tests constitute a partial-equilibrium analysis since the macroeconomic adjustment process triggered by a shock is not taken into account. For example, the bound test that simulates a one-time 30 percent permanent depreciation of the domestic currency has no impact on exports or the current account balance. Furthermore, the persistence of shocks is constrained to be the same across countries even though the dynamic adjustment process is generally believed to depend on various country-specific attributes (the exchange rate regime being a prime example).

In addition, historical series of averages and volatility used for stress tests can be a poor guide in most cases for future predictions, especially in LICs where underlying macroeconomic interrelationships can be highly unstable (Nissanke, 2013). The historical averages over the past 10 years would generate just some trends on that basis. However, the averages would not generate a trajectory with any volatility close to the real world phenomenon. The pattern of volatility historically observed may also not repeat itself. This therefore suggests that even though DSAs are supposed to be carried out annually and integrate newly arising information into the analysis, the accuracy of the DSA forward-looking projections over a 20 year horizon is likely to be limited. This sentiment was

expressed by Wyplosz (2007) who stated that any debt sustainability assessment is only valid within the bounds of underlying guesses.

v. Missing analysis of dynamics among components of total debt in the DSAs

The external risk rating is based strictly on risks emanating from PPG external debt and was justified given that in the past, LIC's external debt was predominantly public. However, as Panizza (2007 and 2010) notes, this situation is rapidly changing in several LICs with domestic debt accounting for an increasing share of total public debt. Non-resident purchases of debt have also become non-negligible, exposing countries to the risk of a sudden shift in investor sentiment (Nissanke, 2013). As such, the external risk rating may provide an incomplete picture of the overall risk of debt distress in the economy, to the extent that there are significant risks associated with public domestic debt or private external debt. Given this, the recent Review recommended deepening the analysis of sustainability of total debt, inclusive of domestic public debt and private external debt and associated fiscal vulnerability. In particular, countries with significant vulnerabilities related to public domestic debt or private external debt, or both, are now assigned an overall risk of debt distress that flags these risks (which are not captured by the external risk rating).

However, what is still missing is the interrelationship among different components of total debt (Nissanke, 2013). In stress tests carried out in the current DSAs, there is not much explicit and detailed discussion on what possible adjustment paths could be taken when countries are faced with various shocks, and the projected debt burden which might lead to an unstable or, worse, explosive, path. Such events to either of the two primary balances (i.e. fiscal account and current account) or both would make dynamics of domestic and external debt unsustainable through interactive adjustment processes

vi. Net present value and discount rates

Martin (2004) challenges the idea that the present value of debt is the more accurate measure of debt burden, because it does not capture the debt overhang effect, which could depend on the face value of debt. The debt overhang is defined as a situation in which the creditors do not expect to be fully repaid because of the presence of a large stock of debt. However, as mentioned above, the present value of debt is widely accepted given that it captures the concessionality of debt in LICs.

On the other hand, the PV makes the degree of debt burden highly sensitive to the choice of discount rates. In this respect, a question that has been asked is what the discount rate would be appropriate for calculating the PV of external debt in the DSA. Prior to the most recent modifications to the DSA, the approach to establishing discount rates for external debt analysis involved multiple discount rates, linked to market rates in different ways and updated with varying frequencies. This led to several operational difficulties⁷ for both country authorities and Bank-Fund teams and as a result the revised DSA has adopted a uniform discount rate of 5%. The rate will remain unchanged until the completion of the next review of the DSF by the Executive Boards of the Bank and the Fund, expected in 2015. The main advantage of a single uniform discount rate is that it allows for greater stability and predictability in concessionality calculations and protects assessments of concessionality and the PV of debt from cyclical fluctuations of interest rates, a key weakness of the previous framework (IMF 2013a).

⁷ For example, estimates of the burden of debt service were inflated due to exceptionally low interest rates upon which the discount rate is based, leading to an unjustifiable narrowing of the assessed borrowing space available to countries under the DSF. See IMF 2013a for further details.

However, from a sovereign borrower's perspective in the case of LICs, it may be relevant to use other discount rates appropriate to understand the relative cost of debt burden at least as a comparator (Nissanke, 2013).

vii. Conflict of interests

Expert analysis by IMF staff is likely to be less self-interested than assessments by the debtor state or private lenders (Riegner, 2014). However, the IMF itself conflates the role as a provider of analysis and advice, which requires objectivity and impartiality, with the role as a major lender, whose chief interest is to get repaid. **Commentators criticise that this may create conflicts of interest and compromise the impartiality of analysis, especially since the DSF leaves so many elements of the DSA to the discretion of the entity conducting the analysis.** While there is no empirical evidence that this problem has actually materialized, the mere appearance of conflicts of interest (as well as arbitrariness) can be a risk for the credibility of indicator-based assessments and thus compromise their acceptance.

viii. Creditor co-responsibility and responsible lending

The DSF has been criticised for not sharing responsibility for lending decisions equally between creditors and debtors, and not taking into account the quality of new lending needed to avoid the re-accumulation of unmanageable debts (JDC, n.d.). According to the Jubilee Debt Campaign, it is particularly worrying when creditors use their adherence to the DSF to answer the growing call for responsible lending.

5 Recommended DSA modifications

This section outlines the various solutions that have been proposed to address some of these abovementioned shortcomings.

i. Human development approach to debt sustainability

A human development approach to debt sustainability holds that human development imperatives should take precedence over debt payments. As such, debt sustainability is defined as that level where debt service no longer crowds out MDG-priority public spending. This introduces a concept of "affordable" debt service linked to the MDGs, and the notion is translated into an argument in favor of debt relief—preferably in terms of debt-service relief.

In practice, this approach can be operationalised in many different ways (See Cassimon et al. 2008 for a more technical discussion). The crowding-out effect on priority spending by debt service could be minimised by establishing upper limits on debt-service ratios (debt service related to government revenue or GDP). One prominent proposal along these lines was suggested by Birdsall and Williamson (2002). Another was pioneered in a Catholic Agency for Overseas Development (CAFOD) article by Northover, Joyner, and Woodward (1998). The basic conceptual setup proposed by Northover, Joyner, and Woodward (1998) is to determine the resources needed for the country to attain the MDGs first, and then attempt to achieve them with the resources generated by the public sector in the government budget (on the basis of an objective minimal "tax rate" on GDP, to avoid moral hazard⁸). The affordable debt service is then determined on the basis of the resources left after spending everything needed to achieve the MDGs and other priority spending (rather than de facto prioritizing debt service).

ii. Debt-stabilising-primary balance approach to debt sustainability

From an operational viewpoint, two main debt sustainability approaches are possible: the first is the debt threshold approach used in the current DSA, while the second one is the debt-stabilizing primary account approach which rests on the evolution of debt levels. The former makes assumption about the evolution of the primary balance, interest rate and growth rate in order to track down the debt path while the latter ask what should happen to the primary balance to achieve a desirable debt path, given assumptions about the evolution of the interest rate and growth rate. Given the impossibility to establish uncontroversial debt thresholds, Wyplosz recommends that the DSA should rest on the second approach, which involves computing the debt-stabilizing primary balance. This approach is based on an alternative definition of 'debt sustainability' in that debt is considered to be sustainable when a debt burden indicator is not expected to follow an explosive path over time, since a debt is sustainable if it is on a non-increasing trend (Blanchard et al. 1990; Buiters 1985; Nissanke 2013). The objective of the computation of the debt-stabilising primary balance is to stabilize the debt at a chosen level deemed more desirable. Wyplosz notes that in this approach to debt sustainability, the debt path is a target, while the primary account is the instrument in terms of macroeconomic policy analyses since debt dynamics are closely governed by either the external current account primary balance or the fiscal primary balance.

One of the main advantages of this approach is that it de-dramatizes the shock effects. It shows that there may be no need to raise serious concerns over the jump in debt levels resulting from shocks originally, if sovereign borrowers are allowed adequate time to adjust. This computational approach also brings to the fore the policy implications of

⁸ Perversion of debtor incentives to raise their own revenues to finance human development expenditures.

various responses. It provides a forum for a meaningful dialogue over policy options to effect adjustment paths upon shocks between borrowers and lenders in their joint exercises of the debt sustainability analysis with regards to impacts of various shocks (Nissanke 2013; Wyplosz 2007).

However, that a debt level be trend-decreasing is neither necessary nor sufficient to avoid debt distress (Wyplosz 2007). In the end, the main reason for paying attention to the evolution of debts is the concern with debt distress. Importantly, this points to the need for a new facility that provides critical contingent financing to deal with shocks facing LICs in order to make adjustments palatable as possible (Nissanke, 2013).

iii. Alternative debt burden thresholds

Many LICs have a number of structural features (macroeconomic and financial) which impact their debt carrying capacity and expose them to greater solvency and liquidity risks. These features include: narrower production bases and export structures; shallower financial markets; less efficient tax systems; and higher dependence on aid. Structural handicaps facing LICs stem from their economic vulnerability and their low human capital. In this regard, the Economic Vulnerability Index (EVI) and the Human Asset Index (HAI) can be useful (Nissanke, 2013; Commonwealth, 2010). The EVI captures a country's vulnerability resulting from the recurrence of exogenous shocks, either natural or external (droughts as well commodity prices instability) and the exposure to these shocks (small size, remoteness, structure of production). The HAI measures levels of human capital, reflecting both the levels of education and levels of health and nourishment. These two indices could therefore be used as an alternative or, at least, as a complementary screening device, to the revised CPIA, for assessing the likelihood of falling into debt distress situations by discriminating a different capacity of LICs to carry debt burdens.

A new measure for the quality of policy and institutions should also be developed and it should be substantially different from the approach used to construct the CPIA. The new index should assess LICs in terms of their adherence to international codes of conduct and norms as well as use social progress in place of the controversial CPIA ratings (Commonwealth 2010; Gunter 2009, Nissanke 2013). At this stage further work and international discussion would be required to agree what these international codes of conduct and norms would be.

The alternative of abandoning the threshold approach altogether would be inferior, as it would leave LICs and their (mainly official) creditors without guidance as to when debt levels may become of serious concern (IDA and IMF, 2004b).

iv. Modeling the links between public investment and economic growth

IMF and World Bank staffs have recognised the importance of gaining a better understanding of the public investment-growth nexus. In fact, work on modelling the investment-growth nexus is ongoing⁹ and goes beyond the scope of the DSF with IMF staff developing the dynamic general equilibrium (DGE) model to analyse the linkages between public investment and growth and the implications for debt sustainability. The DGE model has a number of advantages over the previous DSAs, including: 1) it incorporates both public external and domestic debt accumulation in one unified model as opposed to a parallel analysis of each as in current DSAs; 2) it conducts analyses of fiscal policy reactions which are deemed necessary to ensure debt-sustainability and associated macroeconomic adjustment required to ensure internal and external balance (Nissanke, 2013). Furthermore, application of the model allows the assumptions underlying the

⁹ Other models include the MAMS model (Maquette for MDG Simulations) which quantifies investment needed to meet the Millennium Development Goals (MDG), and estimates its impact on growth, and Spatial Approach, created to help countries assess their proposed infrastructure investment plans by identifying priorities and formulating an adequate sequencing of projects.

projections to be clearer with respect to key parameters since the predictions are made on the basis of the careful calibration of the model.

These models have been piloted in some countries¹⁰ and are intended to be applied more broadly in future DSAs. Notably, the recent application of the DGE model to the most recent DSA for Burkina Faso supports the conservative bias in the advice given by the IMF to its government with respect to its aspiration for public investment drive on account of the high probability of breaching the CPIA- determined debt thresholds in the debt to export ratio in 2021. Nonetheless, these conclusions largely depend on a number of the assumptions made regarding the key parameters for calibration as well as on the structures of the Model itself.

The most recent DSF review noted that "as staff gains more experience with this tool, an explicit assessment of the trade-offs between the usability and the complexity inherent to the calibration and use of dynamic general equilibrium models will be needed before mainstreaming this approach can be envisaged" (IMF & WB, 2012).

v. Alternative to stress tests (Fan charts)

There are alternative approaches to calculating the likelihood that specific unfavourable shocks raise debts to levels that exceed the servicing capacity or fall into an explosive path over time. Fan charts are one such alternative approach and were recommended to be used on an experimental basis in the most recent DSF Review (IMF & WB 2012). Fan chart incorporates the important fact that the future path of the direct determinants of the evolution of the debt – such as interest rates, growth rates, etc. – are uncertain and this uncertainty extends to the path of the relation between debt and GDP. Instead of projecting a single debt value for each year, the model produces a range of values that the debt/GDP ratio could reach with different probabilities attached to them (Borensztein et al. 2010; Nissanke 2013). This range widens with the projections for future periods because uncertainty is greater, consequently the path of the debt/GDP ratio creates a "fan" on the charts.

The advantage of using fan charts over the stress tests under different scenarios in the pre-Review DSAs lies in the former's ability to produce a graphic illustration of wide-ranging possible paths of debt dynamics induced by shocks. In other words, the fan charts convey a 'message' of probabilistic nature of debt sustainability exercises much more explicitly (Nissanke, 2013). Additionally, fan chart techniques exploit correlations among key variables in the equations of debt dynamics. This is important since the interdependence among various variables could provide important information for projections of the impacts of shocks under consideration irrespective of whether individual shocks, or combined shocks, are examined.

The disadvantage is that data requirements for the fan charts analysis are generally demanding, making it difficult to apply to LICs. Moreover, estimates can be sensitive to model specification and the sample period used, and may be misleading in cases where there have been structural shifts (for example, in the conduct of fiscal and monetary policy and the exchange rate regime), which tend to be frequent in LICs.

vi. Country specific discount rates

In the DSF, the uniformity in the discount rate used in the DSAs across countries is given a higher order of importance over country specific discount rates which can take into account country specific circumstances such as reference domestic interest rates, exchange rates, inflation rate and stages of economic development. Nonetheless, Nissanke (2013) suggests that alternative discount rates may be considered at least as a comparator for discussion and negotiation, since the degree of debt burden is influenced

¹⁰ The DGE model has been applied to Togo, Burkina Faso and Cape Verde and are in the process of being applied to Cote d'Ivoire, Ethiopia, Ghana, and Senegal (Nissanke, 2013).

by the choice of discount rates for debt sustainability analysis. A relevant discount rate from a perspective of macroeconomic management over a short-run can be domestic interest rates adjusted by inflation rates or the rate of currency appreciation/depreciation. Relative real domestic interest rates in relation to effective interests on external loans have become important for governments in making a choice between external debt vs domestic debt, since a number of governments of LICs have begun to issue debt instruments for mobilising resources domestically as well as internationally (Nissanke, 2013).

vii. Minimising conflict of interests

In order to minimise potential conflict of interests, some commentators have proposed to entrust assessments to a non-lending UN agency (CAFOD 2004). If such a division of functions is not possible in the short term, as an alternative they recommend an institutionally independent auditing or peer review mechanism housed outside the Bank and Fund or other bilateral creditors.

viii. Ensuring responsible creditor behaviour

A much broader approach is recommended by the JDC for genuinely responsible creditor behaviour, which would see the introduction of binding standards to address a range of issues including the legal and financial terms of the loan, transparency and public scrutiny, and adherence to social, environmental and human rights standards. In response to the last DSF Review, JDC noted that to enable lenders to be held to more account for their actions, and to allow debate on the quality as well as quantity of lending, the DSA should provide more information on where loans are from, on what terms and for what projects (JDC, 2012).

Table 2 summarises the modifications to the DSA discussed in this section, and identifies the main feature or issue in the DSA addressed.

Table 2: Summary of proposed DSA modifications

Proposed reform	Description	Feature
Human development approach to debt sustainability	Broader definition of debt sustainability that prioritises spending on human development priorities (eg. MDGs) over servicing debt in order to determine the affordable level of debt.	Reappraisal of the concept of debt sustainability (i.e. affordability)
Debt-Stabilising-primary balance approach	Approach to debt sustainability which asks what should happen to the primary balance to achieve a desirable debt path, given assumptions about the evolution of the interest rate and growth rate.	Reappraisal of the concept of debt sustainability (i.e. desirable debt path)
Alternative debt burden thresholds	Structural vulnerabilities and quality of institutions affect a country's risk of debt distress and should thus be taken into account when determining debt burden thresholds.	Debt burden thresholds
Modeling the links between public investment and economic growth	Development of internally consistent quantitative macroeconomic framework that captures the growth enhancing effects of borrowing.	Macroeconomic framework (Dynamic interaction among key macroeconomic variables)
Alternative to stress tests	Use of fan charts to make stress tests less deterministic by exploit dynamic interactions	Stress tests (Dynamic interaction among key macroeconomic variables)

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among key macroeconomic variables in a country-specific context.

Country specific discount rates	Use other discount rates to understand the relative cost of debt burden at least as a comparator.	Discount rates
Minimising conflict of interests	Alternative institutional set-up so that the major lender is not also primarily responsible for providing analysis and advice through the DSA.	Institutional set-up (impartiality)
Ensuring responsible creditor behaviour	DSAs should provide more information on where loans are from, on what terms and for what projects in order to make creditors more accountable for lending decisions.	Transparency (creditor co-responsibility)

6 Conclusion

An assessment of debt sustainability is challenging. This can be attributed to the lack of a precise definition of debt sustainability as well as the fact that operationalising any definition of debt sustainability will require making guesses about the future evolution of several key macroeconomic variables such as interest rates, growth and primary balances. This gives rise to the Wyplosz's impossibility principle: because the future is unknown, any debt sustainability assessment is only valid within the bounds of the underlying guesses.

Nonetheless, there are specific modifications to the DSF that can be made in order to make the DSA more robust and relevant to LICs. These modifications are mainly technical refinements to different features of the DSA as summarised in Table 1, and emphasise the role of country specific factors (for example human development needs, structural vulnerabilities, and interrelationships among macroeconomic variables). However, they are likely to vary in their level of complexity.

It is worth noting that the 2012 DSF Review stressed the need to simplify the DSA in order to encourage LIC authorities to produce their own DSAs for their own internal purposes. Hence, it is unlikely that incredibly complex techniques or demanding computational tasks will be adopted in the near future, especially since greater complexity may not necessarily result in less uncertainty and hence greater precision.

Based on these constraints, the DSA results should therefore be used to help inform, rather than make, a judgment about a country's susceptibility to debt distress. Policy conclusions drawn from DSA exercises must also be considered with care (Wyplosz 2007). Sacrificing growth-in the short and even in the long run-to imprecisely known risks concerning debt sustainability can be very costly to LICs.

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