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Review of the Joint WB-IMF Debt Sustainability Framework (2016)

'Readjusting the IMF's Loss Function'

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This discussion paper was written by Travis Mitchell, Economic Adviser in the Economic Policy Division, (Email: t.mitchell@commonwealth.int). The comments and views in this paper do not necessarily represent the views of the Commonwealth Secretariat.

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Publications Section
Commonwealth Secretariat
Marlborough House, Pall Mall
London SW1Y 5HX
United Kingdom

Economic overview

The upcoming review of the joint WB-IMF debt sustainability framework (DSF) is quite timely given the deteriorating outlook for the global economy and the persistence of global risks – linked, in part, to the slowdown in China and increased volatility in world financial markets. With particular respect to debt sustainability, it is worth noting that the above is coupled with a rise in the US interest rate, which is anticipated to lead to a rebound in interest spreads globally.

Fortunately for low-income countries (LICs), buoyant growth across 2007–14 has contributed favourably to debt dynamics in most cases, with debt-to-gross domestic product (GDP) ratios in LICs falling by about 12 percentage points on average. Additionally, borrowing space has increased, though this has fuelled an expansion in capital and recurrent spending (IMF 2015).

Introduction

The Commonwealth has a keen interest in WB-IMF debt sustainability analysis, having been involved in heavily indebted poor countries (HIPC) negotiations and as home to the Commonwealth HIPC Debt Sustainability Forum from September 2000 to April 2009. At the Commonwealth, there is wide recognition of the injurious effects of high debt on growth and on development, reflected in the Secretariat's intense focus on debt management and debt sustainability issues.

The Secretariat has a debt management programme, which assists Commonwealth members with improvements to their debt management capacity and strategy

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by way of the Commonwealth Secretariat Debt Recording Management System (CSDRMS). At the same time, its Finance and Development Policy Section in the Economic Policy Division addresses debt sustainability issues through policy work. The Commonwealth also participates in the World Bank's debt management initiative.

Putting to one side the focus on high indebtedness, at the Commonwealth there is equal acceptance that in order to propel productive investments, some

form of debt financing is necessary to augment countries' domestic savings – especially in LICs, where savings rates are low. Additionally, there is the appreciation that, even in light of hard-earned fiscal gains, increased external debt financing may at some point be necessary to combat future exogenous shocks, as well as to help smooth consumption and taxes.

This 'catch-22' complicates an assessment of the current WB-IMF debt sustainability framework and, more specifically, the operational features of WB-IMF debt sustainability analysis. Similarly, such difficulty in arriving at consensus also exists in the literature. This is particularly the case on questions such as the appropriateness of debt thresholds and the nexus between public investment and growth, where answers remain elusive. With the above caveat, and in the spirit of contributing to the further development of the DSF, this note puts forward a few perspectives for consideration. The main objective is to provoke further thinking by the World Bank and IMF.

Advanced here is the view that the IMF should consider readjusting its own 'loss function' by adding greater weight to minimising false alarms vis-à-vis minimising missed debt crises.

General observations

Regardless of one's stance on the WB-IMF DSF, most would agree that it is important to review its application and use in LICs. The DSF, as depicted in Figure 1, plays a central role in the architecture of international financing. Its original purpose was to warn of potential debt distress and to inform

Figure 1. Role of the WB-IMF debt sustainability framework

Source: Author's interpretation

Figure 2. The DSF loss function

$$L = \alpha \times \frac{MC}{A + MC} + (1 - \alpha) \times \frac{FA}{B + FA}$$

MC	*number of missed debt crises*
A	*number of crises that are correctly called*
FA	*number of false alarms*
B	*number of tranquil (i.e. non-crisis) periods correctly called*

fiscal policies in LICs. However, since HIPC the DSF's role in the international financial community has become much more multifaceted. This is a key reason why the World Bank and IMF, as well as the broader international community should ensure that the DSF gets it right.

In addition to its core functions, the DSF:

- has a role in informing LICs' eligibility, and the scale and composition of international financial institution (IFI) and regional development bank (RDB) lending;
- has a role in determining the terms of international aid;
- is a main factor in the assessment of LICs' credit worthiness and debt restructuring negotiations;
- features in the IMF policy of lending into arrears; and
- in 2009, it was added as a consideration to World Bank and IMF graduation criteria.

To reiterate, the point being conveyed is that the predictions of the DSF have multiple effects, above and beyond signalling debt distress. Following on from this and turning this issue of debt distress on its head, it is instructive to point out that while it is understandable that the World Bank and IMF would focus on accurately predicting the possibility of LICs' debt crises (minimising Type II errors), it is equally as important that these institutions direct as much attention to minimising false alarms (minimising Type I errors) as well. This is particularly because the DSF's 'tentacles' reach most, if not all, aspects of LICs' financing, and thus weigh quite heavily on growth.

Here, the statistical phrases 'Type I' and 'Type II errors' are used both in their literal as well as in their symbolic senses, to speak to (i) the performance of the WB-IMF DSF debt threshold analysis (DTA), and (ii) the focus of the World Bank and IMF institutions more broadly, with respect to signalling LICs' debt distress.

In the selection of DSF debt sustainability thresholds, the World Bank and IMF pick the debt sustainability probability thresholds that minimises the IMF-WB loss function comprising Type I and Type II errors (Figure 2). In this loss function, the Type I and Type II errors are treated equally, such that the same weight (α=0.5) is attributed to instances of missed debt crises and episodes of false alarms. Just as has been found by Berg et al. (2014), who study the application and performance of the DTA, this paper posits that if we apply the same analogy of loss functions to World Bank and IMF positions on LICs' debt sustainability – termed in this note as the "institutions own loss function" – there seems to be an overly strong emphasis on minimising Type II errors vis-à-vis minimising Type I errors, reflecting an α much greater than 0.5. Supporting this assertion is the tone, methodology (DTA) and the lack of a formalised feedback mechanism (recognition of a productive expenditure and growth nexus) in the application of the DSF.

Figure 3. DSF wording for debt distress

Low risk	• All the debt burden indicators are well below the thresholds
Moderate risk	• Debt burden indicators are below the thresholds in the baseline scenario, but stress tests indicate that at least one threshold would be breached if there were to be external shocks or abrupt changes in macroeconomic policies.
High risk	• One or more debt burden indicators breach the thresholds on a protracted basis under the baseline scenario.
In debt distress	• The country is already experiencingdifficulties in servicing its debt, as evidenced, for example, by existence of arrears.

Specific perspectives

Tone of the DSF

Indeed, the phrase 'high risk of debt distress' raises several red flags for most potential investors. Intuitively then, labelling a country's debt position as such should not be taken lightly. Could it be that the World Bank and IMF's fear of missing debt crises, given the potential reputational risks, influences an overly pessimistic and extremely cautious stance on the DSF, particularly with respect to LICs' debt capacity? Some pundits certainly think so, referring to the WB-IMF DSF as a 'strait jacket', which limits LICs' financial mobility.

There is good reason why one might subscribe to this view. On the one hand, there is no doubt that the DSF is crucial to guide LICs' spending plans and to prevent over-borrowing. However, on the other, particularly in less resource-rich low-income countries, it is difficult to dismiss the idea that the DSF could be hampering increased productive investments, which could have been growth enhancing.

Speculations on this last issue are dealt with more thoroughly below, but with respect to the tone and language used in the DSF (Figure 3), it reflects a highly negative view of debt. Specifically, the phrasing does not seem to give much credence to the view that debt for LICs is important – perhaps in the same way that it is important for maintaining infrastructure and for fuelling productive investments in higher-income countries. It therefore raises the question: How are LICs supposed to achieve the Sustainable Development Goals (SDGs) and fill the huge infrastructure financing gap, if aid is lacking and there is such a negative view of debt financing? A good start towards helping LICs rise above this hurdle would be to use slightly less negative language in the DSF. Softer tones, for example, could generate significant mileage with regards to improving LICs' investment potential. Moreover, such language could lighten the 'stain' of debt and give the sense that the assessment is more collaborative.

DSF thresholds and the Country Policy and Institutional Assessment (CPIA)

Berg et al. (2014) find that the WB-IMF debt threshold approach (DTA) is inferior to a host of alternative and simpler approaches. The DTA is found to produce more Type I and Type II errors, and to be based on a weak method of aggregating. The DTA is calculated by way of five individual probit regressions, with each testing

Figure 4. Debt threshold equations

Probit debt threshold regression

$$Prob_j\,(y_{it}=1) = \theta(\beta_{Debt_j} Debt_j + \beta_{MIC} Debt_j \times MIC + \beta_{CPIA} CPIA + \beta_{Growth} Growth$$

Debt threshold analysis equation

$$\overline{D_j^{DTA}} = \frac{\theta^{-1}(\overline{P_j^*} - \hat{\beta}_{CPIA} \times CPIA^G - \hat{\beta}_{Growth} \times \overline{Growth}}{\hat{\beta}_{Debt_j}}$$

Variables

$Debt_j$ – *The debt variable, with* j *indexing five alternatives (present value of external debt-to-GDP; present value of external debt-to-exports; present value of external debt-to-revenues; debt service-to-exports; debt service-to-revenue).*

MIC – *Interaction dummy variable for middle-income countries. Controls for a possible heterogeneous effect of external debt across different levels of development.*

$CPIA$ – *Country Policy and Institutional Assessment, which measures policies and institutional quality.*

$Growth$ – *Proxies for governance and economic shocks.*

the probability that a chosen distress indicator – $Debt_j$ – predicts a debt crisis $Prob_j\,(y_{it}=1)$. These indicators include debt-to-exports and debt service-to-revenue, for example (See Figure 4). The probability distributions generated by the five probit regressions are searched for debt threshold probability candidates $\overline{P_j}$, where the selected probability threshold $\overline{P_j^*}$ for debt variable $Debt_j$ is the one that minimises the loss function in Figure 2. Note that $\overline{P_j^*}$ is a probability. Therefore, to calculate the associated value of the LIC debt threshold for the debt variable $Debt_j$, the probability equation is inverted to give $\overline{D_j^{DTA}}$.

Berg et al. (2014) point out that in order to produce a relatively small number of thresholds, the DSF assigns each CPIA score to one of three categories (low, medium and high), and these groups are assigned a value for $CPIA^G$ of 3.25, 3.5 and 3.75, respectively. Likewise, the time-specific growth variable is replaced by the historic average growth rate for all LICs (*Growth*).

The regressions are then aggregated by what Berg et al. (2014) call the 'worst case aggregator' (WCA), such that if any of the LICs' debt indicators $Debt_j$ (based on debt stock projections over the next 20 years – baseline scenario), violates even one of the five debt sustainability thresholds $\overline{D_j^{DTA}}$ under the baseline scenario or during the stress tests, the country is assigned one of four categories of debt distress (Figure 3). In this way, the WCA attributes equal weight to each probability threshold.

The authors find several weaknesses in the single equation approach to the DTA: the method of aggregation and also with the use of aggregated information in the CPIA and *Growth* variable to calculate debt thresholds. Berg et al. (2014) show that multivariable methods weakly explain more of the dependent variable and that Bayesian methods can be used to circumvent the issue of collinearity, which has been the justification for employing the single equation approach. Moreover, methods such as the Probability Threshold Approach perform better in terms of minimising both Type I and Type II errors, when the debt thresholds are computed using country-specific information rather than aggregated CPIA and Growth data. Berg et al. (2014) suggest that the current WB-IMF DTA is inferior to these other approaches, since it

generates more false alarms. According to Berg et al. (2014), 'the WCA [....] effectively places more than 20 times the weight on each missed debt crisis episode than on false alarms' (page 5).

This is an important conclusion that should not be ignored by the World Bank and IMF, despite the human resource implications of accepting the analysis. It has significant relevance to the upcoming review and fits well with the common sentiment that the Bretton Woods institutions should consider such matters on a case-by-case basis. The evidence is telling and puts further holes in the 'one-size-fits-all approach', which comes as a result of standardisation and simplification. Maybe in applying more suitable methods, the World Bank and IMF would be able to distinguish with greater certainty the deleterious effects versus the enhancing effects of LICs' debt accumulation.

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Productive expenditure and debt sustainability analysis

On the issue of productive expenditure and the DSF, there is consensus among several peers that the DSF does not go far enough in reflecting the benefits of debt financing that is used to finance productive investment. Nevertheless, in the DSF economists are encouraged to give consideration to debt-financed public investment and GDP growth, with the caution that they should refrain from excessive optimism. The IMF cites reasons, such as:

- prolonged growth accelerations are rare;
- even if individual projects have high rates of return, 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; and
- the quality of policies and institutions has a large influence on the macroeconomic return of public investment (see IMF 2013).

In the paper 'Revisiting the debt sustainability framework for low-income countries' (IMF 2012), the Fund recognises that LICs will need much higher investment, particularly in infrastructure, if they are to achieve accelerated and sustained growth. The IMF also mentions that the institution is engaged in ongoing work on the investment–growth nexus, and it has developed a dynamic general equilibrium model that analyses the linkages between public investment and growth and the implications for debt sustainability. Additionally, the World Bank has developed a broad set of analytical tools and instruments that also touch upon the growth–investment nexus.

The work done across a number of these and similar models suggests that productive investments can indeed lead to an investment return and growth, but with certain initial and institutional conditions in place. In this respect, the quality and efficiency of public capital is highly important for LICs (Chakraborty and Dabla-Norris 2009).

What is intimated above tends to give the impression that some significant headway has been made in properly reflecting the investment efforts in LICs. To date however, at least to the author's knowledge, there is still no official and formal approach to capturing the relationship. The closest to this Type II-mode of thinking has been the introduction of remittances into the DSF to augment growth in the debt indicator ratios, carried out on the principal that

remittances are a key source of income.

To use the words of Wysploz (2005), because it is difficult to assess the relationship between public investment and growth, does not mean it should not be done. Hence, although the World Bank and IMF's efforts should be applauded, the fact remains that more needs to be done, and done quickly so as not to stifle future investment in LICs.

Summary and recommendations

The discussion note puts forward several perspectives on the WB-IMF DSF, with the aim of contributing to discussions on the framework review occurring in 2016. The main recommendation is that the IMF should reflect on adjusting its own loss function, such that greater weight is attributed to minimising false alarms, or over-predicted debt crises. This is mainly because of the central role of the DSF and the impact that it has on LICs' access to financing, and hence growth.

The IMF should reflect on adjusting its own loss function, such that greater weight is attributed to minimising false alarms, or over-predicted debt crises.

This recommendation stems from views on the tone, debt threshold methodology and lack of ample feedback in the WB-IMF DSF. More specifically, the World Bank and IMF are encouraged to consider:

- using a softer tone in the DSF to convey a more collaborative approach and to provide a more suitable enabling environment for LICs' engagement with potential investors;
- following up on the findings of Berg et al. (2014), considering the use of alternative aggregation methodologies and the use of country-specific CPIA and growth data to improve the current debt threshold analysis; and
- continuing efforts aimed at establishing the feedback links between productive investments and growth, so as to establish a formal approach in the DSF.

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