

Managing Sovereign Debt for Productive Investment and Development in Africa
-A Critical Appraisal of the Joint Bank-Fund Debt Sustainability Framework and Its Implications for Sovereign Debt Management-

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First Draft July 2013
Revised August 2013

This research paper is written at request of the African Development Bank. The first draft was presented at an internal workshop held at African Development Bank in Tunis on July 18th, 2013. I am grateful to workshop participants, in particular two discussants, Benu Schneider and Annalisa Prizzon for helpful comments. I have benefitted also from timely and encouraging feedback received from Victor Murinde and Adam Elhiraika on my draft text for finalizing the report. I would also like to express my appreciation to Alain Niyubahwe for useful discussions which helped me organize and shape this report. Finally, my thanks are also to Hajer Majoul and Asma Ouni for their efficient administrative assistances throughout. Needless to say, the paper presents the analyses and opinions of the author. It is not meant to represent the position or opinions of the African Development Bank. Any errors remained in the paper are solely my own.

JEL Classification: F34, F35, F37, H12, O11, O23

Keywords: Sovereign debt, Public Finance Management, Development Finance, Economic Development, Sustainability, African Economies

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I. Introduction

Over two full decades of 1980s and 1990s the severe debt crisis stalled the development process of many low-income countries (LICs). With the failure of the earlier debt restructuring attempts through the Paris Club negotiations, the HIPC Initiatives in 1996 and 1999 searched for a durable exit option from the prolonged debt overhang condition through a substantial reduction in official debt, covering both bilateral and multilateral debt. However, the resolution of the protracted debt crisis had to wait for a comprehensive debt cancellation embedded in the Multilateral Debt Relief Initiative (MDRI) in 2005.

Given this disturbing history of dealing with LICs' debt crisis *ex-post* over the prolonged period, the International Financial Institutions (IMF/World Bank) proposed in 2004 the Debt Sustainability Framework (DSF) for LICs as a basis for ensuring better debt management *ex-ante* to prevent the re-emergence of debt distress and crises through more informed borrowing and lending decisions. In contrast to the debt sustainability analysis carried out under the HIPC initiatives, which used backward-looking three-year averages, the new DSF is seen as a "forward-looking" analysis with its focus on the future path of relevant debt-burden indicators over a 20 year period. It has been presented: (a) as an analytical tool to assess potential debt-related vulnerabilities; and (b) as an operational tool that helps the design of a borrowing/lending path by sovereign borrowers as well as by lending institutions and creditor governments (IMF-IDA 2004).

Since then, the DSF was approved by the Boards of the IFIs in 2005 as an official toolkit not only for their recommendation on a borrowing/lending strategy to LICs but also for the IDA allocation, including its decision regarding the grant-loan mix. The DSF is now widely used by other Multilateral Development Banks (MDBs) and export credit agencies as well as some of bilateral donor governments in making decisions regarding their aid allocation and lending policy towards LICs. Further, IDA developed a non-concessional borrowing policy (NCBP) in 2006 with a view to preventing the accumulation of new debts on non-concessional terms, since the development of such conditions is seen to: i) undermine the overriding objective of the MDRI, i.e. to bring down their debt to sustainable levels and create fiscal space for growth and poverty reduction; and ii) allow the risk of free-riding by third party lenders on non-concessional terms. Similarly, the IMF reviewed its external debt limit policy in 2009. Following the lead by the IFIs, the African Development Bank (AfDB) adopted its own non-concessional borrowing policy in 2008, in order to discourage unchecked non-concessional debt accumulation by applying compliance measures, including volume discounts and hardening of borrowing terms of ADF loans and enhancing creditor coordination around the joint IMF-World Bank Debt Sustainability Framework.

Thus, the Debt Sustainability Analysis (DSA) applied to individual countries embedded in the DSF occupies a central place in all sovereign borrowing/lending decisions taken with respect to LICs. Yet, since the release of the original version, the DSF has been subject to criticisms by external experts and NGOs. In responding to some of these criticisms, several modifications, mostly of minor nature, were made in 2006 and 2009, while raising a number of technical issues related to the existing DSF with request for further reworking in several aspects of the DSF. Among other issues raised, the DSF and the DSA exercises as conducted till recently are particularly criticised as inadequate for capturing the critical relationship between public investment and growth, thus restricting the potential financing of Africa's development needs with debt instruments.

Hence, the review of the DSF carried out in 2011 (IMF/World Bank, 2012) with the aim of assessing whether the DSF remains adequate in light of changing circumstances in LICs, recognized, along with the needs to strengthen the analysis of total public debt and fiscal vulnerabilities, that the link between debt-financed investment and growth is integral to the quality of DSAs, and models used should better capture the investment-growth linkages. In the light of the new official guideline issued subsequently, the DSA exercises conducted since then include some discussions of investment-growth linkages, using an open-economy Dynamic General Equilibrium (DGE) model developed at the IMF (Buffie et.al, 2011). Indeed, the importance of assessing the DSF as a focal framework for examining debt dynamics and sustainability in relation to the complex interrelationships in the debt-investment-growth nexus is widely acknowledged.

This is particularly so because the huge infrastructure gap is increasingly accepted as acting as a critical constraint for furthering Africa's economic development. Africa's current infrastructure financing requirements is estimated to be at US\$93 billion or about 15 per cent of Africa's GDP annually. Yet, only about a half of this amount is presently available for infrastructure investment from various domestic and external sources combined. Africa's funding gap for economic infrastructure needs alone is therefore far exceeds what traditional donors and regional and multilateral development banks can provide LICs through conventional concessional lending windows. Hence, accessing funds offered on non-concessional terms, including those from emerging partners as well as from international capital market and financial institutions has become an attractive option for a number of LICs in the African region. Since, if properly structured, debt instruments can be an appropriate vehicle for infrastructure financing and development financing at large, growing requests from its member countries for more flexibility in non-concessional borrowing policy deserve careful evaluation and consideration by the IFIs and regional MDBs. In this regards, it is of paramount importance to find ways to strike the right balance between the policy objectives of debt sustainability and financing for development.

Given this background and specifically recognizing the opportunities and the needs of its regional member countries, the following three specific objectives are set out to achieve by this study commissioned by the African Development Bank:

- i) Evaluate critically the Joint World Bank and IMF Debt Sustainability Framework (DSF) for LICs as currently constructed and used, in particular its methodological approaches and analytical framework;
- ii) Define concrete suggestions to allow African low-income countries to receive a higher level of non-concessional resources to finance their development, without compromising their debt sustainability and with paying due regard to countries' absorptive capacity.
- iii) Analyze how the Bank could increase its provision of non-concessional resources to LICs without compromising its AAA credit ratings.

Towards these objectives, the rest of the paper is structures as follows. The first two sections (Section II and Section III) present a critical evaluation of the DSF, in particular its methodological approaches and analytical framework in two components. These correspond to the DSF's two building blocks as originally designed (IMF/WB, 2004) and retained subsequently (Barkbu et.al. 2008 and IMF/WB, 2012), which are : (i) setting indicative country-specific debt-burden thresholds in relation to the quality of the country's policies and institutions, i.e. the CPIA scores; and (ii) conducting the debt sustainability analysis (DSA) for each country, i.e. an analysis and interpretation of actual and projected debt-burden

indicators under a baseline scenario, alternative scenarios, and standardised stress test scenarios in the face of plausible shocks.

Hence, in Section II, we examine critically the analytical and empirical basis on which the debt-burden thresholds are determined. In questioning the legitimacy of applying the CPIA rating as an exclusive screening device for establishing debt burden thresholds for a country specific DSA, we suggest alternative approaches to establishing debt burden thresholds. The Section III examines the methodological issues involved in the DSA for each country by evaluating how ‘forward-looking’ projections of key debt burden indicators over the 20-year period are made and how robust they are to be used as a key yardstick for deciding on “permissible” level of debt for financing economic development. As the recent Review (IMF/World Bank, 2012) recommended a number of important refinements and revisions to the ways the DSAs are conducted in future, we examine these refinements, including the attempts to incorporate an analysis of the debt-investment-growth nexus into the DSAs with application of the DGE model mentioned above.

In Section IV, we review debt profile of African LICs in light of the current implementation of the LIC-DSF as reflected in the DSAs and debt profile of African LICs, including the types and terms of loans contracted and their implication for sustainability . We also examine the extent to which African countries have so far accessed non-concessional resources. We then revisit the debt-investment-growth nexus in a historical African LIC context from a comparative perspective with East Asia, where productive investment has been deployed for structural transformation of their economies.

In Section V, we discuss a number of Policy Implications from our analyses.

First, we evaluate the extent to which the current implementation of the LIC-DSF is a binding constraint for utilizing fully potentially available all debt instruments to finance development and fill the infrastructure gaps. We discuss the potential use of DSAs as a monitoring mechanism for prudent sovereign debt management. Our critical evaluation of the DSF reveals that there is still considerable room for improvements, especially in terms of determining the debt burden thresholds. In future, once the DSF is further refined in several key technical aspects, *flexible* applications of the DSAs would provide us with one of tool kits for: a) monitoring debt burden profiles; b) conducting meaningful dialogues between borrowers and lenders; and c) making some informed decisions on new borrowing and lending.

However, we argue strongly that any decisions guided by DSA exercises on their own would not guarantee that debt can be made more sustainable.¹ Rather, these projections should be treated purely as an “indicative guide” for prudent debt management. This caveat is crucial because one of the fundamental weaknesses of the DSF as a framework designed to eschew recurrences of debt crises of LICs is the absence of any work-out mechanism of dealing with downside risks, i.e. debt vulnerability of these LICs in face of large external shocks. In this context, it is necessary to engage in discussions how to make debt sustainable in the light of specific features of debt-growth dynamics of LICs that impact their development processes beyond the simple use of toolkits such as the DSF currently in operation. In view of this, we

¹ . Barkbu et.al (2008: 3) offers a broad definition of sustainability, suggesting that debt is sustainable when a borrower is expected to be able to continue servicing its debt without an unrealistically large correction to its income and expenditure. Wyplosz (2007) notes that the definition adopted by the IMF requires much more strict conditions than other technical definitions of “solvency conditions” found in literatures (e.g. Eaton, 1993). See Wyplosz (2007) for further discussion on different definitions of debt sustainability.

present the rationale for, and a design of our proposal of, establishing a new contingent facility embedded *ex ante* in more efficient, incentive-compatible aid and sovereign debt contracts. Finally, we discuss various options available for the African Development Bank as a premier development finance institution of the region in providing more flexible facilities and instruments.

II. Critical Appraisal of the CPIA-centred System of Aid Allocation and Establishing Debt Burden Thresholds

II.1. The Current Approach

In the LIC-DSF, sovereign debt distress risk is assessed against policy-dependent external debt-burden thresholds. This decision is based on the empirical analysis carried out by Kraay and Nehru (2004 and 2006) at the World Bank, the results of which were subsequently corroborated by a similar analysis carried out by the IMF team (IMF/IDA, 2004a and 2005). In particular, it rests entirely on their “main finding”, which is claimed to be robust irrespective of model specifications and data sets used, that the debt levels LICs can sustain are influenced by the quality of their policies and institutions as measured by the Country Policy and Institutional Assessment (CPIA) index, compiled annually by the World Bank. For example, Kraay and Nehru suggest that countries operating in a weak policy environment (25th percentile of the CPIA) have the same risk of distress as do countries with strong policies (75th percentile) at debt ratios that are lower by about 30 percent of GDP, 200 percent of exports, and 100 percent of revenues, including grants.

Taking this empirical evidence as a rationale, the DSF classifies the LICs into three policy performance categories according to the CPIA rating: strong ($CPIA \geq 3.75$), medium ($3.25 < CPIA < 3.75$), and Poor ($CPIA \leq 3.25$), and uses different indicative thresholds for debt burdens for each category, shown in Table 1 below. All debt burden ratios calculated in the DSA for LICs use the present value (PV) of debt as a nominator on ground that it can account better for the concessionality of debt and allows for a slower pace for contribution of debt-creating flows to output and export growth.² In order to reduce volatility of aid flows from switches in annual CPIA ratings, the three-year moving average CPIA score is now used to determine a country’s policy performance in the DSA. It is assumed that countries with weak policies and institutions (i.e. with a low CPIA rating) would face a repayment problem at the lower level of debt burden than countries with a higher CPIA rating (IMF-IDA 2005).

Table 1. Debt Burden Thresholds under the DSF

	NPV of debt in percent of			Debt service in percent of	
	Exports	GDP	Revenue	Exports	Revenue
Weak Policy ($CPIA \leq 3.25$)	100	30	200	15	25
Medium Policy ($3.25 < CPIA < 3.75$)	150	40	250	20	30
Strong Policy ($CPIA \geq 3.75$)	200	50	300	25	35

² . The PV is the discounted sum of all future principal and interest at a given discount rate. There has been a debate over which discount rate is appropriate for use and when the discount rate should be changed. We shall address these issues in Section III below.

Sources: World Bank and IMF Website

Further, the debt stress burden threshold applied for each country depending on the CPIA score is used for determining the mix of grant-loan allocation by many multilateral development institutions as well as bilateral governments. For example, the International Development Association (IDA) uses a “Traffic Light” System since the time of the IDA 14 Replenishment, under which a country is assigned one of three categories of warning signal depending on the degree of debt distress as determined by its DSA against its specific thresholds. According to the system, the risk ratings are translated into traffic lights: red, yellow or green, depending on the distance to thresholds. A country in debt distress or at a high risk would be assigned a red traffic light and receives 100 percent of the IDA allocation in grants, a country with a moderate risk- a yellow light with 50 percent in grants, while a country with a low risk, assigned a green light receiving 100 percent in loans. Further, in order to eschew moral hazard problems, 20 percent discount is applied on grants upfront. Consequently, the volume of available financing is reduced by 10 percent for yellow-light countries and 20 percent for red-light countries. That is, this allocation method actually penalises severely countries with a lower CPIA rating, which are doomed to be high risk.

Despite fundamental criticisms abound, the basic principle underlining the system of determining the debt burden thresholds is kept largely intact in the recent official review, claiming that the system has served its purpose well (IMF/World Bank, 2012).³ However, we assess that the arguments and methods used for determining debt burden thresholds in DSF cannot withstand critical scrutiny due to several methodological and fundamental issues. In the rest of this section, we shall first evaluate two main aspects of the procedures currently used to determine debt burden thresholds: i) the use of the CPIA for assessing a country’s performance rating as well as for determining debt burden thresholds (Section II. 2); ii) robustness of the empirical analyses used for justification of the DSF (Section II.3). Then, in the final sub-section (Section II.4), we shall present alternative approaches to establishing debt burden thresholds and aid allocation, including the grants-loan mix.

II.2. Critical review of the CPIA and the Performance Based Allocation

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, a serious concern can be raised over the legitimacy of the use of the CPIA for measuring and rating the quality of institutions and policies of LICs for aid allocation, including for determining the debt burden thresholds and the grant-loan allocation in the DSF (Kanbur 2005 and Nissanke 2010a). The CPIA comprise of 16 criteria grouped into four equally weighted clusters: (i) economic management; (ii) structural policies; (iii) policies for social inclusion and equity; and (iv) public sector management and institutions, as shown in Table 2.

Table 2: 2004 Criteria included in CPIA

³ . The Review recommended modest revisions to the thresholds for debt service to revenue and for the PV of debt to the sum of exports and remittances.

A. Economic management

1. Macroeconomic management
2. Fiscal policy
3. Debt policy

B. Structural policies

4. Trade
5. Financial sector
6. Business regulatory environment

C. Policies for social inclusion/equity

7. Gender equality
8. Equity of public resource use
9. Building human resources
10. Social protection and labour
11. Policies and institutions for environmental sustainability

D. Public sector management and institutions

12. Property rights and rule-based governance
13. Quality of budgetary and financial management
14. Efficiency of revenue mobilization
15. Quality of public administration
16. Transparency, accountability, and corruption in the public sector

Source: World Bank (2005a) Box 2, Annex 1 p.45

In IDA-14 allocation, for example, the country performance ratings (CPR) is arrived at by first constructing the composite index, wherein the CPIA is given 80 per cent weight with 20 per cent weight allocated to the portfolio performance ratings (PORT). The latter is derived from the Bank's Annual Review of Portfolio Performance (ARPP) for reflecting the percentage of IDA-funded project at risk in a country. The composite index is further moderated by a governance factor (*GOV*), which is made up of six criteria: five are drawn from Cluster D of the CPIA rating (measuring public sector management and institutions as shown in Table 2 and one from the ARPP (World Bank 2005a, IDA 2007 a & b).⁴ Thus, the process of determining CPR is illustrated in the Bank's documentation as Figure 1-a.

⁴ The CPIA, portfolio performance ratings and governance factor were publicly disclosed only in 2007.

Figure 1.a IDA Country Performance Rating under IDA 14

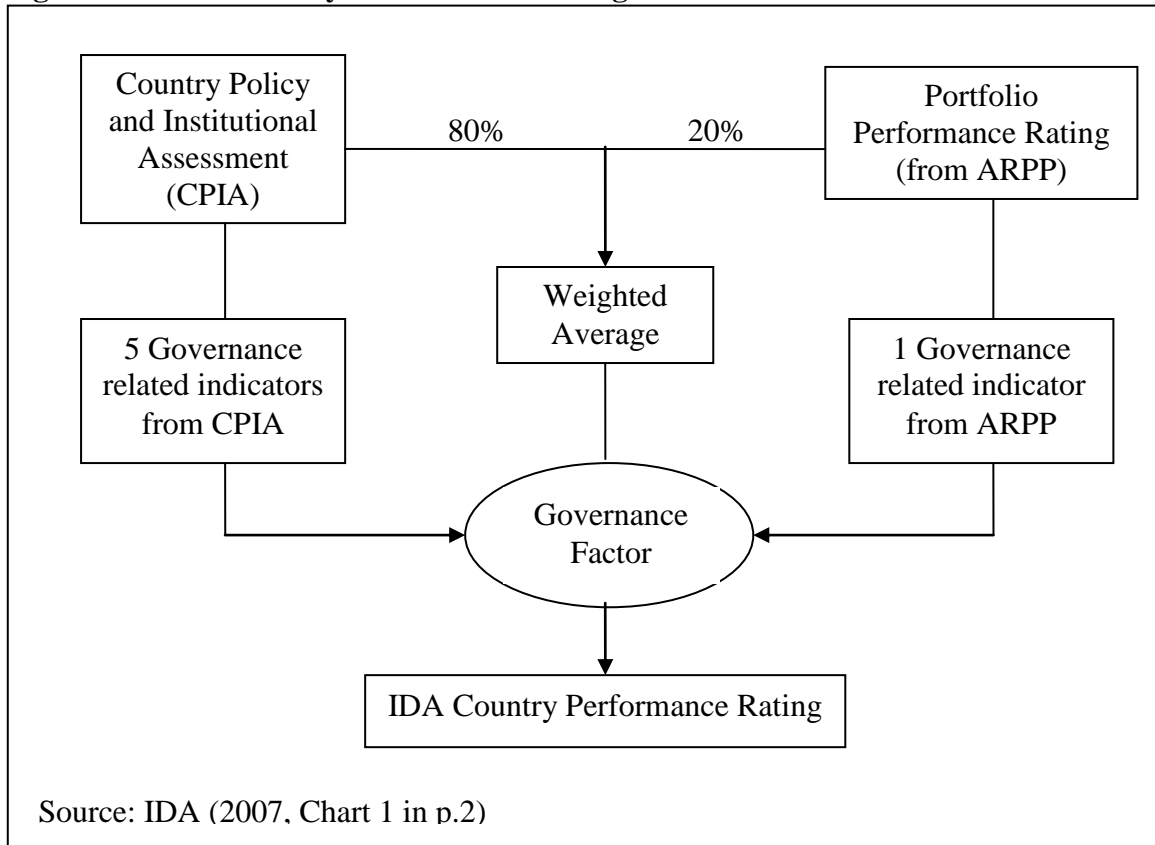
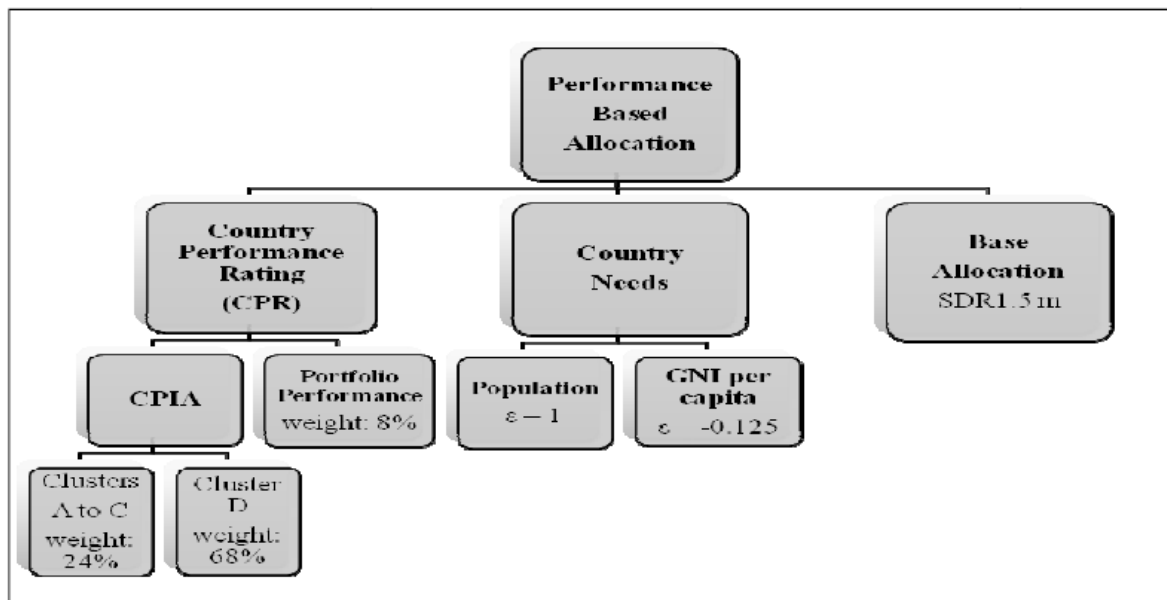


Fig.1.b The PBA Formula Under IDA 15



The actual formula used to determine CPR in IDA-14 is:

$$\text{Country performance rating} = (0.8 * \text{CPIA} + 0.2 * \text{PORT}) * (\text{Gov}/3.5)^{1.5}$$

The governance rating is divided by 3.5, which is the mid-point of the CPIA scale, and then raised to an exponent of 1.5. This means that for governance scores above 3.5, the rating is increased while for scores below 3.5, it is decreased. Finally, IDA annual allocation received by each country is determined according to the following formula:

$$\text{IDA Country allocation per annum} = \text{base allocation} + f(\text{Country performance rating}^{2.0}, \text{Population}^{1.0}, \text{GNI/capita}^{-0.125})$$

Thus, in IDA-14, IDA country allocation, addition to the base allocation of SDR 1.1 million per annum to all IDA-eligible countries, is a function of CPR as defined above, the population size, and a country's needs reflected in per capita GNI.⁵ Clearly, these mechanisms and formulae make the CPIA the dominant factor in the IDA allocation, while variables such as population (*POP*) and gross national income per capita (*GNIPC*) are merely a moderating factor. This led the World Bank to confirm that 'there is a modest bias in favour of the IDA eligible countries with a lower GNI per capita' (World Bank 2005a: Annex 4). Hence, as Kanbur (2005: 5) notes, "the performance rating has a much higher weight than the measure of the need' where 'the need' is captured by the income criterion". In short, "aid productivity' is given precedence over the 'need' in the donor's impact analysis" (ibid: 11).

Similar 'rule-based' methods are adopted for allocating highly concessional resources at both the Asian Development Bank and African Development Bank (IDA 2007a).⁶ As noted above, since the DSA within the DSF is conducted in parallel with the IDA aid allocation, the CPIA is used to determine the outright grant component with an upfront reduction of 20 per cent in overall IDA allocation to a country.

In fact, the strong bias towards the performance-based allocation noted above has been further intensified in the process of simplification of the formula at the Mid Term Review of IDA-14 with the stated aim at reducing the volatility for IDA-15 (IDA 2007a and b). After much discussion, the new formula adopted for IDA-15 is:

$$\text{Country performance rating} = (0.24 * \text{CPIA}_{A-C} + 0.68 * \text{CPIA}_D + 0.08 * \text{PORT})$$

$$\text{IDA Country allocation} = f(\text{Country performance rating}^{5.0}, \text{Population}^{1.0}, \text{GNI/capita}^{-0.125})$$

As evident in this new formula, the exponent applied to the CPIA dominant performance rating is raised from the value of 2 to 5 for IDA-15, signifying the much increased weight given to the performance rating measured in CPIA compared to the 'needs' variables (IDA 2007b).⁷ The overall Performance Based Allocation (PBA) system currently in use is illustrated in Figure 1-b above.

In assessing the selectivity aid allocation rule in general as well as in determining the grant-loan mix in the DSF in particular, both of which rest so much on one index, the CPIA, it is critical to examine first how the CPIA itself is constructed in relation to a more fundamental

⁵ In exceptional circumstances the performance-based country allocation is adjusted in the light of countries' access to alternative financial sources or their emergence from conflict or severe natural disaster.

⁶ The formulae adopted by the Asian Development Bank and the African Development Bank give slightly different weights to each variable in arriving at the volume of final allocation. It may be worth noting that the Asian Development Fund gives as twice as much a weight to the 'needs' variable than that adopted in the IDA allocation, whereas the African Development Fund adjusts the performance rating by the post-conflict enhancement factor (IDA 2007a).

⁷ . There are a few exceptions that IDA-15 makes in applying the formula for IDA allocation (IDA 2007b).

question as to who defines (and how to define) good policies for country-specific conditions.⁸ At the outset, it is important to note that the CPIA is not an *objective* measure of the quality of policies and institutions, but is a set of *subjective* scores (1-6 rating scores) by Bank staff, based on questionnaires organized with country teams at the World Bank (World Bank 2005b).

Furthermore, the CPIA is constructed in terms of mixed score parameters: while some parameters rank policy choices and institutional quality, others rather reflect outcomes or, more often, both outcomes and policy choices. Hence, the World Bank's assertion that policies and institutional arrangements assessed through the questionnaires can be classified as *input*, which are within the country's control, as opposed to *outcome* (e.g., the growth rate), which is influenced by elements beyond the country's control, should be seriously questioned. In reality, such a separation is often fictitious, as is apparent upon a closer inspection of score guidelines listed under each of the CPIA categories (World Bank 2005d).

Many indicators included in the CPIA can be seen as reflecting outcomes influenced by exogenous events. For example, the ability of governments to pursue aggregate demand policy or fiscal policy, consistent with price stability and achieving external and internal balances, is often undermined in the face of large external shocks typically facing fragile LICs. The aptitude of governments in providing public goods depends also on their revenue-raising capacity which, in turn, is affected by exogenous events outside their control. Thus, what is assessed is often endogenous to growth, contrary to the claim that the criteria used in the CPIA are "in principle independent of growth outcomes" (Collier and Dollar 2004: F255). At the same time, some scores are distinctly related to policy choice variables, as illustrated in rating score under trade policy, which is based mostly (about 75 per cent) on the 'trade restrictiveness' measured in terms of tariff and non-tariff barriers deployed.

While some of the criteria used are not necessarily controversial in their own light and terms (e.g., those listed under policies for social inclusion/equity), it should also be recognized that the quality of institutions and the implemental capacity for socioeconomic policies, evaluated under the CPIA, are often a reflection of structural characteristics of low-income economies.⁹ Hence, they should be treated as a manifestation of their stage and level of economic development rather than that of societal subjective preferences or simple choice parameters of recipient governments. These structural characteristics should evolve and change as development proceeds. For example, all three dimensions against which financial sector policy performance is assessed (financial stability; the sector's efficiency, depth, and resource mobilization strength; and access to financial services) are dependent on the level and stage of economic development. The financial sector develops in tandem with the real sector activities as demand and supply for financial services interact dynamically over time.¹⁰

⁸. The evaluation, carried out in 2009 by the Independent Evaluation Group raises several issues regarding the construct and use of the CPIA but not necessarily touches upon many of the fundamental questions discussed here. In general, the evaluation confirmed the usefulness of the CPIA as a broad indicator of development effectiveness. The evaluation also found, among others, that the contents of the CPIA were largely relevant for growth and poverty reduction and that they mapped well with the policies and institutions that are identified in the literature as relevant for growth and poverty reduction. However, it recommended a review of the CPIA be made and the criteria revised and streamlined as necessary. The evaluation contained specific recommendations on a few CPIA criteria, such as the criteria covering trade, financial sector, and equity of public resource use (IEG 2009).

⁹. The IEG evaluation cited above in the footnote 8 in fact recommended that the CPIA guidelines clarify which criteria should take into account the stage of development and how the adjustments should be made, though it actually raises an objection in passing to make too much allowance for country-specific factors including the stage of development.

¹⁰. See our earlier work (Nissanke and Aryeetey 1998; Nissanke 2004).

Thus, the CPIA-based aid allocation formula cannot be seen as a fair rule, since it gives a common scoring to all countries with the equal weighting of the different factors, irrespective of the level of development and structural characteristics of each country.¹¹ Indeed, a closer evaluation of the criteria listed in the CPIA reveals that these scores overlap in many aspects with those included in the extended policy conditionality list that the recipient governments had to comply in return for aid disbursements under the Washington Consensus (SAPs) and the Post-Washington Consensus. The nature of policy conditionality remains largely intact. This is not surprising, since the CPIA is based on the premise that “the broad thrust of World Bank policy advice over the last two decades has been correct” (Collier and Dollar 2004: F246).

What has changed is the method of aid allocation mechanisms from *ex ante* conditionality to performance-based *ex-post* conditionality. This regime shift does reflect how the aid effectiveness debate initiated in the mid-1990s has been conducted at the IFIs and other major policy circles in the donor community over the past decade or so. Throughout the two decades of 1980s and 1990s, *ex ante* conditionality, whereby foreign aid and budget supports were delivered conditional upon the promises of implementation of stabilization-cum-structural reforms, was a dominant feature in the donor-recipient relationships. Attaching a string of strict ‘policy’ conditionality was justified then on the grounds that donors should actively influence the policy and conduct of recipient countries through ‘aid’ leverage.

However, in the course of the debate on aid effectiveness, as ‘aid selectivity’ has become a dominant feature in aid delivery, this *ex-ante* policy conditionality regime was replaced by the performance based *ex-post* conditionality regime. Thus, the original paper that introduced the DSF explicitly states that the HIPC Initiative facilitated this regime change “by limiting its support to those countries that are not pursuing sound policies (IMF/the World Bank, 2004:10). Clearly, in the debate conducted in western dominated policy circles, the content of policy conditionality was not much challenged, except that the list of policy conditionality was first extended and subsequently streamlined.¹²

While ‘ownership’, ‘partnership’, ‘dialogue’ etc. are increasingly recognized and promoted as an important dimension for success in producing the desired development outcomes through aid delivery, the selectivity rule- and performance-based aid allocation as practiced today, including the DSF, still amounts to an imposition of one particular development model by the donor community on aid recipient countries as an uniquely appropriate, universal model to be adopted by all developing countries. From this critical perspective, the CPIA cannot be treated, as claimed, as truly performance-based parameters measured in terms of choices of policies and institutions leading to desired development outcomes. Instead it is a matrix contaminated with ‘intermediate variables’ that measure the extent to which a recipient accepts policy choice parameters as seen desired by donors (Kanbur 2005).

In short, we challenge the current system, under which performance that should be treated as a reflection of complicated and dynamic interactions between policy and institutions on one hand and initial conditions and structural characteristics on the other is represented by a single index – the CPIA. We also question the practice of interpreting of the CPIA as an “input”, “choice variable” on the part of LICs, hence as “efforts and actions” under their own

¹¹ With reference to his criticism of the CPIA, Kanbur (2005) also remarks that a common scoring for all countries is justified only if we endorse the assumption of ‘a common development model for all countries’, postulated in a cross-country ‘average relationship’.

¹² See Nissanke (2010a) for a critical review of the aid effectiveness debate conducted at aggregate macro-relationships.

control. Guillaumont et al. (2010) also raise similar concerns over the use of the current PBA system for aid allocation. Their criticisms are summarized in three points: i) “performance” should refer to the results or outcomes obtained by a country in a given initial situation, whereas PBA performance refers to a subjective assessment of the country policy; ii) the CPIA is a subjective assessment, with regard to uniform norms, which does not particularly fit in with the principles of alignment and ownership; and finally iii) the CPIA is not stable, making the allocation unstable and hardly predictable, and it is pro-cyclical, leading to less aid when the countries need the more.

In this context, we further argue that there should be room for open discussion and debate on different development models, rather than imposing a monolithic model of economic development and reforms. It is now widely accepted that many Asian countries in the fast growing region under contemporary globalisation have not followed the development model that the Washington Consensus had advocated for a long time.¹³ LICs should be given a space for *policy learning* and *policy experimentation*, as suggested by Morrissey (2004). There should also be a policy space for *institutional innovations*. The impressive poverty reduction in China achieved in 1980s is a lot to do with institutional innovations such as Township-Village Enterprises. Thus, Rodrik (2004) argues that “effective institutional outcomes do not map into unique institutional designs”, and that “there is no unique, non-context specific way of achieving desirable institutional outcomes. Since what works will depend on local constraints and opportunities, we should bear in mind that institutional prescriptions should be contingent on the prevailing characteristics of the local economy and that institutional design has to be context-specific” (Rodrik 2004: 9).

Therefore, we also argue that institutional and policy design for economic development has to be context-specific and, hence, that the quality of institutions and policies are not so mechanically and quantitatively rated as practiced in the CPIA. It should be noted here that we do endorse the need for specifying conditionality for any inter-temporal aid and debt contracts, including sovereign debt contracts with LIC. There is nothing controversial about sovereign debt contracts exchanged between LICs and official aid-development agencies specifying conditions that conform to international rules, norms and code of conduct as well as procedures for LICs’ access to official concessional loans. The issue at stake, and what is debated, is, however, the *nature and content of policy conditionality*, which could be objected on the ground of being an imposition of a particular development model as a universally superior model on LICs, and the way policy conditionality has been practiced to date in one form or another.¹⁴

II.3. Critical review of empirical evidences used for determining the debt burden thresholds and aid allocation

As other recent studies attempting to build an ‘early warning’ system for predicting the likelihood of financial crises, Kraay and Nehru (2004, 2006) use a probit model, applied to 132 LICs and MICs for the period of 1970-2002, to examine determinants of ‘debt distress’, defined as periods in which countries resort to any of the three forms of exceptional finance:

¹³ See for example, Milanovich (2003), among many other studies that have emerged to question and clarify the interpretations of the East Asian development model in the East Asian Miracle Study by the World Bank (1993). It is also worth noting here that the post Washington Consensus is not a significant revision, but a rather modified, more nuanced version of the earlier Washington Consensus.

¹⁴ . Kanbur (2005) makes a similar point in his assessment of the aid allocation adopted in the IDA-14.

(i) significant arrears on external debt, (ii) Paris Club rescheduling, and (iii) non concessional IMF lending. A 25 % probability of debt distress is chosen as a benchmark distress level. They find that three factors explain a substantial fraction of the cross-country and time-series variation in the incidence of debt distress: the debt burden, the quality of policies and institutions as measured by the CPIA rating, and shocks that affect real GDP growth. They also find that the relative importance of these three factors differs between low-income countries (LICs) and middle-income countries (MICs). Further, they place a particular emphasis on their ‘central’ finding that the quality of policies and institutions is key determinants of debt distress in LICs and the contemporaneous effect of improvements in policies and institutions on the probability of debt distress is quantitatively large, and is roughly of the same order of magnitude as reductions in debt burdens (Kraay and Nehru, 2006:2-3).

Based on the confidence in their findings after carrying out several ‘robustness’ checks, they draw particular attention to the policy implications of their central findings for the lending strategies of multilateral concessional creditors. First, they urge policy makers not to use a common single debt sustainability threshold for all LICs, but to use thresholds, which are differentiated among LICs according to the CPIA score. As an example, they cite their benchmark results suggesting that countries at the 75th percentile of the CPIA score can have a present value of debt to exports that is two to three times higher than countries at the 25th percentile of this indicator, without increasing the probability of debt distress. Thus, they conclude that countries with better policies and institutions can carry substantially higher debt burdens than countries with worse policies and institutions without increasing their risk of debt distress. Second, they caution policy makers against providing a large scaling-up aid in concessional loans that could lead to very sharp increases in debt burdens of many LICs. Instead, they recommend greater use of grants to LICs with a lower CPIA score.

The central claim of their study, confirmed by a similar study by the IMF team (IMF-IDA 2004a)¹⁵, provided the IFIs with the empirical basis for determining the debt burden thresholds and a grant-loan composition according to CPIA scores in the DSF. Thresholds for the present value (PV) of debt to GDP, debt to exports, and debt to revenue were calibrated using the results obtained by the IMF team in 2004, while thresholds for debt service to exports and debt service to revenue were calibrated using the Kraay-Nehru study. In 2011, preceding the most recent Review of the DSF, the IMF staff re-estimated these models using updated data and a single methodological framework to identify debt distress and non-distress episodes. In their re-estimation, a number of experiments were attempted such as including remittances in external debt thresholds or the use of ‘probability – based’ estimation that traces country-specific evolution of debt distress, yet the basic structure of the model specification were not altered. Consequently, the Review concluded that the re-estimated thresholds are roughly in line with the current DSF thresholds, with the exception of the threshold for debt service to revenue. The latter would result in setting a lower level of thresholds than in the current DSF.

Yet, in our view, the model specification itself should have been questioned and re-examined, as it has been subjected to legitimate criticisms and challenges on a number of methodological grounds. For example, in addition to the problems associated with the use of the CPIA rating as an accurate measure of the quality of policy and institutions as already

¹⁵ . There are some differences between the two studies carried out by Kraay and Nehru (2004, 2006) and IMF (2004a) in some technical aspects such as the samples used, the definitions of debt distress episodes or the probability of debt distress selected. See Box 4 and Annex 1 of IMF-WB (2012) for detailed information.

discussed, the use of real GDP growth as a proxy for shocks is inadequate and inappropriate for capturing the effects of exogenous shocks that should be seriously considered as one of the main factors affecting the debt crisis in LICs. However, real GDP growth is chosen to capture both exogenous and endogenous shocks in these studies. They do not provide any explanation why more appropriate measures of exogenous shocks such as the Economic Vulnerability Index (EVI) are not tried as alternative measures of shocks.¹⁶ 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. Therefore, both variables, CPIA and real GDP growth included in their probit models, can be suspected to be ‘contaminated’ by much noise. Moreover, the two variables must also be closely correlated contemporaneously, if we accept their reasoning for using them as main explanatory variables. If a debt burden indicator - another explanatory variable in the model – is expressed as ratio to GDP, there will be further inverse correlation issues among three explanatory variables, pointing to non-linearity.¹⁷ Further, the decision to use a 25 % of probability as thresholds is an arbitrary one, since this choice has been made on the basis of their model specification and estimation results.

Indeed, as discussed in Cohen et al. (2008), other simulation exercises on debt distress similar to the Kraay and Nehru study show that the likelihood of a debt crisis in low-income countries is 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).¹⁸ These findings shed serious doubts upon the central position assigned to the CPIA rating as a predictor of debt distress episodes, and hence, the empirical basis for the DSF is found rather fragile, certainly less robust than claimed in the official papers produced by the IMF and World Bank.

In fact, these studies used for determining CPIA-centred debt thresholds share many methodological problems previously raised in relation to other empirical studies carried out at the World Bank to justify the performance-based selectivity for a basis of aid allocation. The analytical and empirical basis for the selectivity approach rests almost entirely on cross-country regression results of the growth-aid relationship in Burnside and Dollar (1997, 2000) or Collier and Dollar (2001, 2002, 2004), which led to a very strong policy conclusion that the growth-enhancing effect of aid can be found only in a *good policy* environment. However, the empirical findings and analyses of these studies have been seriously challenged

¹⁶ See below Section II.4 for our discussion on the EVI. Kraay and Nehru (2006) state that in their robustness check tests, real exchange movements and Terms of Trade shocks are tried but these are not found significant predictors in their model specifications.

¹⁷ Their results could also be challenged on account of possible estimation errors due to missing variables that explain the likelihood of debt distress. For example, we should not ignore the fact that many LICs for the estimation period were heavily aid-dependent and relied often on aid for its shock damping effects, as revealed in Guillaumont and Chauvet (2001). Aid flows to the HIPC countries for the estimation period are known to be highly unpredictable and volatile throughout.

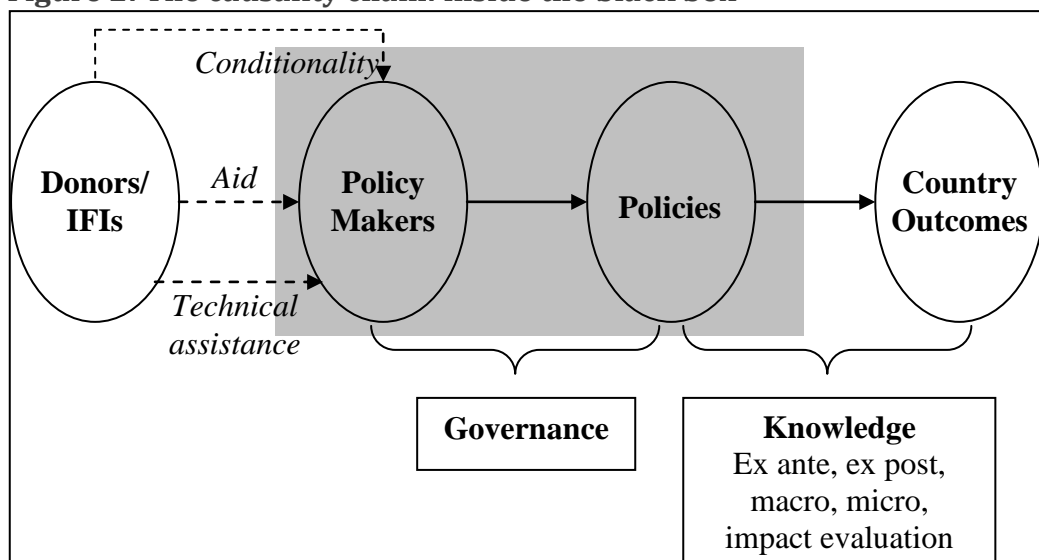
¹⁸ The governance index developed by Kaufmann, Kraay and Mastruzzi (Kaufmann et.al 2005) is used as a substitute for the CPIA index which was not publicly available till 2007. The index covers six dimensions of governance: voice and accountability; political stability and the absence of major violence and terror; government effectiveness; regulatory quality; rule of law; and control of corruption. However, Kaufman (2005) warns against using it mechanically for ranking countries, as margins of error are not trivial and caution is required in interpreting the results.

subsequently on several weaknesses in empirical methods by a large number of empirical analyses carried out outside the World Bank.¹⁹

Yet, cross-country regression analyses such as Burnside and Dollar and Collier and Dollar had very strong and direct influences on policy making and actual aid allocation mechanisms in favour of performance-based adopted by multilateral and bilateral donors. This is because the selectivity rule had a powerful appeal for the donor community as an effective instrument to overcome the moral hazard problems in dealing with recipient governments. In particular, the poverty-efficient aid allocation proposed by Collier and Dollar ((2001 and 2002), which used the CPIA as a screening device, has become influential in the policy debate on the feasibility of achieving the Millennium Development Goals (MDGs), where the poverty reduction is singled out as the most important objective of giving aid and publicised as such in order to mobilise public support for securing aid budgets in donor countries.

Subsequently, Bourguignon and Sundberg (2006) attribute the weaknesses of methodologies employed in these cross-country regressions to: i) the treatment of the complex causality chain linking external aid to final outcomes as a *black box*; and ii) the heterogeneity of aid motives, iii) the limitations of the tools of analysis. They argue for disentangling the causality chain inside the black box as a first step towards gaining a deeper understanding of the impact of aid on economic development. As shown in Figure -2, they identify three types of links in the black box: (i) policies to outcomes (knowledge); (ii) policymakers to policies (governance and institutional capacity); and (iii) donors to policymakers (financial resources, technical assistance and aid policy conditionality). Clearly, such detailed analyses of the causality chain cannot be effectively conducted through simple reduced-form cross-country regressions at the aggregate level, which have been a popular analytical tool in empirical research on aid effectiveness.

Figure 2: The causality chain: inside the black box



Source: Bourguignon and Sundberg (2006: Figure 1).

¹⁹ Nissanke (2010a) presents a summary of many analytical and methodological issues raised in evaluation and assessments of these empirical studies during the aid effectiveness debate. Further, for other critical assessments of the empirical analyses by Burnside and Dollar (1997, 2000) and Collier and Dollar (200, 2002 and 2004) , see Easterly *et al.* (2003), Dalgaard and Hansen (2001), Guillaumont and Chauvet (2001) , Hansen and Tarp (2001a,b), Delgaard *et.al* (2004), and Rajan and Subramanian (2005) .

Thus, the empirical basis used to rationalise the current CPIA-dominated, performance-based selectivity approach to aid allocation as ex-post conditionality, in which the DSF is structurally embedded, is thin and unconvincing. The ‘Deaton Report’—an influential evaluation report of World Bank research for 1998-2005, conducted by a group of independent academics (Deaton et al. 2006), also exposed the methodological flaws in these cross-country regressions carried out the World Bank. Warning against the practice of using selectively the empirical evidence to support an advocacy position, the Report concludes that “much of this line of research appears to have such deep flaws that, at present, the result cannot be regarded as remotely reliable, much as one might want to believe (p.53)”.

Furthermore, legitimate concerns have also been raised over the fact that using discrete CPIA cut-offs as practiced in the current DSF gives rise to ‘CPIA threshold effects’, whereby a small change in a country’s CPIA score near the boundary of two policy performance categories (i.e. CPIA score near 3.25 or 3.75) results in a large shift in debt burden thresholds. These artificial ‘cliff-like effects’ are the direct outcome from the way these CPIA-centred empirical exercises are carried out. In order to avoid such artificial effects, it has been suggested that the debt-burden thresholds should be set for each country on the basis of country-specific information such as growth performance or other key macroeconomic indicators.

However, despite all these technical issues and concerns, the recent Review endorsed keeping the current practice of the CPIA-centred debt burden thresholds without really providing convincing reasons. Presumably, the need for applying a standardised set of thresholds to all aid eligible countries on a comparable basis stems from the fact that the DSF is designed to be used as a basic principle underlying aid allocation mechanisms on the basis of the risk rating assigned to countries. Hence, this may have worked against setting country-specific debt thresholds. Yet, it is still hard to find a scientific justification for settling on the CPIA-centred debt burden thresholds over the use of other indicators in establishing thresholds, to which we shall now turn our discussion.

II.4. Alternative Approaches to Determining Debt Burden Thresholds and the Grant-Loan Mix

Our critical review of the DSF so far points abundantly to the need for taking into account a country’s various structural characteristics for understanding its debt carrying capacity. In this regard, the proposal made by Guillaumont et al (2010) deserves urgent attention as a promising way forward for improving the performance-based allocation system (PBA) for the IDA allocation. They argue that relying on a debatable definition of ‘performance’ dominated by the CPIA, the current *PBA* does not meet the equity concern arising from LIC’s structural handicaps to growth and development. Their main points are that: i) it presupposes that aid effectiveness only depends on the quality of policy and governance, itself measured in a subjective and unstable manner; ii) it refers to a narrow notion of needs, captured by the GNI per capita, instead of addressing the equity issue; and iii) it is not at all transparent, due to an excess use of exceptions needed to make the formula acceptable through caps and floors for fragile states and/or post-conflict or conflict-prone countries, and these are treated only in a curative manner.

Therefore, they call for improvement by introducing key indicators of measuring structural handicaps into the current PBA system on grounds of equity, effectiveness and transparency. Structural handicaps facing LICs stem from their economic vulnerability and low human capital that they face, which cannot be regarded as their “choice” and “will”. Hence, they

propose to augment the PBA by including the Economic Vulnerability Index (EVI)²⁰ and the Human Asset Index (HAI) to reflect LICs' structural vulnerability for country performance rating (CPR) and a country's "needs" respectively.

They note that the EVI already exists, as it is currently used by the UN for identifying the Least Developed Countries as a distinctive group among developing countries, as such it can be easily extended to other LICs currently not classified as LDCs. 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). Hence, the EVI is a composite indicator comprising seven elements, which can be grouped into two categories: i) under the size of the recurrent exogenous shocks, and ii) the exposure to these shocks. For measuring the first category, it uses the instability of exports of goods and services; the instability of agricultural production; and the homelessness due to natural disasters. For measuring the second category it uses: the smallness of population (log) number; the remoteness from world markets; the export concentration; and the share of agriculture, fisheries and forestry in GDP. The HAI is a composite index of health and education components, also used for the identification of the LDC. It consists of four indices respectively related to child survival, percentage of population undernourished, literacy rate and secondary enrolment ratio. For an actual inclusion in the CPR, Guillaumont et al. (2010) recommend the use of a low human capital index ($LHAI = \text{Max HAI} - \text{HAI}$).

This proposal by Guillaumont et al. (2010) could provide us with a promising direction for improving the DSF. In advancing a new overall aid allocation in IDA, we argue strongly, as they do, that ignoring structural handicaps measured by the EVI and LHAI in determining debt burden thresholds is indeed a major omission in the current DSF, creating a sense of unfairness. Furthermore, we also suggest that the present system has not attended 'incentive' issues adequately, as LICs are assessed by criteria, which encompass consequences from exogenous shocks generated by events outside their control. Overcoming structural handicaps that result in high economic vulnerability to shocks and low capacity to withstand them is what the process of economic development entails for LICs. Aid as development finance is supposed to contribute to this vital process of structural transformation. Unfortunately, the CPIA-centred aid allocation and the CPIA-dominated DSF amount to penalising many structurally handicapped LICs. Such a system is not conducive to delivering aid to those countries where transformation of economic structures and increasing their resilience to exogenous shocks is most needed.

Hence, in this context, we call for a major reform, not marginal changes, to the current DSF. As part of such a reform, the EVI and the HAI should 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.²¹ If the IEG recommendation of discontinuing the "stage of development" adjustment to the CPIA rating is followed through, the use of the EVI and HAI would become even more critical in the overall system of the PBA and DSF. While the "stage of development" adjustment to the CPIA rating on an ad-hoc basis as practiced so far is indeed

²⁰ . Patrick Guillaumont is the major contributor to constructing the EVI over many years. See Guillaumont (2009) for detailed discussion of the EVI.

²¹ . As mentioned in the Footnotes 8 and 10 above, the CPIA rating system is under review, as result of the IEG report (IEG, 2009) , which made four recommendations: disclose IBRD ratings, discontinue the "stage of development" adjustment to the ratings, review and revise the content and clustering of the criteria, and discontinue the current aggregation of the criteria into an overall index (IEG, 2009).

unsatisfactory, accounting for structural characteristics through the EVI and HAI in the PBA and DSF is absolutely essential. Under the present DSF, a country's vulnerability to shocks is only considered when stress tests are undertaken to predict the likelihood of future debt distress and crisis when the debt sustainability analyses are conducted for an individual country, as discussed in Section III.1-2 below. This is completely inadequate, since overall aid allocation is decided on the formulae dominated by the CPIA. A new system of defining debt burden thresholds as resulting from future empirical work in this critical aspect would be not only fair but more incentive-aligned.

Further, we recognise that the inclusion of the EVI and HAI may not automatically negate the need to take into account, as an incentive consideration, the quality of policy and institutions of a country as an additional screening device. Naturally, any new measure for the quality of policy and institutions should be radically different from the way the current CPIA is constructed. The new index should be a streamlined one, netting out much of the "noises" which are outside the control of LICs. Our preference would be an index, which assesses LICs in terms of their adherence to universally accepted international codes of conduct and norms as well as to efforts to make social progress in place of the controversial CPIA ratings subjectively constructed at the World Bank. Such codes could include a strict adherence to basic human right as embedded in the UN convention/resolution, a degree of transparency and accountability to domestic stakeholders in policy making and governance as well as efforts of governments to achieve MDGs and post-MDGs, which are agreed collectively by the international community at large.²² Indeed, we reckon that the use of such an index that specifies conditionality of practicing these codes and norms for accessing to aid, would invoke little controversy and encourage nurturing good governance and real democracy in LICs.

An appropriate weight given to these different indices in aid allocation and calculation of debt burden thresholds should be left to future empirical analyses as well as to open discussions among various stakeholders, once this new proposal is accepted in principle. We also predict that the combined use of different indices, including the EVI and HAI in calculating debt burden thresholds would avoid a very sharp, cliff-like shifts of thresholds applied to a country in the current DSA exercises, which may have partly originated from some unstable CPIA ratings obtained.

Another area we call for urgent amendment to the current DSF is the present practice of a mechanical application of the traffic light system for deciding the grant-loan mix in aid allocation. First of all, in deciding on the grant-loan' mix, a country's overall debt carrying capacity should be primarily assessed against its performance in public finance and debt management, not the mixed score such as the CPIA.²³ Further, grants cannot be seen always a better modality of aid delivery compared with debt contracts. For example, if grants are the only instruments used for aid provision, the size of overall aid envelope could be limited by budget constraints bilateral donor governments and multilateral development agencies face. Indeed, as noted in Gunther (2009), increasing aid through loans entails lower real costs for donors than providing the same nominal amount of aid in the form of grants. The use of

²² Gunter et al. (2009) reports the findings from their probit analysis similar to the original "Kraay-Nehru" study to suggest that the capacity to bear debt is related to progress made in social development and their findings of statistically significant positive effects of social development on the debt carrying capacity even after controlling for good policies and institutions.

²³ . Since the World Bank country mission makes an assessment on Debt Management Performance Assessment (DeMPA), the data should be readily available.

concessional loans allows the augmentation of the overall aid resources envelope, as donor governments and official multilateral agencies can utilize more funds mobilized through efficient inter-temporal management of their own resources, including recycling principal repayments and any interest payments on the loans made earlier.²⁴

Importantly, an appropriate configuration of the grant-loan mix should be decided dependent on what aid is used for. Many infrastructure projects which can alleviate various absorption capacity constraints and critical supply bottlenecks could in principle generate high growth dividends and social returns if projects are managed efficiently to create a stream of steady cash flows over a period corresponding to a negotiated debt payment schedule. For financing these types of projects, concessional loans can be a superior instrument to grants. The maturity and other terms associated with concessional loans such as the IDA loans and ADF loans are indeed very generous. For example, IDA loans are presently offered to LICs with grant elements often around 60-70 %, with maturity of 40 years, including a 10-year grace period, carrying very low interest rates, as discussed in details in Sections IV and V below. Productive investment financed by these highly concessional loans should be able to generate returns to make serving easily affordable if projects are designed and managed well. Seen in this light, the sharp division of IDA- only countries into “red-light” (100 % grant), “yellow-light” (50 % grant- 50% IDA credit) and “green-light” (100 % IDA credit) as practiced in the DSF is, in our view, overly artificial within the 10-year grace period.

What is more useful is to provide valuable technical assistance for managing the financed projects to generate tangible growth dividends, enhanced cash flows and tax revenues so that debt is serviced according to the schedule laid out. As discussed in Section V below, if generous concessional loans are offered in properly structured, incentive-compatible debt contract, they are superior to outright grants in financing productive investment, provided that projects are carefully selected, well designed and executed. What is needed is to address LICs’ high vulnerability to exogenous shocks with an efficiently structured contingent financing facility (see Section V).

On the other hand, grants can well be more appropriate for financing social infrastructures such as education and health or economic infrastructure financing rural roads or water supply to the poor. Investment in health and education, for example, would take a longer time to generate growth dividends. It is also hard to project cash flows over time from funding the social sector or those targeting specifically at the poor compared with productive investment in large economic infrastructure projects. For example, returns to investment in human capital accruing to individuals are widely dispersed, requiring an efficient tax system to recuperate. The latter itself takes a longer time for governments to create and administer. Therefore, grants are needed for covering the cost for this kind of investment or technical assistance and cooperation. All these point to a great care required in deciding which aid instruments and modality are appropriate on a case-by-case basis.

III Critical Appraisal of the Debt Sustainability Analysis (DSA) embedded in the DSF

III.1. The Construct of DSAs and Proposed Changes

²⁴ For example, IDA is known to receive a substantial reflows on previous IDA loans, which enhances its overall resource envelope by substantial amounts.

The Debt Sustainability Analysis (DSA) applied to an individual country and conducted so far within the DSF comprises three elements²⁵: 1) constructing a baseline scenario of debt dynamics, representing the projected macroeconomic framework with economic policies and growth potentials, main assumptions and relevant parameters; 2) conducting a series of bound/stress tests applied to the baseline scenario, providing a probabilistic upper bound for the debt dynamics under different assumptions; 3) constructing alternative scenarios (Barkbu et.al. 2008).²⁶

The DSAs in place are used to be carried out separately for external debt and public debt. The formulae used for generating a baseline scenario debt dynamics in the DSA are presented in Appendix 2. As shown in Equation (2) in Appendix 2, external debt dynamics, expressed as a ratio of the present value of debt stock to exports, is generated by dynamics of the current primary balance (the external financial gap) adjusted for concessional financing and the difference between the concessional interest rates (i_t) and the growth rate of exports (ϵ_t). On the other hand, public debt dynamics is generated by dynamics of primary fiscal deficit in relation to GDP and the difference between real interest rate (r_t) and real growth rate (g_t), as expressed in Equation (4).

In the DSAs six bound/stress tests are conducted for external debt sustainability, applying historical averages minus one standard deviation, applied to real GDP, exports; GDP deflator; non-debt-creating flows (e.g.FDI); a combination of all these four variables; and a 30 percent devaluation of the national currency. For public debt sustainability, five bound tests are conducted using historical averages minus one standard deviation, applied to real GDP, the primary fiscal balance, a combination of the two; a 30 percent devaluation of the national currency; a 10 percentage point of GDP increase in debt-creating flows. The shocks are expected to last for five years.

Further, for the external debt, two alternative scenarios are constructed: i) a historical scenario at their historical averages of real GDP, GDP deflator, growth, noninterest current account in percentage of GDP, and non- debt- creating flows; and ii) a scenario with less favourable financing terms. For the public debt, three scenarios are constructed: i) a historical scenario at their historical averages applied to real GDP and the primary balance; ii) a scenario with the primary balance in the projection period equal to the first year of projection; and iii) a scenario with permanently lower real GDP growth (Barkbu et.al 2008). All the elements in the DSAs cover uniformly a period of over 20 years for LICs, instead of a five-year projection used for Middle-Income Countries (MICs), on account of the long maturities of LIC debt. The use of debt indicators expressed in PV terms is also justified on the ground of predominance of concessional debt, as discussed below. It also uses a 25 percent probability of distress for stress tests.²⁷

In the current DSAs, a country is assigned one of the following four debt distress rankings solely on the basis of an analysis of external public debt relative to the indicative CPIA-based thresholds over a 20-year projection period:

²⁵ .The recent Review of the DSF recommends that a full joint Bank-Fund DSA is produced every three years with lighter joint updates in the interim years (IMF/World Bank, 2012).

²⁶ The terms of bound and stress tests are used interchangeable in the IMF documents.

²⁷ . The use of a 25 percent probability of distress in the stress test as a benchmark is somewhat arbitrary. This benchmark is quite conservative in the light of other earlier studies. For example, Cohen (1997) calculates the growth impact of a debt crisis at various probabilities to identify the probability of debt distress that has the largest negative effect on growth. He finds that a 60 percent probability of distress has the maximum effect on growth.

- *Low risk (green-light)*: All the debt burden indicators are well below the thresholds.
- *Moderate risk (yellow-light)*: 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.
- *High risk (red-light)*: One or more debt burden indicators breach the thresholds on a protracted basis under the baseline scenario.
- *In debt distress*: The country is already experiencing difficulties in servicing its debt, as evidenced, for example, by the existence of arrears.

Since its official release in 2004-5, several methodological issues have been raised with respect to the DSAs and a series of modifications have been made through regular review processes. The most recent Review carried out in 2011 is more comprehensive and proposed to strengthen DSAs in several important aspects by: 1) refining stress tests to better reflect dynamic linkages between macroeconomic variables; 2) deepening the analysis of total public debt and fiscal vulnerabilities; 3) carrying out an additional risk rating for countries with significant vulnerabilities related to domestic public debt or private external debt; 4) incorporating explicitly the link between debt-financed investment and growth into DSAs; and 5) simplifying the template to be used easily by country authorities (IMF/World Bank, 2012).²⁸

We present below our evaluation of the proposed revisions to the DSAs under four sub-headings: revised methodological refinements to stress tests (Section III.2); interrelations among external, public and private debt (Section II.3); a review of scaling factors to debt burden indicators and the role of discount rates in debt management (Section III.4); review of the proposed DSAs with application of the DGE as a coherent forward looking macroeconomic framework for examining the effects public investment surges on debt sustainability (Section III.5).

III.2. Methodological Refinements to Stress Tests

III.2.1 Baseline Scenario and Stress Tests in the current DSA

In the current DSAs all projections of debt dynamics under a baseline scenario are generated by applying macroeconomic relationships leading to debt dynamics such as Equations (2) and (4) in the Appendix 2. For this, various assumptions have to be made with respect to key variables by the staff at the IFIs. These are in turn derived from the underlying macroeconomic framework in use at the IFI. Though the DSAs are often presented as authoritative forecasts with forward-looking and probabilistic features, we should interpret them with due caution and care, as with any forecasts over future events. As noted in the original IMF paper, “such projections are only as good as their underlying assumptions, and these assumptions have a particularly slender basis for the long time horizon implied by the average maturity of concessional loans. The scope for error is large, both on the upside and the downside (IMF 2004a: 13)”.

The baseline is first compared with a historical scenario. Further, a reality check of the baseline scenario is carried out to compare the projected time paths against alternative scenarios created by a series of bound tests through exposing key variables to various shocks.

²⁸ The recent Review of the DSF recommends that a full joint Bank-Fund DSA is produced every three years with lighter joint updates in the interim years (IMF/World Bank, 2012).

The bound/stress tests are done to reveal the implication of temporary adverse deviations in key parameters from the baseline projections. In addition to the uniform deviations standardised across countries indicated above, the DSF suggests using the size of the deviations informed by country-specific historical experiences with volatility. The stress tests are calibrated under these alternative scenarios so that the implied outcome for the long-term debt ratio (say, at a 10- year horizon) has a roughly 25 percent likelihood of occurring.

For illustrative purposes, two original examples of external debt and public debt dynamic in the DSA are shown in the Appendix 1, Fig.A-1. At first sight, these procedures appear rigorous enough to create a set of useful projections for a country's future paths of debt dynamics and hence to make informed decisions on borrowing/lending. However, the stress tests calibrated around the baseline scenario are not necessarily informative under scrutiny as historical series of averages and volatility used for stress tests can be a poor guide in most cases for future predictions. The averages would not generate a trajectory with any volatility close to the real world phenomenon, while the pattern of volatility historically observed may not repeat itself.

This is the case especially if a country emerges from a conflict situation, with a radical change of government or experiencing some structural changes with new investment triggered, say, by a discovery of a natural resource or changes in some main economic policies. Then, the relationships between macroeconomic variables could undergo some significant changes. So projections should factor in these structural brakes. It is known that the underlying macroeconomic interrelationships are typically highly unstable in LICs, much more so than in developed countries, especially if they experience not just one-off brakes but some structural brakes continuously, political turmoil or other shocks. Hence, the accuracies in forward-looking projections over a 20 year time horizon are seriously in doubt, even though DSAs are supposed to be carried out annually to update and feed newly arising information into analyses. Any debt sustainability assessment is only valid within the bounds of the underlying guesses, as Wyplosz (2007) reminds us. This is not only because the future is unknown inherently, but particularly so because we live in an ever-increasing, highly uncertain, globally integrated world, which can expose LICs more frequently to larger shocks.

III.2.2 Alternative analysis to stress tests

The Review in 2011 accepted the criticisms that the technique of using various pre-determined scenarios for stress tests in the DSAs can be improved upon in several directions, including the use of more dynamic simulation techniques. This is because while efforts are made to apply country-specific events/shocks for bound tests in addition to standardised analyses of the impact of shocks (applied for ease of comparison across LICs), most DSAs conducted so far did not exploit fully the time-series historical data for forecasting exercises. As Arizala et al. (2008) note, it does not take into account uncertainty about future movements of macroeconomic variables that are directly relevant to determining debt dynamics. The pre-Review DSAs take a deterministic approach, simply first projecting 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.

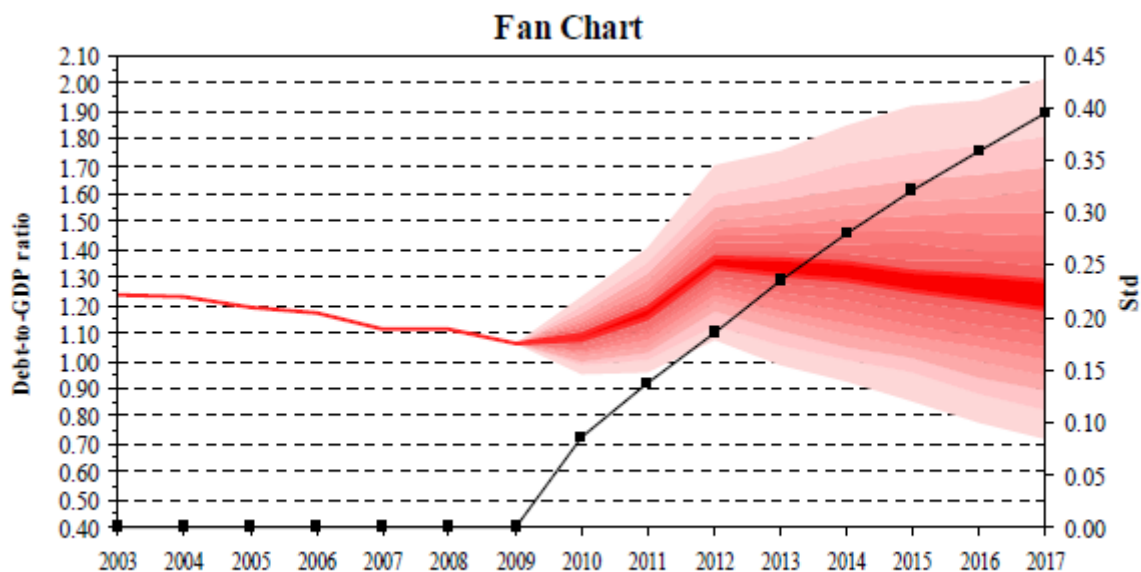
As the manual produced by the research team at the Inter-American Development Bank (IADB) describes, there are alternative approaches to calculating the likelihood that specific

unfavourable shocks raise debts to levels that exceed the servicing capacity or fall into an explosive path over time (Borensztein et al., 2010).²⁹ The “Value at Risk analysis (fan charts analyses)” is one of these methods, widely used for short-term macroeconomic forecasting. This analytical tool is based on two main ideas: “history allows evaluating the probability of various events or combinations of events, and that reactions should take into account both the possible severity of each event and its likelihood (Wyplosz 2007: 22).” The framework of “Fan Charts” can incorporate the structure of random shocks hitting the economy to obtain a complete distribution of probable outcomes. It hence recognises that “even when the government is resolute in pursuing its fiscal targets, the outcomes are subject to significant risks, especially as the planning horizon lengthens (Arizala et al., 2008)”. The probabilistic approach undertaken to uncertainty analyses is superior to the approach to forecasting adopted in pre-Review DSAs. The latter does not take into account how the main key variables in the equations of debt dynamics interact with one another. Specifically, the fan chart techniques allow exploiting correlations among these variables. This is important since the interdependence among various variables, reflected in co-movements in macroeconomic variables, could provide important information for projections of the impacts of shocks under consideration irrespective of whether individual shocks, or combined shocks, are examined.

Hence, the DSF Review recommended the use the Value at Risk analysis (fan charts analyses) in parallel on an experimental basis to exploit dynamic interactions among key macroeconomic variables in a country-specific context, as far as data availability allows. As described in detail in Arizala et al.(2008), risk measure is approximated using a vector autoregressive (VAR) model, which captures the correlation pattern between a set of macro variables and produces the joint dynamics for all the variables included in the analysis. The procedure in the fan charts can be automated to generate randomly a very large number of shocks, through Monte-Carlo simulations, assigning a probability of occurrence to each shock. Therefore, a corresponding evolution of the debt dynamics associated with shocks is finally produced with a probability of occurrence. Fan charts such as those shown in Fig. 3 can be obtained through this procedure without making any arbitrary choices about the nature and size of shocks as in the DSAs so far used. The procedure could offer more accurate estimates of the probability of each event.

Figure 3 Fan Charts

²⁹ . In the manual, they consider five approaches in details. They are: 1) Standard Approach, 2) Endogenous Debt Dynamics, 3) Sudden Stop, 4) Fan Charts and 5) Natural Debt Limit.



Source: Fig.14 in Borensztein, E. et. al (2010)

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 are capable of conveying a 'message' of probabilistic nature of debt sustainability exercises much more explicitly. The users are provided with charts of debt dynamics showing increasing standard deviations around the central path over time. If appropriately used, the fan charts can offer a useful forum for policy dialogue between sovereign borrowers and lenders. More informed borrowing/lending decisions can be made with better appreciation that the projected debt dynamics are indeed just an indication of possible paths, each of which has a different degree of probabilities attached. Fan charts also demonstrate graphically how much and how quickly the predictive power diminishes over time. They clearly show that it is almost impossible to predict debt dynamics over a medium-to-long time horizon with any sort of acceptable ranges of accuracy, certainly beyond a five year period.³⁰ In short, it reminds us plentifully of 'futile' nature of exercises of predicting debt sustainability in principle in a world governed by high uncertainty.

Importantly, we should bear in mind that the use of the fan charts approach does not guarantee the accuracy of forecasting value generated. It is still build on the assumption that the past is a good guide for future. It assumes that historical correlations among variables observed in the past are equally relevant for future. As noted above, however, in evolving dynamic economic settings, this assumption may prove incorrect as much as in the current DSAs, since interactions among variables could well undergo significant changes.

In this context, Arizala et al. (2008) note that being purely *backward* looking in the forecasting procedure, the fan charts analysis based on the simple VAR model "does not take into account shifts in policies and ongoing structural changes in the economy. The more frequent these situations, the less reliable the econometric estimates for the prediction of

³⁰ . This is the reason behind the popular use of the fan charts analysis for short-run macroeconomic forecasting such as in periodically published "Inflation Reports" at the Bank of England or other central banks. It is not used much for generating long-term predictions spanning beyond a 10-year period.

future evolutions of the variables of interest”. They mention that structural VARs can be used in place of the simple VAR model, to interpret the effects of different economic policies such as the interest rate policy that can be considered as an exogenous variable in this context, and/or to incorporate some restrictions on the relations between the macroeconomic variables that can arise from theory or judgment.³¹ They further suggest, as a promising way forward, an alternative combined approach, wherein the central projection is given by some external forecast, while the VAR is used only to obtain a correlation matrix for the joint distribution of the errors. They evaluate advantages and disadvantages of different ways of using fan charts analyses, classifying them into: 1) VAR approach, 2) External Forecast, 3) External Forecast with correlated errors and 4) Weighted Projections.³²

Figure A-2 in the Appendix 1 reproduces, for illustrative purposes, the fan charts produced at the IADB for Uruguay, using these four methods. It shows, as noted above, that the projected paths in fan charts lose progressively its predictive ability as the forecasting period lengthens in all cases, though the charts shown here only cover a five year period. It should also be noted that data requirements for the fan charts analysis are generally demanding, which points to some difficulty in applying to LICs compared to MICs. Furthermore, it is known that econometric analyses using a VAR or its variations are more suited when higher-frequency data are applied.

Indeed, as Wyplosz (2007) notes, there is some trade-off between complexity and simplicity in the choice of econometric techniques. His warning against going down in a direction of using unnecessarily complex techniques and demanding computational task should be noted.

III.2.3. Reappraisal of the concepts of “debt Sustainability”

In fact, Wyplosz (2007) regards any analysis of debt sustainability as a “mission impossible”, suggesting that the concept of debt sustainability is so elusive and illusory for policy purpose that it may be better to use instead “debt distress avoidance” as policy objective. Referring to the “trade-offs” between complexity and simplicity, he discusses, on the merit of its simplicity, the approach of computing *the debt-stabilizing primary balance* as addressing the debt sustainability question, as in Blanchard et al. (1990) and Buiters (1985). The starting point of their approach is an alternative definition of ‘debt sustainability’, in which 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 not on a non-increasing trend. The objective of the computation of the debt-stabilising primary balance is to stabilize the debt at a chosen level deemed more desirable. Since debt dynamics are closely governed either by the external current account primary balance or the fiscal primary balance, as expressed in Equation (2) and Equation (4) in the Appendix 2 respectively, the focus should be on stabilising the level of these primary balances in order to keep current debt stable. 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.

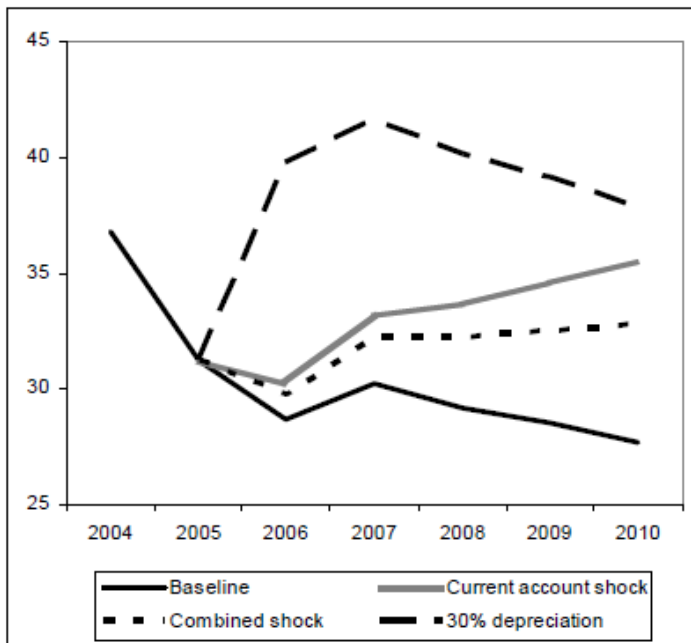
He uses an example of such an exercise wherein the objective is to maintain the debt ratio at its pre-shock level of 2005, assuming a 30 % depreciation shock in 2005, shown in Fig 4-a below, reproduced from Figure 3 in Wyplosz (2007) for ease of comparative illustration. This

³¹ It can be noted in passing, however, that structural VARs are not universally accepted as a robust method for macroeconomic policy analyses yet, as they are very sensitive to specifications of structural models and restrictions placed.

³² See Table1 in Arizala et al (2008).

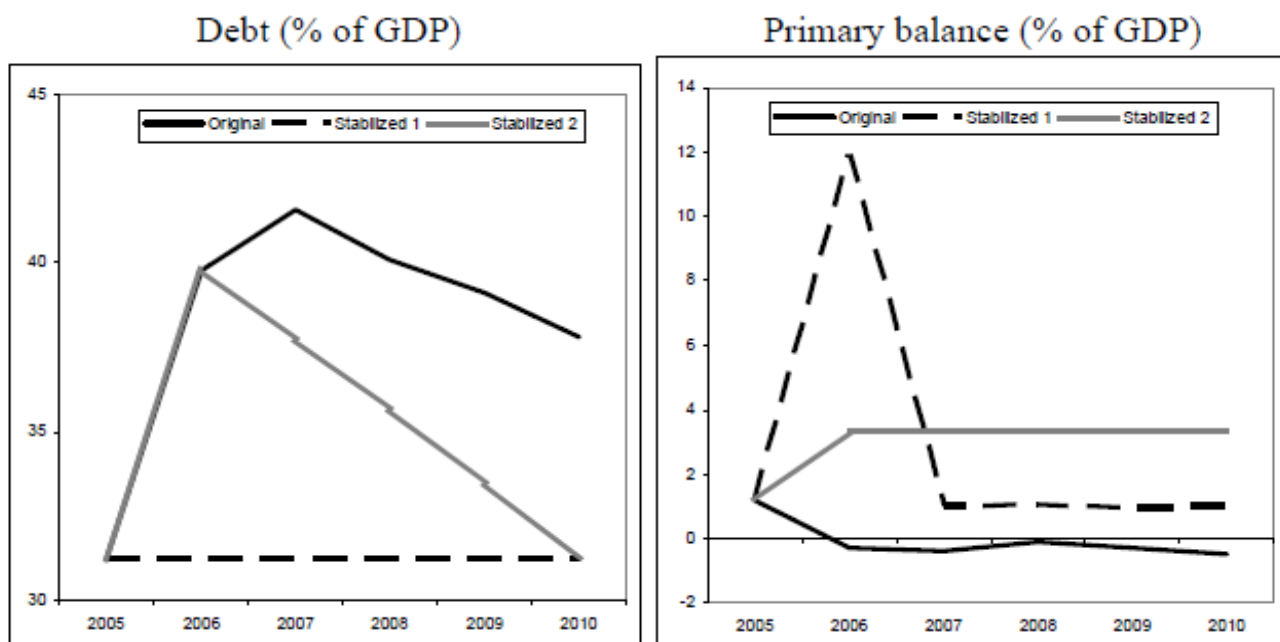
chart is the one drawn following the procedure laid out in the current DSAs. This is depicted as an “original” scenario in the next two charts (Fig 4- b&c), reproduced from Figure 5 in Wyplosz (2007) which is used for discussing the debt-stabilising-primary-balance approach. In terms of contemplating policy responses, if the aim is to reduce the debt ratio promptly, policy makers are required to produce a large primary surplus immediately. This is shown in Fig 4-b & c under “Stabilized 1” policy option. Fig 4-c shows that fully stabilizing the debt requires a huge primary account improvement immediately when the depreciation suddenly increases the domestic currency value of the external debt. This tightening is relaxed over time when price increases catch up with depreciation. Wyplosz considers another possibility under “Stabilized 2” policy option, where the debt is allowed initially to rise first but is aimed at returning to its 2005 level gradually by the end of the planning period, in this case in 2010. This shows that the least disruptive way of adjusting to shocks is to achieve a primary surplus that remains constant over the planning the period, as in “Stabilized 2” in Fig. 4 b & c. Under the latter scenario, the primary balance now increases moderately, even though the shock is unusually violent, allowing an initial jump in the debt ratio.

Figure 4. Comparative Analysis of Policy Responses
(a) Simulated Paths of the Debt-to-GDP Ratio under DSA



Source: Fig.3 in Wyplosz (2007)

Fig. 4 (b) and (c). Debt Stabilising Primary Balance



Source: Fig. 5 in Wyplosz (2007)

In our view, this computational approach provides us a forum for a more 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. As Wyplosz demonstrates through the diagram that time permitting, even very large debt shocks can be dealt with through moderate primary account corrections, as a moderately sustained primary account correction produces a large cumulative effect of reducing the debt ratio over time under the “Stabilized 2” option. This option is of course more acceptable economically and politically, since it avoids a massive spending contraction which is bound to result in a severe recession. This also indicates that temporary shocks could be dealt with policies that spread adjustment costs over time. There is 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.

Importantly, this points to the need for a new facility to deal with shocks facing LICs. If upon shocks critical contingent financing is available to make adjustments palatable as possible, the debt level can be kept under control, while avoiding a sharp contraction in aggregate demand to produce a primary balance surplus in a short time framework. Given official liquidity made available immediately upon shocks through such a contingent facility, sovereign borrowers could then focus on achieving development objectives. However, if a shock proves ex-post to be more permanent, in order to sustain development spending and support investment, LICs with structural handicaps would require supplementary development aid in addition to the contingent credit line (Griffith-Jones and Ocampo 2008).

In this context, Vaggi and Prizzon (2009) also discuss the long run sustainability of external debt for LICs, using a similar analytical approach to the one that Wyplosz deployed above with a focus on dynamic paths of non-interest current account balance (*nica*), interest rate and growth rates in the framework of the “Geometry of Debt Sustainability (GDS)”. They emphasise the importance of a deeper appreciation of the fact that for LICs with a narrow export base, moving from a deficit position to a surplus one in ‘*nica*’ implies a process of

structural change, requiring much longer lead time. Therefore, while debt restructuring or cancellation would provide an important relief in short-run, any discussion about debt sustainability for LICs should take a long run view of economic development process, involving the attainment of human development targets and or other objectives detailed in MDGs or post –MDGs targets.

In Section V below, we shall return to this issue again when we discuss the imperative for instituting a new contingent financing facility in the face of exogenous shocks with a view to making debt instruments to work truly for economic development of LICs.

III.3. Missing analysis of dynamics among components of total debt in the DSAs

In the pre-Review DSAs, the sustainability analysis of external and public debt is conducted independently and in parallel, while a country is assigned one of the four debt distress ratings based solely on the basis of its forward-looking external public debt indicators relative to respective thresholds. In the past, LIC's external debt was predominantly public debt, while public debt was mostly external debt. So the focus on external public debt may have been judged as adequate for sustainability analysis of sovereign debt, seen from a point of external debt for managing the primary external balance on the one hand, and from that of public debt for managing the primary fiscal balance on the other. Thus, the traditional dominance by official concessional loans both in external debt and public debt in LICs could be a rationale for emphasising the risks associated with external public debt while recognising the importance of domestic debt more generally.

Thus, for example, domestic debt was not included in the pre-Review DSA exercises. This was justified in the past due to the marginal share of borrowing from domestic debt markets in public debt in LICs in general. However, as Panizza (2007 and 2010) notes, this situation has been changing rapidly during the past decade in several large LICs, including those in Africa. Domestic debt has increased its share in public debt in these countries. Furthermore, he also points to the newly imaging situations, whereby non-resident purchases of domestic public and private debt have become non-negligible. This would lead to a fear that these countries are now exposed to the risk of a sudden shift in investor sentiment, followed by instability in the domestic financial market and the associated risk of difficulties in managing domestic debt. The latter issue is very much what a large number of advanced and emerging countries are forced to grapple with in the aftermath of the global financial crises and this topic is hotly debated among economists.

Further, as private debt denominated in foreign currencies has to be treated as a contingent liability, which governments have to assume at times of non-payment, it should be incorporated in an analysis where public debt management is discussed. As Panizza (2010) emphasises, under these circumstances the distinction between domestic and external debt as well as between public and private debt will become blurred and hazy. Accordingly, debt management will become much more complicated in LICs with the emerging need to address the question on debt structures and compositions in terms of maturities and currency denominations.

Indeed, an option to turning to domestic debt as a financial instrument for fiscal management has opened up in several LICs with deepening of domestic debt markets, while the prospects of accessing international capital markets have significantly improved on account of better growth performance of many African countries, as discussed in Section IV below. While this

emerging situation is often embraced as positive development reflecting a wider and due recognition by investors and markets of the potential of African economies, it has also given rise to fears that domestic public debt and external private debt can develop its own negative dynamics, leading to vulnerability and fragility. Compared to official external debt with high concessionality, these debt instruments carry much elevated costs of servicing with higher interest rate payments and shorter maturities attached. Given this, the recent Review recommends deepening the analysis of sustainability of total debt all inclusive of domestic public debt and private external debt and associated fiscal vulnerability.

Yet, the emphasis of the Review’s recommendation in this area is placed more on deriving definite benchmarks of total public debt, as the case in the current analysis of external public debt, leading to assigning a risk distress rating relative to the CPIA-centred, standardised thresholds at the end of each DSA exercise.³³ Having gathered domestic debt data spanning several decades covering 123 countries, of which 81 are classified as LICS, they carried out empirical exercises similar to those reported in Kraay and Nehru (2004,2006) and IMF (2004a) reviewed in Section II.3 above, and produced the following results of the implied CPIA dependent *total* public debt sustainability thresholds (Table 3).

Table 3. CPIA-determined total public debt thresholds

Indicative Policy-Dependent Public Debt Benchmarks		
	Public debt to GDP	
	PV	Nominal
Probability minimizing type I and type II errors	12.3%	12.7%
Weak (CPIA=3.25)	38	49
Moderate (CPIA=3.5)	56	62
Strong (CPIA=3.75)	74	75

Source: IMF/World Bank (2012)

However, whilst the focus is placed on producing a “scientific” basis for arriving at debt distress ratings on the basis of CPIA-centred benchmarks for total debt in the Review, what is critical is to examine emerging interrelationships among different components of total debt. As discussed in the Three-Gap model developed and discussed extensively by Bacha (1990) and Taylor (1988 and 1991), an analysis of dynamic interactions among three main macroeconomic imbalances facing developing countries – the external current account imbalances, the fiscal imbalances and the saving-investment balance – is of critical importance. In their framework, three gaps identified as a separately distinguishable binding constraint are seen explicitly as interacting closely with one other endogenously to engender an economy’s adjustment path in response to various shocks. Once the parameters are not considered as fixed,³⁴ *ex ante* gaps in all the three sectors reveal themselves as not truly independent as Maizels (1968) notes in relation to the original two gaps model. Then, both

³³ . Since high levels of private external debt are observed in only a few LICs, the Review suggested to take a country-specific approach rather than including it in estimation of benchmarks of debt distress rating of total debt for the time being.

³⁴ . Easterly’s criticism of the financial gap model in (1999b) is basically directed at the gap model’s uncritical adoption of the assumption of the fixed relationships between key parameters as found in the original Harrod-Domar growth model. However, this has been for long and widely recognized as one of the drawbacks of the model. The gap models should be instead treated as a macroeconomic analysis of the disequilibrium adjustment process as in Taylor (1988 and 1991). Then, they can serve as a useful analytical tool for examining various adjustment policy options.

the two-gap and the three gap-models could serve as a tool for macroeconomic policy analysis of the disequilibrium adjustment process as found in Taylor's discussion of the three-gap model (1988 and 1991).

The necessary *ex ante* adjustments are by no means either spontaneous or painless, whether achieved through the market mechanism or through government policies. As Chenery and Strout (1966) emphasize, there is no automatic mechanism to equate the gaps, and the process of closing the gaps is, in essence, a disequilibrium adjustment process. Taylor (1988 and 1991) shows that while in theory there are several mechanisms by which the gaps between the three gaps can be closed in the wake of exogenous shocks, the growth rate is an endogenous adjustment variable in all his eighteen case-study countries.

In stress tests carried out in the pre-Review DSAs, 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 might set for an unstable or, worse, explosive, path. Such events to either of the two primary balances or both would make dynamics of domestic and external debt unsustainable through interactive adjustment processes. As the DSF is meant for monitoring debt dynamics as well as for serving as a toolkit in policy dialogues between sovereign borrowers and official lenders, an analysis of the two balances and the two debt dynamics projected initially separately should be integrated and thoroughly discussed. For this, the approach of computing *the debt-stabilizing primary balance* to debt sustainability discussed above in Section III.2.3 and illustrated in Figure 4-b&c could be invaluable for understanding policy options in adjusting to shocks as well as examining feedback reactions between the two dynamics.

Referring to Keynes's infamous "transfer problem" thesis, UNCTAD (2010) discusses the importance of understanding different implications of domestic debt mainly with a budgetary implication and external debt with a payment implication in foreign currencies. Hence, it emphasises that developing countries who cannot issue external debt obligation in its own currency, have to develop the capacity to cover international obligations on a net basis (i.e. without creating new debt). A country can make payments from income streams generated by internationally tradable goods and services only in sustained presence of a current account surplus. The two-gap model referred to above is developed precisely on the recognition of this critical premise. Hence, real exchange rates are a critical adjustment mechanism for ensuring for management of the current account balance.

At the same time, the UNCTAD Report goes on to discuss why a full analysis of interactions and linkages between external and fiscal sustainability is vital. In particular, it stresses the importance of understanding the critical policy trade-off in the adjustment mechanisms arising from these interactions: a real devaluation is a necessary condition for restoring external sustainability but since a large share of external public debt in developing countries is denominated in foreign currencies, a large devaluation can lead to a sudden jump in the debt-to-GDP ratio. This implies that "a currency appreciation can jointly have a positive effect on fiscal sustainability and a negative effect on external sustainability" (UNCTAD 2010: 63). Yet, as it notes, if a rapid deterioration of the current account develops, the improvement in fiscal conditions is temporary and that this trade-off also implies that allowing currency devaluation in presence of foreign currency public debt may lead to a debt crisis on the fiscal front. Hence, exchange rate movements have to be carefully managed,

taking into account this potential trade-off in ensuring debt sustainability with an eye on the development of both external and internal balances.³⁵

A switch to domestic borrowing in public debt management can reduce the policy trade-off of this kind, but also lead to another well-known trade-off between inflation targets and domestic debt management for attaining domestic macroeconomic balances. This is again the precise issue addressed in the three-gap model by incorporating a fiscal gap into the analysis. We should also note that the first policy trade-off arising from the impacts of exchange rate movements on the external and internal balances is not eliminated by the switch to domestic debt altogether. What matters is the relative expected rate of changes in exchange rates and domestic prices. As Wyplosz (2007) note, “if the exchange rate depreciates faster than prices, foreign currency debt becomes more expensive in domestic currency. The same happens when the interest rate on domestic currency debt increases by more than the inflation rate. Debt service becomes heavier. Conversely, when interest and exchange rates fail to fully reflect expected inflation and the debt is not indexed and in domestic currency, rising inflation temporarily reduces the cost of borrowing.”

In the pre- Review DSAs, much meaningful discussions are not conducted on these crucial issues altogether by missing an analysis of interactions between external and public sustainability and associated policy adjustment questions into its analytical framework. As discussed below in Section III.5, this question takes rightly one of central places in the new DSAs conducted with use of the DGE model.

III.4. Adjustments to Scaling factors and Interpretation of Discount Rates

Following on the recommendation of the earlier review, the recent Review has also proposed to adjust debt burden indicators of debt/exports ratios by including growing remittances and official international reserve holdings into a denominator of debt burden indicators. Naturally, debt burden indicators should reflect, as accurately as possible, a country’s all inclusive income flows such as private transfers or official reserve holdings that are available for debt service payments.

Discussions on the discount rate in the DSF- another scale factor to debt burden indicators- remain conducted purely as a technical matter as to which rate should be selected for calculating the present value (PV) of debt. The present value (PV) of debt is the discounted sum of all future principal and interest ($a_t + i_t$) at a given discount rate (β). That is:

$$PV_t = \sum_{t=1}^n \frac{(a_t + i_t)}{(1 + \beta)^{(t-1)}}$$

From this it is clear that debt for LICs is concessional, since its PV is always lower than the face nominal value, because the contractual interest rate is very low, usually lower than the discount rate applied.³⁶ Hence, in the DSF the use of PV in calculating debt burden indicators in place of the nominal value is justified on the grounds that it can account for the concessional nature of debt by applying an appropriate discount rate. It is also argued that the use

³⁵ . The classical tension between policy instruments and targets for attaining the internal and external balances is well known, and extensively discussed in text books on open economy macroeconomics. This is also addressed in the three-gap model by applying an analysis of disequilibrium adjustments in a dynamic context.

³⁶ . Strictly speaking, the net present value should be used for measuring a country’s debt profile. However, a simple PV is calculated in DSAs on account of the limited data availability for the NPV, while gross figures are more readily available.

of PV allows for a slower pace for contribution of debt-creating flows to output and export growth. After taking into account other elements of concessionality such as the grace period, the maturity and the frequency of payments to calculate *effective* interest rates charged on debt instruments, the PV is regarded as a critical element for calculating the grant element (GE) as:

$$GE = \frac{(\text{face value} - PV)}{\text{face value}}$$

In this respect, a question arises as to the discount rate appropriate for calculating the PV in DSF. Currently, in the DSF, the US dollar CIRR (commercial interest reference rate; six month average) is applied as a uniform discount rate for all LICs. It is adjusted regularly according to the rule that the discount rate should be adjusted whenever it deviates from the CIRR by at least 100 basis points for a period of six consecutive months (IMF and World Bank, 2009).³⁷

This global commercial reference rate is selected as a discount rate to an official concessional debt, since it reflects a shadow interest rate for sovereign borrowers, if they were to resort to non-concessional commercial loans for their development finance. Donors also insist on the use of a reference commercial rate, as the commercial rate reflects the opportunity cost of concessional lending from their perspective.³⁸ The choice of such a commercial reference rate over an appropriate discount rate in the case of official loans has not been easily settled since there is hardly any secondary market for official concessional loans for providing a clear reference point, as opposed to the case of commercial sovereign debt instruments issued for Middle Income Countries and Emerging Market Economies.

Certainly, from a sovereign borrower's perspective in the case of LICs, it may well be relevant to use other discount rates appropriate to understand the relative cost of debt burden at least as a comparator. 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. Domestic rates are already factored in as interest rates in the case of domestic public debt. However, 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 started taking increasingly an option of issuing debt instruments for mobilising resources domestically as well as internationally, as discussed in Sections III.3 above and IV.1 below.

This discussion demonstrates that there is a range of issues to consider for deciding which discount rates should be used in the debt sustainability analysis for productive and meaningful policy dialogue for making sovereign borrowing/lending decisions. 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. We suggest that alternative discount rates may be

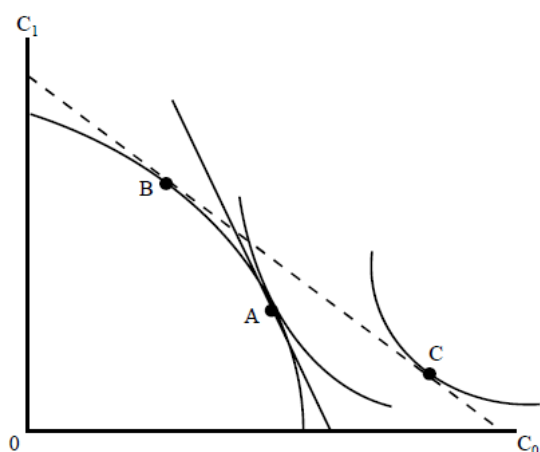
³⁷ This rule is said to strike a balance between the desire to insulate PV calculations from temporary noise

³⁸ . Cosiro-Pascal (2010) notes that the use of the commercial rate such as CIRR is useful for creditor countries for a fair burden sharing of the debt rescheduling in Paris Club negotiations.

considered at least as a comparator for discussion and negotiation, since the degree of debt burden is influenced by the choice of discount rates for debt sustainability analysis.

For now, we turn our discussions to the important role of discount rates in the analysis of sovereign debt from a borrower's *long-run* developmental perspective, i.e. its key role in decision making of inter-temporal resource allocation rather than just for the use to reflect a mere concessionality of official sovereign debt. This is because the discount rate used should also reflect a sovereign borrower's decision on how much weight the society places in aggregate on current enjoyment (consumption) against one in the future (investment) as a matter of inter-temporal resource allocation. In the theoretical borrowing/lending model as in Obstfeld and Rogoff (1996, shown in Fig.5, a country's inter-temporal allocation depends on the two parameters as reflected in a position and shape of indifference curves: the elasticity of inter-temporal substitution and the subjective discount rate. The former measures the sensitivity of the inter-temporal consumption allocation to an interest rate change, whilst the latter indicates the country's preference placed in future consumption against current enjoyment.

Figure 5. Intertemporal Borrowing Model



Bearing such a model in mind, Easterly (1999a) characterises HIPCs as countries with a low inter-temporal elasticity and high discount rate. Interpreting the two parameters basically as the society's choice variable, he argues that a country chooses a set of 'wrong' economic policies, which gives rise to a low elasticity of inter-temporal substitution and high discount rate. In particular, governments are seen as having a higher discount rate than private agents, due to the uncertainty of tenure and lower concern for future generations of governments. Thus, according to him, governments in HIPCs typically exhibit a tendency to run-down country's net assets as a result of the combination of asset decumulation and liability accumulation on the part of politicians in power. Hence, in his view, firstly, a country gets into a heavily indebted position out of its own choice. Second, these two key behavioural parameters are assumed to be unchanged after debt relief, unless a country actually implements 'policy reforms', which are packaged by the donor community

Surely, Easterly's account of "predatory" behaviour of governments/political leaders may fit a number of the cases among HIPCs. However, a generalisation is always dangerous. Further, we question Easterly's one-sided interpretation of the origin of the debt crisis in HIPCs in

both conceptual and empirical aspects.³⁹ At the conceptual level, his treatment of the behavioural parameters as a reflection of *permanent* preference order of HIPC's, which could be changed only by adopting donors' reform packages, can be seriously challenged. Economic development processes should involve many structural changes, including a shift in several important behavioural parameters. One of the pressing issues we face today is why many donor-inspired reforms adopted as policy conditionality attached to concessional official aid to many LICs since the mid-1980s, whether ex-post or ex-ante, have been rather slow to produce transformation of economic structures of African LICs to date. Today, many of them remain largely commodity dependent, and the recent high growth record of African countries are a lot to do with the resource boom commenced around 2002 in the face of rapidly increasing demand for a wide range of commodities from Asian Drivers such as China and India.⁴⁰

In contrast to Easterly's "predatory-story" above, we suggest the structural characteristics of low-income economies, such as the low saving rate and the high discount rate, should be duly recognized as a manifestation of their stage of economic development rather than just that of subjective preference. Importantly, the high discount rate exercised by governments of LICs, and the resultant condition of liability accumulation may reflect their pressing need to address a large number of developmental bottlenecks through investment in economic and social infrastructures. If high discount rates "today" reflect these developmental imperatives facing governments in responding to demand from domestic stakeholders to address bottlenecks urgently, *temporary* liability accumulation should be viewed as a precondition for asset accumulation over time as part of development processes.

III.5. Refinements to the DSAs with the Dynamic General Equilibrium Model as a consistent Macroeconomic framework

In the pre-Review DSAs, the aspect of growth/development dividends expected from debt is significantly underplayed. Possible growth-enhancing effects of external borrowing are pushed aside into the background in the DSA's stressed tests. In a way, this may not be necessarily surprising as the DSF emerged after the IFIs and other donor governments finally conceded that a huge reduction, or cancellation, of official multilateral debt through the HIPC and MDRI initiatives was inevitable as the only viable exit option from the two-decade long debt crisis of LICs.

The previous Review of the DSF carried out in 2009 acknowledged that the DSAs did not explicitly and sufficiently consider the role of investment in the growth-debt nexus in stress tests and requested the staff at the IFIs to examine the debt-investment-growth nexus (IMF/World Bank 2009). In particular, in discussing the scaling-up scenarios from increased investment, the earlier IMF paper emphasises that in order to substantiate the claim of high growth dividends from investment, it is necessary to estimate the impact of additional public investment on other macroeconomic variables such as GDP growth, exports and public revenues, which are denominators of the debt indicators (Barkbu et.al, 2008: 13). However, it also points to the need for exercising caution against excessive optimism placed on high growth dividends-scenario and urges also for constructing an alternative high-investment, low-growth scenario. In other words, they tend to lean towards conservative borrowing on the

³⁹ See Nissanke (2010a).

⁴⁰ See Nissanke (2011 and 2012) and Kaplinsky (2010) for factors behind for the contemporary phase of commodity price super-cycle.

basis of empirical evidences indicating that historically prolonged growth accelerations are rare in LICs.

Yet, such a pessimistic position, supposedly based on historical experiences, requires a careful reassessment in light of changing dynamics in African LICs over the past decade. Indeed, whether it is in the classical literature such as growth-cum-debt model, the debt cycle model, the gap model or in the neoclassical inter-temporal borrowing/lending model discussed above, all these theoretical models emphasise potential growth dividends to justify sovereign borrowing by developing countries. In other words, LIC's sovereign debt should not result just from the need for financing temporary shortfalls in external and fiscal macroeconomic balances or consumption smoothing due to income shocks. Sovereign debt for LICs is rationalized on the ground that borrowing/lending is for financing *development*, that is, primarily to accelerate economic growth for facilitating the process of social-economic development. Indeed, all multilateral agencies and institutions themselves exist on the mission of providing a continuous flow of development finance to developing countries.

In responding to recurrent criticisms of the DSF for not adequately capturing the benefits of debt-financed public investment, the most recent Review recommend the use of an open economy Dynamic General Equilibrium (DGE) Model developed at IMF (Buffie et al, 2012) in order to shed a new insight into the investment-growth nexus for calibrating a debt burden profile in DSAs. The Review also suggests that this nexus is so important that it merits further work by integrating the two models developed by the World Bank into DSAs for gaining deeper understanding on this question.⁴¹

The Dynamic General Equilibrium (DGE) Model has been developed to provide the DSAs with an internally consistent quantitative macroeconomic framework with focus on the public investment-growth nexus. That is, its objective is to examine the macroeconomic effects of public investment surges in LICs. Built for a coherent long-run, forward –looking debt sustainability analysis of effects of debt-led public investment scaling ups , it 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 adjustments required for achieving internal and external balance.

The model is an open economy two sector model (traded and non-traded sectors to allow an analysis of real exchange rates and TOT shocks) with three types of public sector debt (external concessional, external commercial and domestic debt) and three agents (firms, consumers and the government). Incorporating a neoclassical production function with private and public capital, it allows public investment raise output directly but accompanied by both crowd-in and crowd-out effects on private investment. It attempts to capture some of key features of a typical low-income country or a lower middle-income country on the basis of historical records observed in SSA. They include: i) the limited absorptive capacity due to coordination problems or supply bottlenecks during the implementation phase of public

⁴¹ . They are the Maquette for MDG Simulations (MAMS) and Spatial Approach model. The former quantifies investment levels needed to meet the MDGs, while the latter is used to assess proposed infrastructure investment plans by identifying priorities and formulating an adequate sequencing of projects.

investment projects ; ii) the low efficiency of public investment spending. assuming that spending on public investment does not lead to an equivalent increase in the stock of public capital because of the possibility of “waste” or spending on projects with poor returns; iii) the slow response of the private sector, iv) the difficulty in adjusting taxes and spending, which is necessary for servicing debt in the face of limited, exogenously given aid and concessional funds available; v) the dominance of hand-to-mouth consumers; and vi) the limited access to international capital markets.

Clearly, as a forward looking model for projecting debt sustainability over a long period, the DEG model goes a long way in answering previous concerns and criticisms raised in relation to technical weaknesses of the current DSAs. Within the confinement dictated by a particular construct of the DEG model and its associated assumptions, an incorporation of the DGE as a consistent macroeconomic model would enhance technical aspects involved in DSAs and enrich discussions of future policy options. As the predictions are made on the basis of a careful calibration of the model, it allows the assumptions underlying the projections clearer with respect to key parameters. Hence, as Buffie et.al (2012) emphasises, it could serve a richer menu to discuss different simulated scenarios; help apply empirical information, for example, on project rates of return; and allow more systematic risk assessments.⁴² It provides with a useful tool kit for making some informed decisions on opting for different financing mechanisms, since the DGE model allows for financing schemes that mix concessional, external commercial and domestic debt, while taking into account the impact of public investment on growth as well as constraints on the speed and magnitude of fiscal adjustment.

Now, based on the results of a calibration of the DGE model to a data set of the average LIC under alternative policy scenarios, Buffie et al (2012) summarises their findings in the following points;

1. Well-executed high-yielding public investment programs can substantially raise output and consumption and be self-financing in the long run, provided that certain conditions such as high returns on public capital, high public investment efficiency and high collection rates of user fees are met. Such conditions are often not present in LICs.
2. However, even if the long run looks good, transition problems can be formidable when concessional financing does not cover the full cost of the investment program. Absent additional borrowing or aid, the revenue gains from growth will not materialize soon enough to obviate the need for difficult fiscal adjustments on the transition path, especially when the scaling up is front-loaded.
3. Covering the resulting gap with tax increases or spending cuts requires sharp macroeconomic adjustments, crowding out private investment and consumption and delaying the growth benefits of public investment.
4. Covering the gap with domestic borrowing market is not helpful either: higher domestic rates increase the financing challenge, and private investment and consumption would be crowded out.
5. Supplementing with external commercial borrowing, on the other hand, can smooth these difficult adjustments. However, the strategy may be also risky. With poor execution, sluggish fiscal policy reactions, or persistent negative exogenous shocks, this strategy can easily lead to unsustainable public debt dynamics.

⁴² . The model has been applied to Togo, Burkina Faso and Cape Verde. It is in the process of being applied to Cote d'Ivoire, Ethiopia, Ghana, and Senegal..

6. Front-loaded investment programs and weak structural conditions (such as low returns to public capital and poor execution of investments) make the fiscal adjustment more challenging and the risks greater.

These findings from the simulation exercises have led them to side with the cautious stance over the policy debate on debt-led public investment scaling ups. The application of the DGE model to the most recent DSA for Burkina Faso, for example, confirms this conservative bias in the advices given 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. Naturally, these conclusions depend on a number of the assumptions made regarding the key parameters for calibration as well as on the construct of the DEG Model itself. These results are also obtained from the calibration to the historical data series of macroeconomic variables or some average figures for SSA over the past 10-20 years.

Yet, strong demand for scaling up of public investment today, especially surge for infrastructural investment, comes from the imperatives to address structural bottlenecks found in LICs to facilitate the process of transformation of socio-economic structures and laid down a foundation for inclusive, broad based development. If infrastructure investment can indeed succeed in bringing about a major shift in economic structures, large externalities and high social returns 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. Hence, an interpretation of calibrated results on debt sustainability in a distant future should be made with this in mind, exercising a good judgement backed up by detailed country-specific knowledge.

Therefore, while the refinement to the DSAs by application of the DGE model has created a better toolkit to guide discussions and negotiations on sovereign borrowing/lending on a much more informed basis, this by itself cannot give a basis for settling the dilemma facing policy makers in LICs over the scale and pace of acceleration of public investment against the fear of making debt unsustainable. Rather, one can draw more subtle policy inferences from their calibration results of the DGE. First, their analyses and results, especially those from stress tests, point to the critically important role of the availability of concessional financing facilities at the time of repayment difficulties. Debt can be made sustainable if an appropriate facility to deal with such a debt distress situation is in place, as discussed above.

While their paper takes explicitly a position opposing to Wyplosz's view on debt sustainability, their finding actually concurs with the position taken by Wyplosz, who emphasises the need to approach to the issues related to sovereign debt management from a perspective of "debt distress" management rather than chasing after an elusive concept of debt sustainability. It is apt to note here that in the context of stress tests of unexpected shocks, the results reported in Buffie et al (2012) confirm that additional concessional financing instead of external commercial loans at times of experiencing debt distress could greatly reduce the risks of debt becoming unsustainable. For example, the analysis of one of the stress tests shows that when an unexpected TOT shock hits the economy, additional concessional borrowing to finance the public investment surge, while setting caps in the tax adjustment, can ensure debt sustainability. In their own words, "(T)he crux of the matter is whether LICs can obtain additional aid in the event of adverse shocks" (Buffie et al, 2012:44).

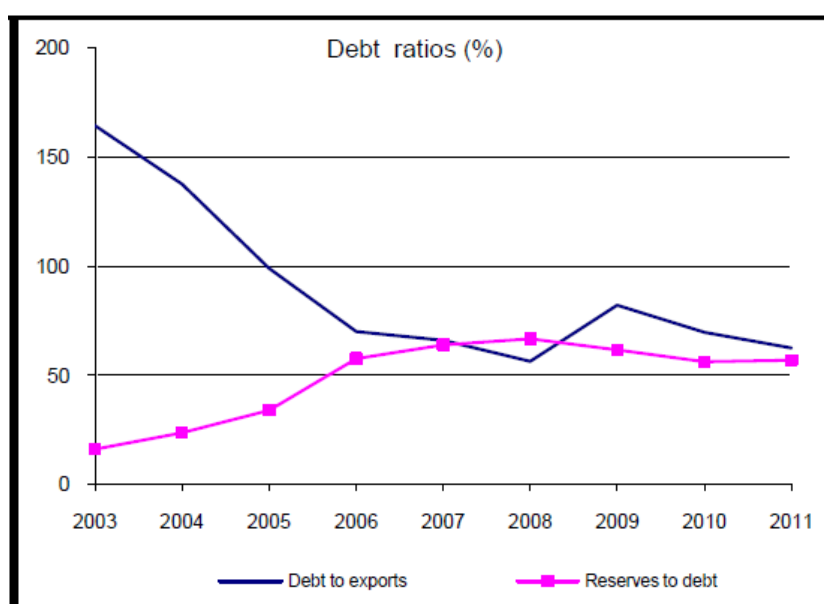
Second, since their results confirm that debt sustainability of productive investment surge is critically dependent on the structural conditions in LICs, discussions should be more focused on improving these conditions by developing local institutions with a view of increasing the efficiency of public investment and the absorptive capacity. It is also important to ensure that infrastructure projects with high social returns are selected so that greater economy-wide spill over effects and externality can be achieved to spur the process of structural transformation, and that future revenues from infrastructure projects are secured to cover the recurrent maintenance and running costs. Thirdly, their comparative analysis of different financing schemes reveals a greater chance of experiencing an explosive debt path and associated fiscal vulnerability by resorting too much to non-concessional borrowing for scaling up productive investment and at times of payment difficulties. With these pointers in mind, we shall now turn to discussions on the emerging patterns of sovereign borrowing since 2006 and why the scaling up for public investment is seen as imperative in African LICs.

IV. Emerging Patterns of Sovereign Borrowing and Imperatives for Public Investment

IV.1. Recent Evolution of Public Debt Profile and New Debt Instruments

Fig. 6 shows that debt burden, measured as a ratio of external debt stock to exports, has steadily declined since the debt resolution through the HIPC/MDRI process was implemented in SSA as a region, where all African LICs are located. In Table A-1 of Appendix, where several main indicators of external debt profile of all African countries are presented⁴³, 27 countries are classified as LICs, while 12 countries are Lower Middle Countries (LMCs) and 7 countries as Upper-Middle Countries (UMICs) in SSA. In North Africa, two countries - Algeria and Tunisia - are classified as UMICs while three other countries (Djibouti, Egypt and Morocco) are LMICs.

Fig. 6 Trends in External Debt to exports and Reserves to debt for 2003-2011

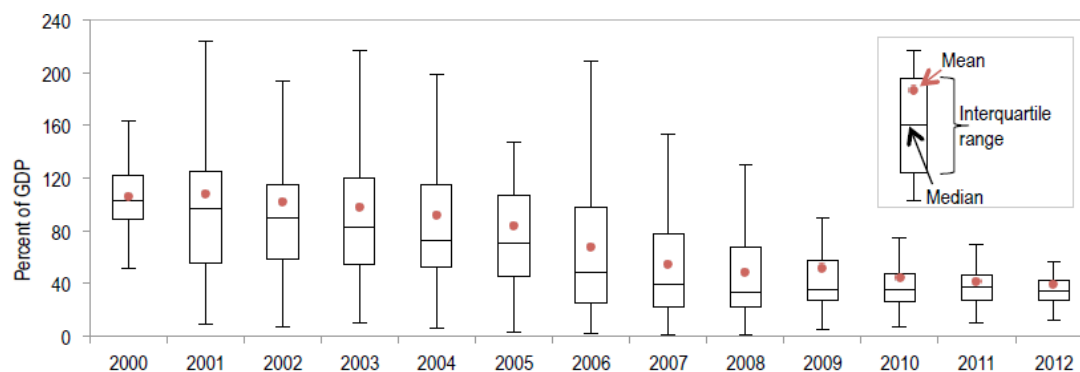


⁴³ . Data are taken from International Debt Statistics, 2013, World Bank. It does not cover some countries in Africa such as Libya. The cells marked in blue indicate that the ratios exceed the CPIA-determined thresholds.

Source: World Bank, International Debt Statistics 2013, p.45.

This downward trend in debt burden for the SSA region is also clearly shown in the IMF analyses of public debt burden (external and domestic debt combined) as shown here in Fig. 7 (IMF, 2013).

Fig.7. Public sector debt as percent of GDP for 44 SSA countries: 2000-12



Sources: IMF, DSA database; and IMF staff calculations.

Note: For any given year, the "box and whiskers" plot (or boxplot) summarizes the distribution—during that year—of debt-to-GDP for 44 countries in sub-Saharan Africa (outliers not shown). Debt-to-GDP ratios pertain to public sector debt as defined in the IMF-World Bank Debt Sustainability Framework.

Source: Fig.2.1 in IMF (2013).

These data indicate that countries in SSA reduced their debt burden significantly since 2006, and the recent global financial and economic crises erupted in September 2008 has not noticeably deteriorated their public debt positions in the SSA region as a whole. Fig. 8 show changes in ratios of public debt to GDP in 2012 from those observed in 2007 for 44 countries in SSA.

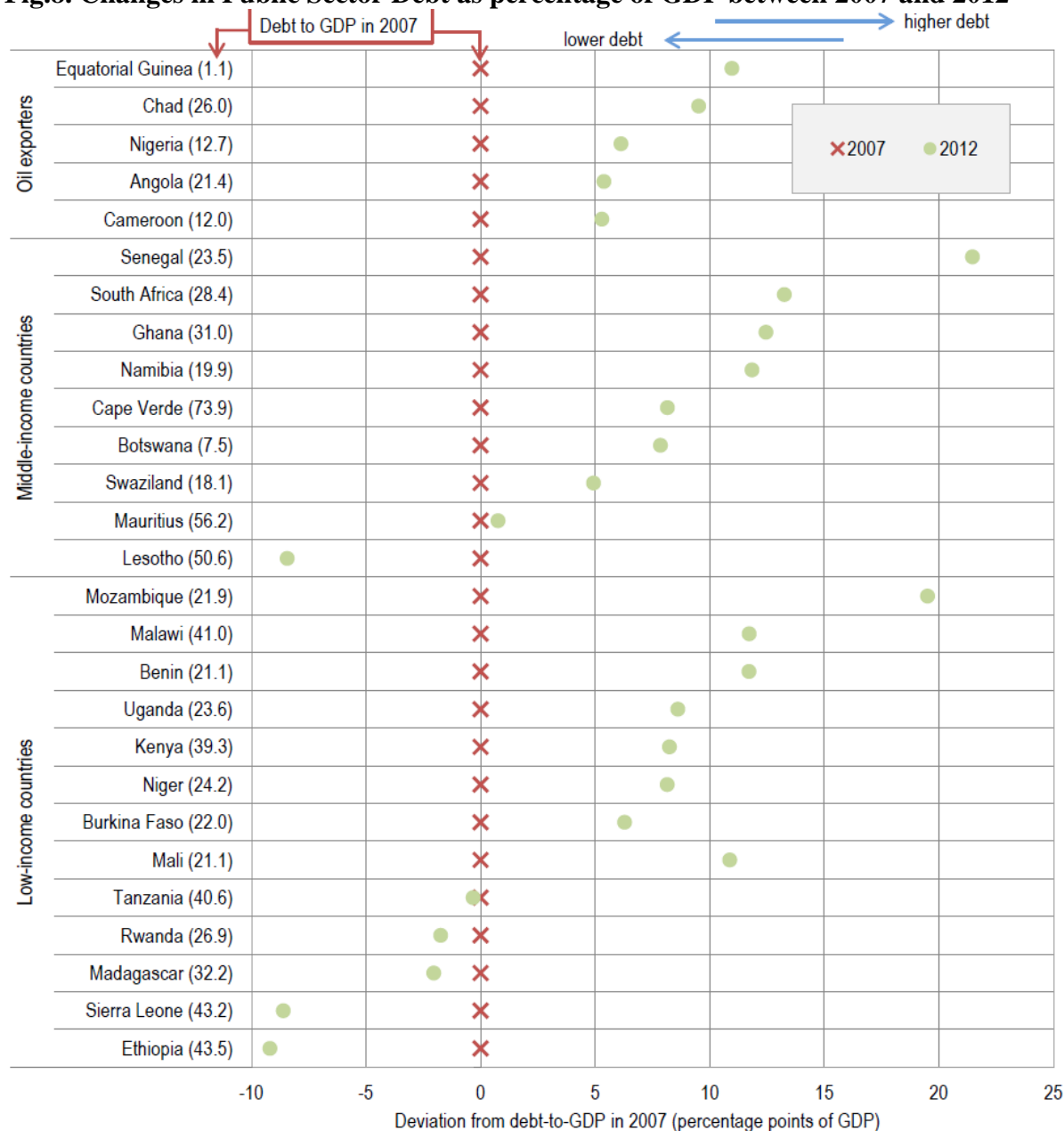
Turning to the debt burden indicators of individual countries Table A-1 taken from the World Bank data set, most countries did not breach their CPIA-determined thresholds as measured in PV external debt to exports so far.⁴⁴ 9 countries among LMICs and LICs exceeded their respective thresholds, measured in external debt in PV terms to exports in 2011, as marked in blue in Table A-1. They are Djiburti, Sao Tome and Principe, Sudan, Brundi, Comoros, Eriteria, Guinea, Mauritania, Zimbabwe. However, none of SSA countries have shown any distress in their ability to cover debt service payments by exports in 2011. Two countries, Sao Tome and Principe and Brundi, who had higher debt service ratio than their respective thresholds set for the CPIA score in 2006, did reduce this ratio significantly by 2011. Hence, this confirms that the debt situations in LMICs and LICs do not raise any serious concerns as in 2011, when their country-specific thresholds are applied.

This overall picture is indeed confirmed by the most recent analysis of public debt, covering both external and domestic debt, of SSA countries (IMF 2013). Fig.8 shows changes in public sector debt as % of GDP between 2007 and 2012. Only two countries- Senegal (LMIC) and Mozambique (LIC)- whose debt stock was just over 20 % of GDP in 2007, increased debt to GDP by around 20 % for these five years. The increase in Senegal is accounted for more by the rise in domestic debt, while that of Mozambique is explained by increase in external debt (Fig.9). The increase of public debt of most countries is limited to

⁴⁴ The CPIA determined debt burden indicators are expressed in ratios to GDP, exports and revenue, but the World Bank data reports as ration to GNI rather than GDP. So here we discuss bleach of ratios to exports rather than GDP.

5-15 % of GDP, while five countries (Lethoto, Rwanda, Madagascar, Sierra Leone, Ethippia) managed to reduce their ratio of total public debt to GDP for these five years.

Fig.8. Changes in Public Sector Debt as percentage of GDP between 2007 and 2012



Sources: IMF, DSA database; and IMF staff calculations.

Note: Excludes countries that received debt relief during or after 2007, as well as Eritrea, Gabon, Seychelles, and Zimbabwe (Gabon and Seychelles restructured their debt in 2007–08 and 2009, respectively). Debt-to-GDP ratios pertain to public sector debt as defined in the IMF-World Bank Debt Sustainability Framework. For Equatorial Guinea, the figures correspond to external debt (2012 is projected).

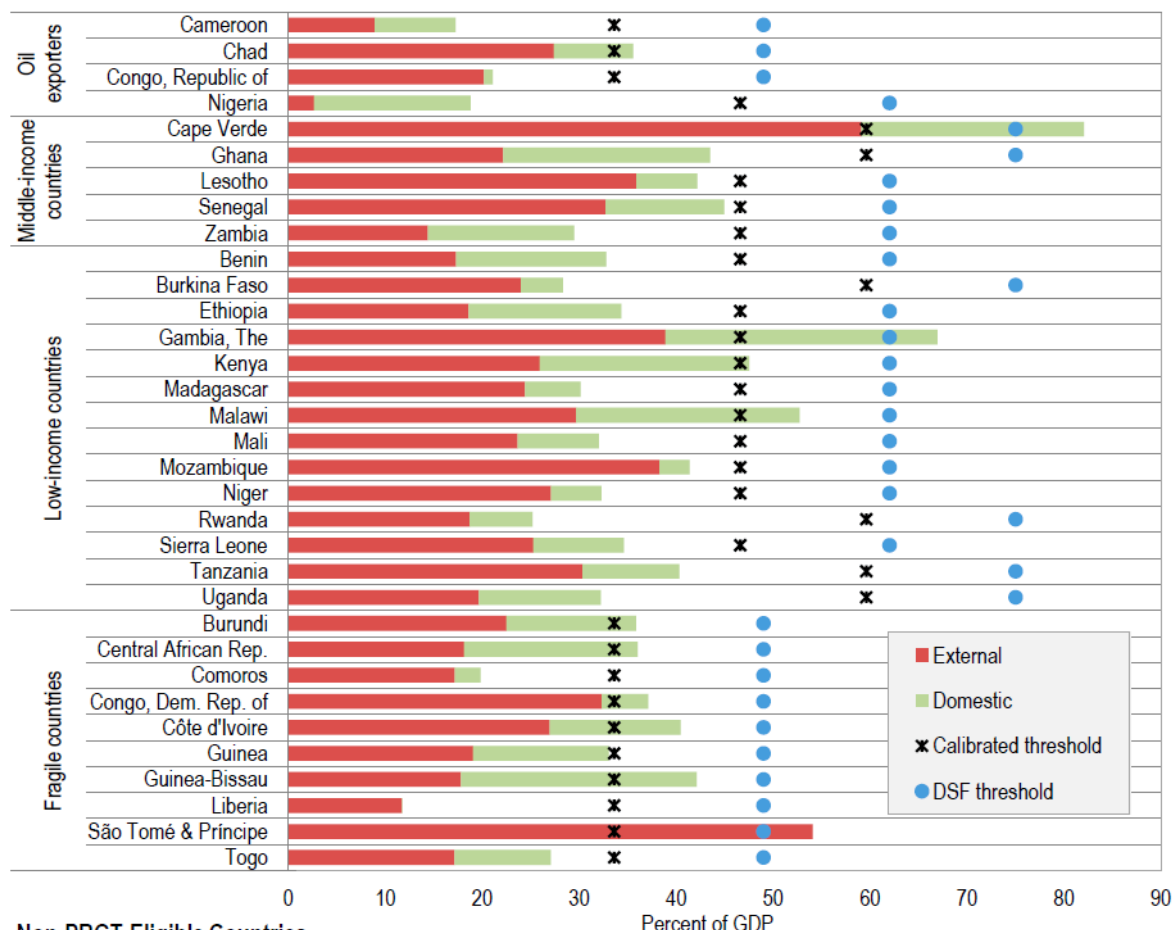
Source: Fig.2.3 in IMF(2013)

Fig.9 reproduces the IMF analysis of public debt burden in relation to GDP in 2012 against their DSF thresholds for PRGT-eligible countries and against calibrated thresholds for both PRGT-eligible and PRGT non-eligible countries. The calibrated thresholds are obtained from a more conservative assumption regarding the probability of experiencing debt distress (10 % of probability) than the DSF. Hence, the latter is a more stringent criterion for judging the probability of debt distress. The calibrated thresholds for PRGT eligible countries are set at

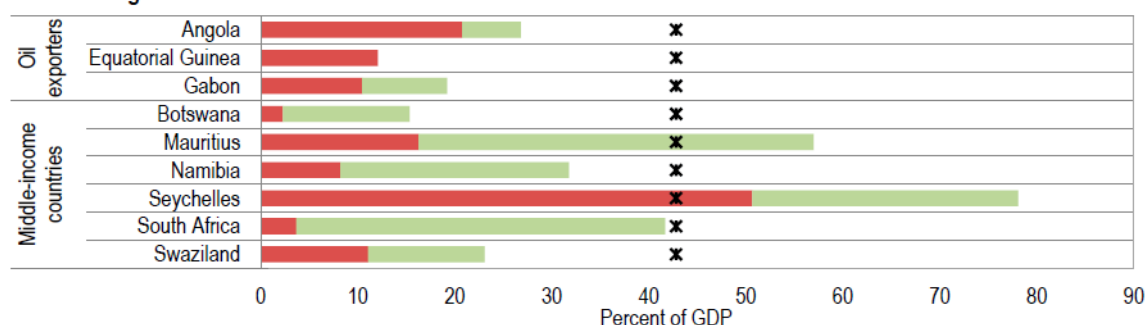
34, 47 and 60 % depending on the CPIA score. For non-PRGT eligible countries the uniform rate of 43 % is used as thresholds, similar to that applied for emerging market economies in the IMF's fiscal analysis.

Fig.9 Public Sector Debt in 2012 and Debt Sustainability Thresholds

PRGT-Eligible Countries



Non-PRGT-Eligible Countries



Sources: IMF, DSA database; and IMF staff calculations.

Note: Excludes Eritrea and Zimbabwe. Debt-to-GDP ratios pertain to public sector debt as defined in the IMF-World Bank Debt Sustainability Framework. For Equatorial Guinea, the figure corresponds to projected external debt as of 2010.

Source: Fig.2.4 in IMF (2013)

According to Fig. 9 and the analysis reported in IMF (2013- REO), of the 33 PRGT-eligible countries considered, three countries (Cape Verde, the Gambia and Sao Tome and Principe) have 2012 debt-to-GDP levels that exceed the DSF thresholds, whereas 10 countries exceed the more conservative calibrated thresholds. Of the nine non-PRGT-eligible countries,

Mauritius and South Africa are beyond or near 43% of thresholds, but their debt is dominated by domestic debt. At the same time, many PGRT-eligible countries started having an increasing portion of their public debt in domestic debt.

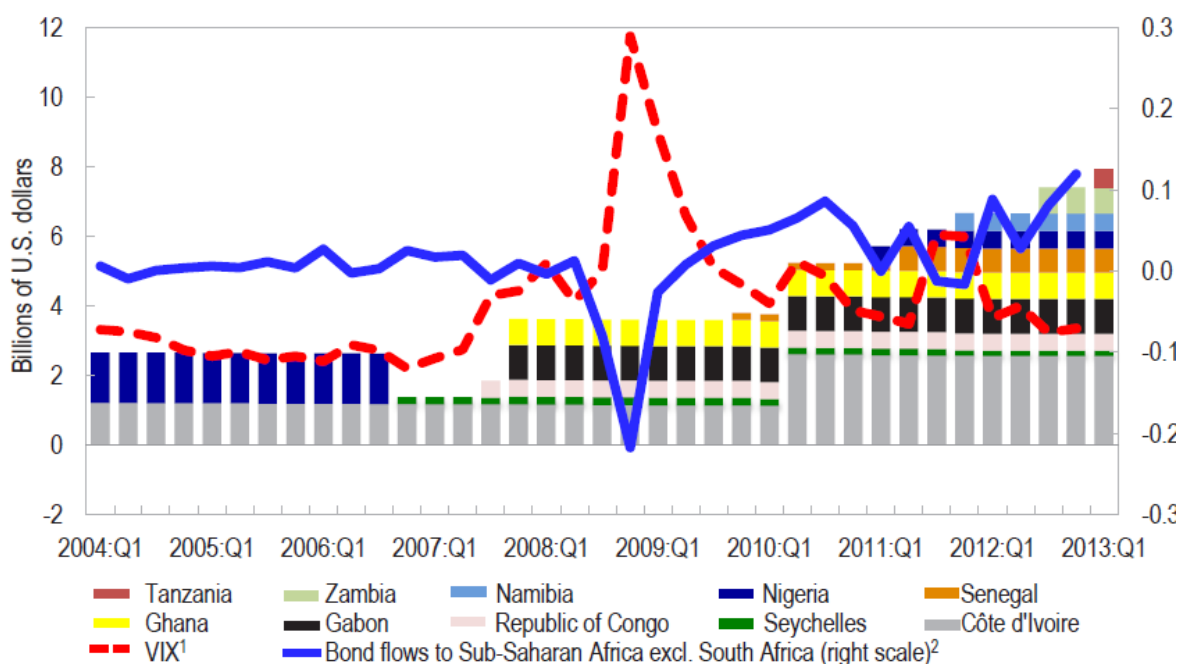
Overall, IMF (2013) summarises the findings of the most recent DSAs for 33 low-income countries as follows:

- 14 countries are deemed to be at low risk of experiencing external debt distress;
- 14 countries are deemed to be at moderate risk of experiencing external debt distress under some adverse scenarios;
- 5 countries (Burundi, Comoros, Democratic Republic of Congo, The Gambia, and São Tomé and Príncipe) are currently deemed to be at high risk of debt distress.

After examining the projected debt profile to 2017, IMF (2013) concludes that except these five countries listed above and those projected to be at moderate risk, “current (or projected) debt levels do not constrain temporary financing of expanded budget deficits in most low-income countries “(IMF 2013: 31).

Now, over recent years, several so-called “frontier” countries in Africa, including some of LICs, started raising capital from international capital markets by issuing sovereign bonds. Fig. 10 and Table 4 shows the recent issues reported in IMF (2013).⁴⁵

Fig. 10. Recent Sovereign Bond Issues of countries in SSA



Sources: Bank for International Settlement Quarterly Review; Bloomberg, L.P.; and EPFR Global.

¹ VIX is the Chicago Board Options Exchange Market Volatility Index.

² Data correspond to flows of investment in bonds issued by entities of the corresponding sub-Saharan Africa countries by global exchange funds and mutual funds, expressed in U.S. dollars. A negative value corresponds to a reduction in the holdings. Data are available for Botswana, Democratic Republic of Congo, Côte d'Ivoire, Gabon, Ghana, Nigeria, and Zambia.

Source Fig. 3.1, IMF (2013)

⁴⁵ . Though it is on increase, IMF (2013) estimates that at end-2011, sub-Saharan Africa’s total international bonds outstanding reached only about 0.25 percent of the stock of outstanding international bonds issued by emerging market countries and advanced countries and it is just 0.02 percent if South Africa is excluded.

Table 4. Terms and other features of Sovereign Bonds issued by SSA countries

	Date	Yield at issue	Tenor	Spread (in bps.)	Size (\$ mn.)	S&P (rating at issue)	Currency	Governing laws	Bond type ¹	Coupon type ²
Seychelles	9/27/2006	9.466	5	470	200	B	USD	England	Bullet	Funged
Ghana	9/27/2007	8.500	10	387	750	B+	USD	England	Bullet	Fixed
Gabon	12/6/2007	8.250	10	426	1000	BB-	USD	US	Bullet	Fixed
Republic of Congo ³	12/7/2007	8.770	22	458	480	Not rated	USD	Luxembourg	Sink called	Step-up
Senegal	12/15/2009	9.473	5	691	200	B+	USD	England	Bullet	Fixed
Seychelles ³	1/14/2010		16		168	Not rated	USD	England	Sinkable	Step-up
Côte d'Ivoire ³	3/15/2010	17.354	22	393	2330	Not rated	USD	France	Sinkable	Flat trading
Nigeria	1/21/2011	7.126	10	372	500	B+	USD	England	Bullet	Fixed
Senegal	5/6/2011	9.125	10	583	500	B+	USD	Luxembourg	Bullet	Fixed
Namibia	10/27/2011	5.835	10	336	500	Not rated	USD	England	Bullet	Fixed
Zambia	9/13/2012	5.625	10	384	750	B+	USD	England	Bullet	Fixed
Tanzania	2/27/2013		7	600	600	Not rated	USD	England	Sinkable	Floating

Sources: Dealogic; and Bloomberg, L.P.

Note: Seychelles and Côte d'Ivoire issued small amounts of bonds in 2007 and 2012, respectively, which are not presented.

¹ Sinkable = Bond backed by a fund, which sets aside money on a regular basis to ensure investors are paid principal and interest. Sink called = Issuer exercises the right to buy back outstanding bonds from investors at a pre-agreed rate using funds set aside for this purpose. Bullet = Entire face value of bond is paid at maturity.

² Fixed = Fixed percentage of face value paid in interest. Floating = Variable percentage, often calculated as fixed spread above LIBOR.

Flat trading = A bond that is trading without the accrued interest, because it is usually part of the bond purchase price. Bonds that are in default trade flat. Step-up = Bond with increasing coupon rates in later years. Funged = Refers to a bond that has been funged into another bond and taken on that bond's characteristics.

³ Issued in the context of debt exchange/restructuring.

Source Table 3.1 in IMF (2013)

11 countries which issued sovereign bonds listed in Figure 10 are the Republic of Congo, Côte d'Ivoire, Gabon, Ghana, Namibia, Nigeria, Senegal, Seychelles, South Africa, Tanzania, and Zambia.⁴⁶ These countries issued bonds for a variety of reasons: 1) Ghana, Senegal and Zambia issued bonds for financing economic infrastructure in the energy and transport sectors; 2) Nigeria and South Africa have issued international sovereign bonds to provide a benchmark for (other) governments and corporate bond markets by providing information for assessing the yield spread at which their foreign currency debt is traded, and served as a reference for international corporate bond issues; 3) Seychelles, Gabon, Republic of Congo and Côte d'Ivoire issued international bonds in the context of debt restructuring.

Not only do these bonds carry considerable currency risk, but these debt instruments offered on commercial terms are much more expensive over concessional borrowing in all terms such as yields, spreads and bond types. The spread of these bonds ranges between 372 and 600 basis points, while maturity spans from 5 to 10 years, except in the case of Republic of Congo, Côte d'Ivoire and Seychelles which issued bonds for restructuring purposes (Table 4). There are reports that yields and spreads have come down noticeably from the initial offer levels observed in several cases in the recent past.⁴⁷ However, although the cost currently attached is not prohibitively high under the prevailing global environments of historically low interest rates, there is a risk of steeply escalating costs, as soon as interests start edging up and investors' risk appetites shift abruptly. Therefore, there is no doubt that raising of funds through sovereign bonds issues carries a high cost, considerably higher than those available through concessional windows. This can be clearly seen when these terms are compared with those available from the IDA (Table 5). The standard IDA credit offered to LICs are payable

⁴⁶ More recently, Rwanda also raised financing by issuing sovereign bonds.

⁴⁷ This may also indicate some mispricing of these bonds at too high levels at issue.

over 40 years with a 10 year grace period with calculated grant elements of 62 % at 6% discount rates, while blend term credit to LMICs is payable over 25 years with a 5-year grace period with calculated grant elements of 35 %.

Furthermore, even among debt instruments, bonds can be a more expensive instrument for financing infrastructure projects compared with loan contracts structured tailored for specific projects. Bond contracts can entail additional ‘carry costs’, and lack often flexibility. As the history of sovereign debt restructuring processes is littered with difficult and costly negotiations, and internationally accepted, orderly workout mechanisms of sovereign bonds are yet to establish. Hence, restructuring sovereign bonds with private bond holders can be a very lengthy and costly exercise for LMICs and LICs at times of payment difficulties in future.

Information on precise terms of loans provided by emerging partners such as China, Brazil, Turkey, India etc. is not so easily obtainable. For example, the details of the actual negotiated terms of the contracts, and in particular the shadow relative prices used in the calculations for long-term barter arrangements implicit in China’s ‘resources for infrastructure’ contracts, are not disclosed. Hence it is difficult to ascertain the actual distributional outcome from these deals between the contracting parties, including the benefits accruing to Chinese companies and stakeholders in Africa respectively. According to Foster et al (2007), the contract terms appear to be subject to periodic revisions, so the contracting parties are not necessary locked rigidly into the prices and terms initially negotiated. It also reports that Chinese preferential loans charge on average an interest rate of 3.6 %, with a grace period of 4 years and a maturity of 14 years. If these are the terms used in Chinese loan contracts, this amounts to a grant element of less than 25 % (which is the minimum required for an agreement to be classified as official aid according to the OECD-DAC definition of aid). However, this cannot be easily verified, as the terms of each contract are usually left opaque and not disclosed. It is also known that the degree of concessional elements is not uniform, with some variations observed depending on projects.

Table 5 Lending Terms of IDA

**Table 3: Lending Terms of IDA
(Terms Applicable for FY13)**

Instrument Type	Recipient Countries	Maturity /Grace	Principal Repayment (yrs)	Current Charges	Interest Rate	Grant Element @6% DiscRate ^{4/}
Grant	"red-light" IDA-only (100%) and "yellow-light" IDA-only (50%)	Grant	None	none (but 20% volume discount on country allocation)	none	100%
Regular-Term Credit	"green-light" IDA-only (100%) and "yellow-light" IDA-only (50%)	40/10 yrs	2% pa yrs 11-20, 4% pa yrs 21-40	75bp service charge + 0bp commit.charge ^{2/}	none	62%
Blend-Term Credit	Blend countries & countries with GNI pc above IDA cut-off (US\$1,195) ^{1/} for 2 years	25/5 yrs	3.3% pa yrs 6-15, 6.7% pa yrs 16-25	75bp service charge + 0bp commit.charge ^{2/}	1.25%	35%
Hard-Term Credit	Blend countries (excl. small island blends receiving regular IDA credits)	25/5 yrs	3.3% pa yrs 6-15, 6.7% pa yrs 16-25	75bp service charge + 0bp commit.charge ^{2/}	1.50% ^{3/}	32%
Partial Risk Guarantee	IDA-only countries	depends on project loan	not appl.	75bp guarantee fee + 0bp stand-by fee ^{2/} + Initiation & processing fee ^{5/}	not appl.	not appl.

Notes:

- 1/ Operational cut-off for FY13.
- 2/ The commitment charge is reset annually within a range of 0 – 50 bps. The grant element is calculated using the FY13 rate of 0 bps. The guarantee stand-by fee is set at the same level as the commitment charge on credits.
- 3/ The interest rate for hard term credits is determined annually based on the fixed rate equivalent of IBRD interest rates less 200 basis points.
- 4/ Calculation assumes the disbursement period for regular credits is over 8 years and for blend and hard-term credits over 6 years.
- 5/ The initiation fee is 15 bps or US\$100,000 (whichever is higher) and a processing fee of up to 50 bps of the principal amount of the guarantee for all private sector borrowers. The processing fee is assessed on a case by case basis and can either be waived or increased in exceptional cases.

With concessional borrowing from MDBs and RDBs far dominating, LICs in SSA still benefit from contracting most debt in their generous terms. This is reflected in terms of new commitments of debt to most of LICs for 2006-2011 on average and those obtained in 2011, as shown in Fig.11 a&b. These can be compared specifically to terms available in private debt in general for selected LICs, shown in Fig.12 a&b.⁴⁸ Clearly, borrowing from sources that offer high concessional terms plays a vital role in making LICs' debt much more manageable than otherwise.

However, resources available for concessional borrowing are limited and likely to be constrained or cut sharply given the scale of fiscal problems facing traditional donor governments. These traditional financial sources are seen to be grossly inadequate for filling the huge infrastructure deficits in the region. A temptation is very strong for resorting to less concessional debt instruments when demand for public investment scaling up is so high.⁴⁹

⁴⁸ . For comparison, terms of new commitments of external public and private debt for African LMICs and UMICs are presented in the Appendix.

⁴⁹ In relation to Regional Member Countries eligible for the African Development Fund (AfDF-RMCs) Martin (2013) presents a summary of their borrowing profile to date in the following points: 1) overall external borrowing trebled since 2000 to UA20 billion in 2012, of which UA 993 million is from the AfDF; 2) ODA (bilateral, multilateral and global funds) rose by 50% since 2000 to UA22 bn in 2012, but fell more than 9% in real terms in 2010-12 and will stagnate in 2013-16; 3) concessional and non-concessional loans provided by emerging partners through South-South Cooperation trebled since 2000, UA7 billion to Africa in 2011, and expected to rise further; 4) with renewed creditworthiness of African countries, these countries have accessed to a number of funding sources available on commercial terms through issuing bonds over UA 1 bn, bank loans about 1bn, public-private partnerships of over 5 bn, and increased domestic borrowing over 5 bn. N.B. UA stand for the Unit of Account used at the African Development Bank for the AfDF facility for disbursement. One UA is equivalent to one Special Drawing Right (SDR) of IMF, which is around 1.5 US \$.

Figure 11-a&b. Terms of New Commitments of external public debt (Average 2006-2011)

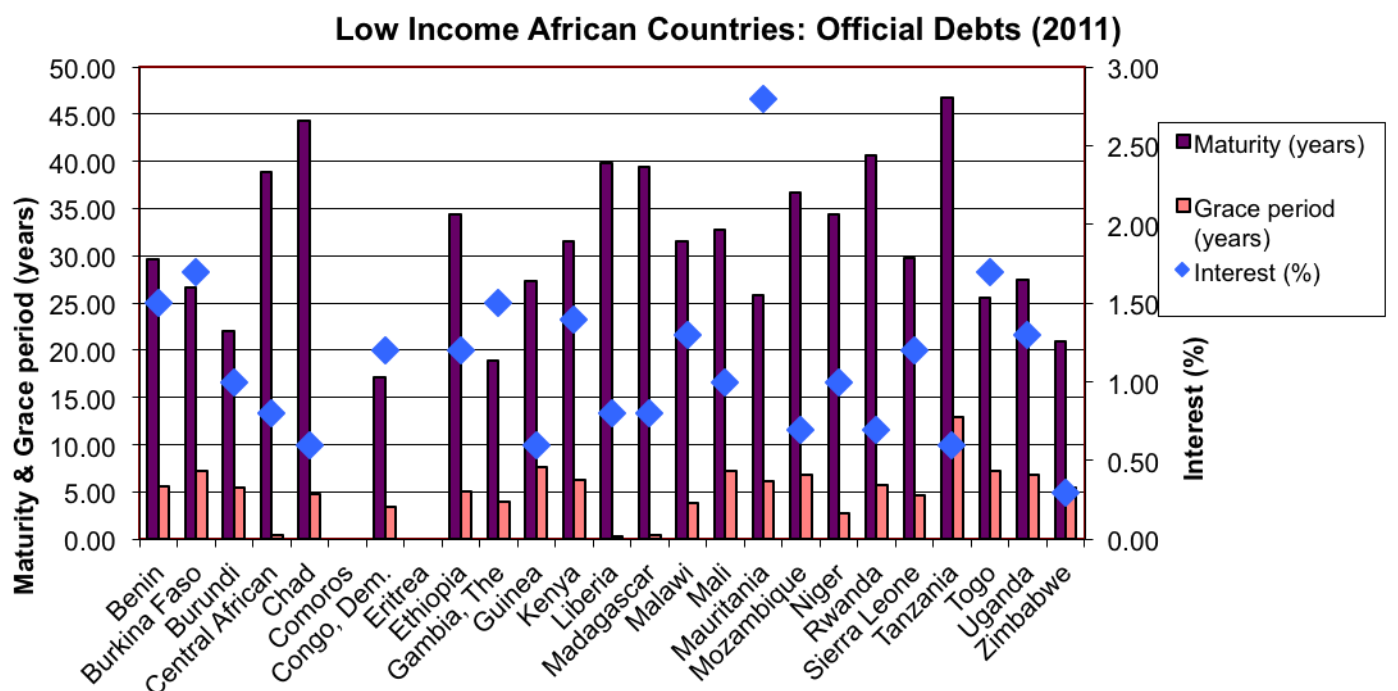
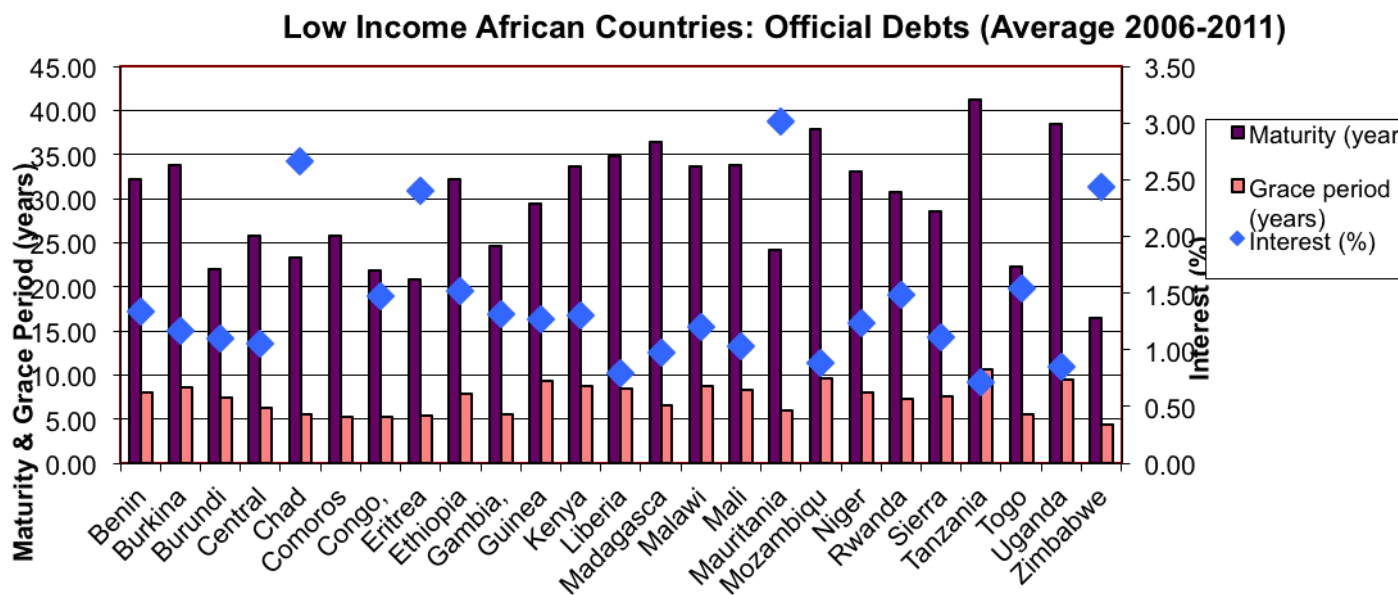
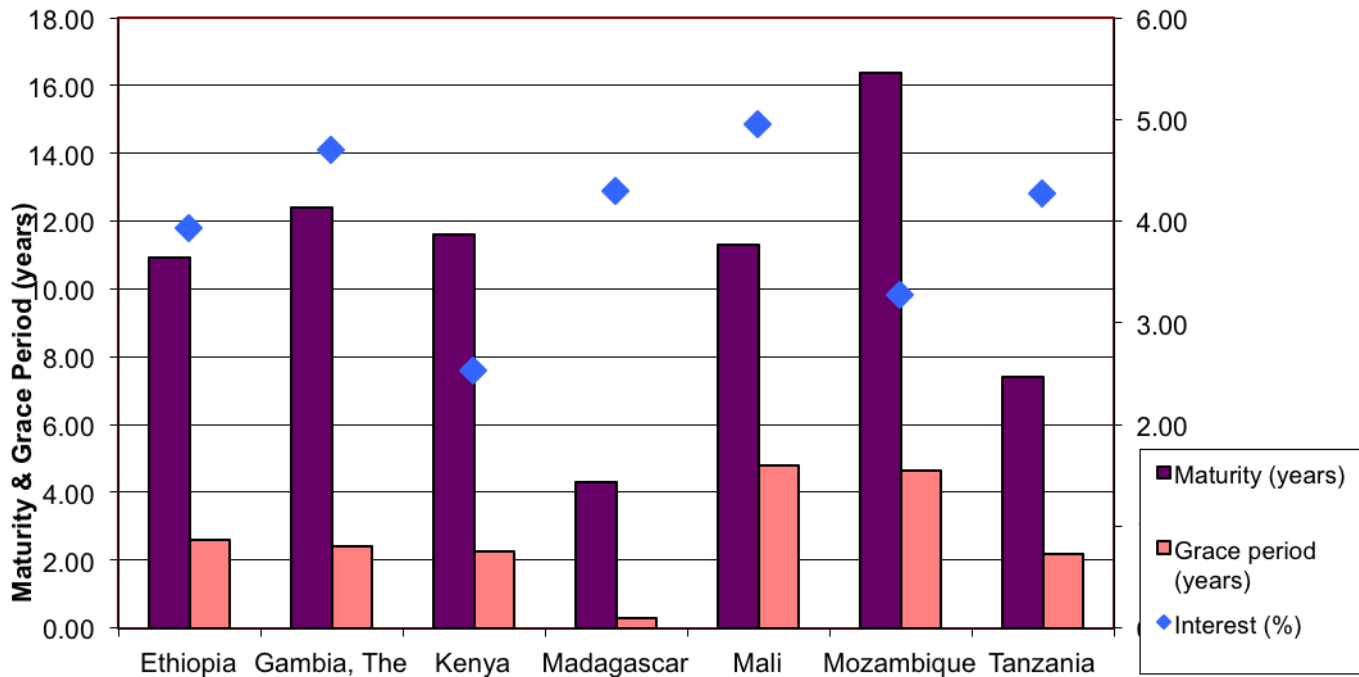
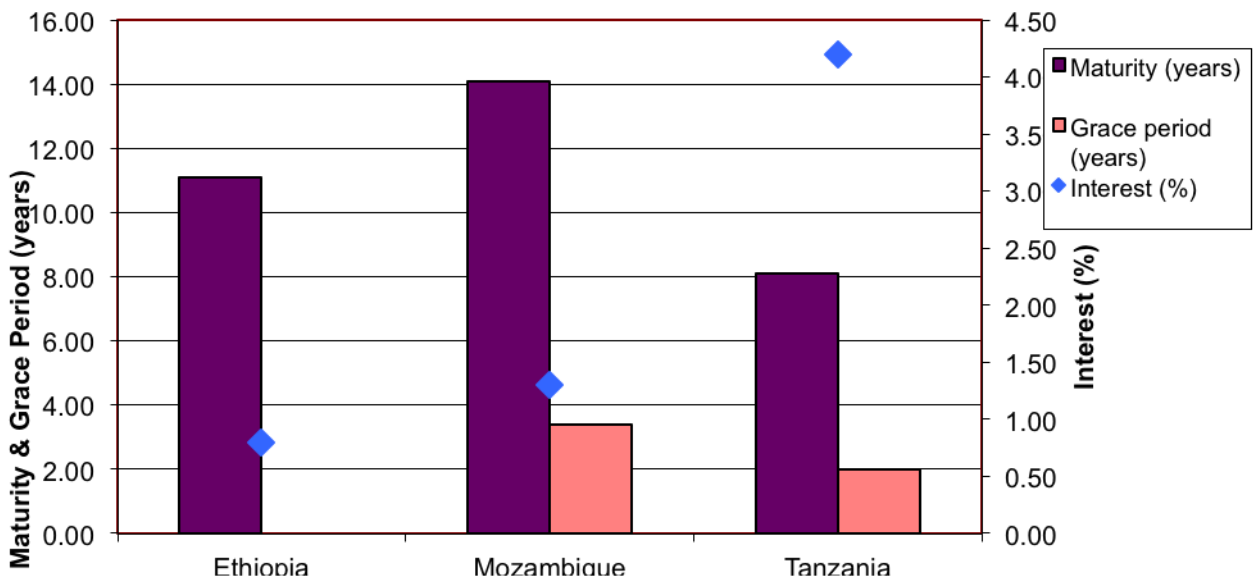


Fig.12 a&b Terms of New Commitments of private external debt available to LICs

Low Income African Countries: Private Debts (Average 2006-2011)



Low Income African Countries: Private Debts (2011)



IV.2. The Debt -Investment -Growth nexus revisited – A Comparative Perspective with East Asia

There is no doubt that LICs in Africa are at a critical historical juncture. It is blessed with new opportunities hitherto rarely available throughout their post-independent years, while challenges facing policy-makers how to seize upon the new opportunities for turning optimism into reality are equally daunting. Key to realizing their development aspiration lies in the question whether they can facilitate the process of structural transformation by

increasing in both the scale and efficiency of productive investment. There is universal acknowledgement of the urgent needs to scale up investments and address enormous infrastructure gaps the continent faces. Indeed, productive investment is a critical link in the debt-growth nexus, as we know it.

In the wake of on-going sovereign debt crises in almost all developed and emerging economies in the aftermath of the global financial and economic crisis of 2007-9, a heated debate has been taking place among economists regarding the debt-growth nexus. Among many, Krugman (2010) questions the causal interpretation of the correlation analysis between growth and debt found in the influential papers by Reinhart and Rogoff (2010 a and b) on this topic.⁵⁰ Challenging the causality running from high debt to low growth implied in these papers, Krugman suggests that causation can well run from collapsing growth to high debt rather than the other way around, citing episodes of high debt and low growth such as observed in Japan since the late 1990s.

Reinhart and Rogoff (2010 c) clarify and reiterate their early cross-country empirical analyses based on newly compiled data on forty-four countries spanning about two hundred years, which covers both advanced countries and emerging countries. They summarise their findings that: i) the relationship between government debt and real GDP growth is weak for debt/GDP ratios below 90% of GDP; ii) though arbitrary judgments are involved in determining debt burden thresholds, they settle these at around 90 % where nonlinearities in the debt-growth link are found; iii) while severe economic downturns would lead to higher debt/GDP levels contemporaneously and/or with a lag, a unilateral causal pattern from low growth to high debt, does not accord with the evidence; iv) the reverse causation from high government debt leading to lower growth is more likely.⁵¹ However, as Krugman suggests, the evidences of high correlations they produced cannot be used for discussing the causation. Subsequently, a number of serious methodological and technical flaws were discovered in their empirical studies analyses used to establish the debt burden thresholds. Hence, the empirical findings by Reinhart and Rogoff are no longer regarded as credible. Yet, until this fatal weakness was widely reported through media in May 2013, their findings have been a critical reference widely used world-wide by those urging for austerity measures in dealing with public debt.

In reality, historical evidences point to *two-way* causation in growth-debt dynamics. Once a negative feed-back loop sets in the growth-debt nexus, it is very hard to get a momentum of economic growth restored as a heavy debt burden leads to a severe curtailment in productive investment. In fact, one of the most illustrative episodes of the existence of two-way causation in a negative feed-back loop is found in the protracted 'debt overhang' condition many LICs had to endure in the 1980s and 1990s. Debt overhang is defined as the situation where outstanding debt is so large that investment will be inefficiently low without a sizeable reduction in debt stock or debt service payments (Claessens and Diwan 1989).

Claessens and Diwan (1989) identify two effects of the debt overhang on investment and growth: the *liquidity* effects and *incentive* effects. The former refers to the condition in which, given the burden of large external debt with extremely scarce liquidity around, both capital formation and consumption reach a minimum level after years of austerity and low income

⁵⁰ Krugman first made this point in his New York Times Opinion Column on 11th August, 2010.

⁵¹ See Pattillo et.al (2011) for cross-country regression analyses which examine the non-linear impact of external debt on growth, using panel data of 91 developing countries. They suggest that the average impact of debt becomes negative at about 160-170 % of exports or 35-40% of GDP.

growth. The latter refers to the depressed level of both public and private investment for future growth, as a larger share of the future income stream is expected to be directed for resource transfer abroad. Thus, it is admitted that the two effects combined could push highly indebted countries into a downward spiral, which would further diminish both the debtor's willingness/commitment and capacity for debt payment.⁵² This is not the best outcome for creditors either, since both creditors and debtors would lose out. Clearly, under this condition we find a story of *vicious* circle in the growth-investment-debt nexus, i.e. the causality running from high debt via lower investment to lower growth as well as from lower growth via lower investment to higher debt and debt burden. This is exactly an opposite to the virtual circle of the debt induced growth emphasised in the earlier post-war literature on the debt-cum growth model.

Thus, the missing link in the debate on the two-way causalities in the growth-debt nexus in LICs is the paucity of *productive* investment, both private and public. Therefore, one of critical policy questions is how to ensure that sovereign borrowing is used productively for investment and development, and growth dividends are delivered definitely and on time. That is, the real challenge confronting the development community is how to raise both the rate and efficiency of investment financed through debt instruments in LICs. Naturally, "borrowed resources do not systematically deliver any growth bonus", as reminded by Wyplosz (2007:14). However, as he continues to suggest, "ignoring the conditions under which external borrowing can harm or boost growth amounts to asking the wrong question. If external borrowing is growth enhancing, the risk of over borrowing is small, possibly inexistent". Hence, it is imperative to examine theoretically and empirically these conditions under which different outcomes come about by exploring in detail various debt-investment-growth links in a country-specific context.

Indeed, the low-equilibrium trap of high debt and low growth was particularly evident in Sub-Saharan Africa during the 1980s and 1990s. With the advent of the debt crisis in the 1980s, fiscal retrenchment (hence, reduced spending on public goods provision) was consistently pursued as part of the stabilization-cum-adjustment policies. Governments were generally left with little capacity and dwindling resources to implement development-oriented policies domestically and in particular, to undertake public investment on a sustained basis. Typically, it is large-scale infrastructure projects that get first axed in fiscal expenditure allocations at times of crises. In reality, the fiscal retrenchment at the height of the debt crisis in the 1980s was so deep that essential public goods provision in social infrastructure such as basic education and health expenditures were also axed and it was then assumed that these services could be provided on a fee-paying basis. This had often resulted in a fragile state with a seriously depleted and impaired institutional capability to deliver social services and to build physical and social infrastructure. Under these conditions, the scope and quality of public social services and infrastructure provision had progressively deteriorated.

Particularly, the dwindling capacity to undertake public investment on the part of governments burdened with high debt resulted in their inability to promote and crowd-in private investment. The low level of both public and private investment combined had severe negative consequence for economic growth and development. In the absence of reliable public goods provisions, economic transactions in many LICs were conducted in highly uncertain and

⁵² . Several IMF working papers present cross country regressions analyses with a panel of developing countries to investigate the debt-growth nexus. For example, Cordella et al (2005) and Pattillo et.al (2004) carry out such an analysis respectively to investigate: i) how the debt-growth relationship varies with indebtedness levels and other country characteristics; and ii) whether debt affects growth through factor accumulation or total factor productivity growth.

risky environments, which engender eminently volatile returns to investment and income streams. The high degree of uncertainty and instability is also known to have a powerful deterrent effect not only on the rate of private investment and economic growth but also on the *composition* of investment in favour of reversible and safe investments that have a self-insurance character. Thus, under such circumstances, safe and liquid assets are systematically chosen over less liquid but high-yielding assets. While wealthy segments of population may chose to invest abroad, resulting in substantial capital flights, other private investors chose to put their capital in short-term assets in sectors with relatively lower sunk costs and shorter turnover periods, such as trading, rather than in long-term physical investments.

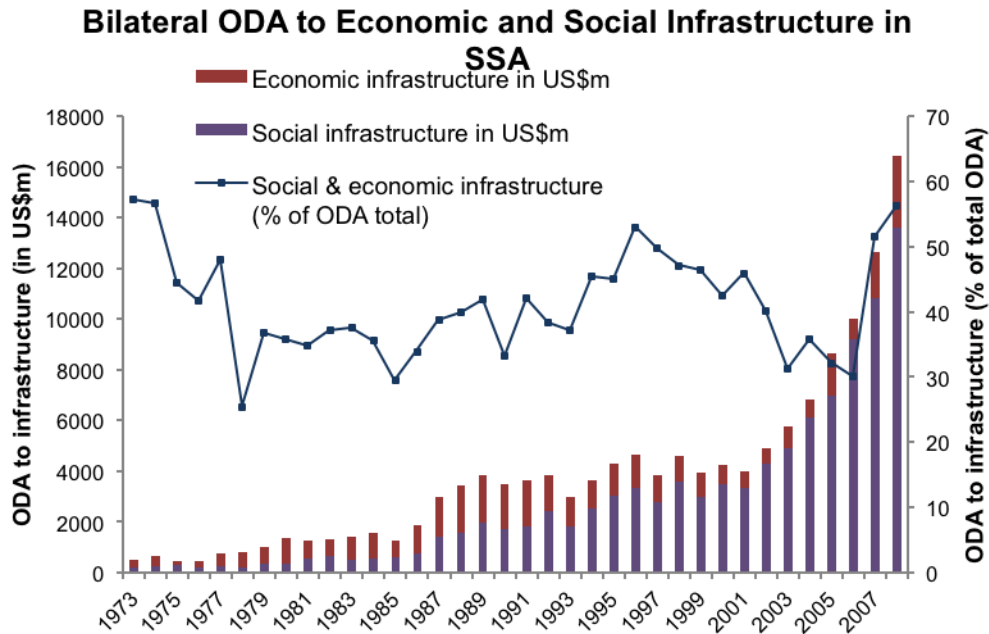
In fact, the political and economic environments in LICs tend to keep the economic activities of a significant proportion of private agents away from the "official" economy. Then, the so-called *informal* economy has become an important source of employment and income for many households. In the absence of functioning formal institutions, economic activities tend to be restricted to small-scale production and local trade to obviate the contract enforcement problem through repeated dealing and cultural and social homogeneity. The majority of the poor, particularly the rural poor are often left behind. At the same time, a largely informal economy with a weak and narrow tax base reinforces the fiscal fragility. Hence, the poor public goods provision and the fragile fiscal condition develop its own loop of vicious circle for condemning an economy to a low equilibrium. These factors together have acted as a serious impediment to structural transformation of the economies of LICs.

In parallel, the donor community had steadily reduced aid to economic infrastructure projects in relative to overall aid as well as to social infrastructures in SSA in the 1980s and 1990s. This is again in a sharp contrast to the experiences of developing countries in East Asia, where Japan- a major bilateral donor in the region during 1980s and 1990s- concentrated its aid on economic infrastructure development.⁵³ Fig. 13 A-B, Fig14 A-B and Fig.15 A-B display a historical trend of ODA allocations in SSA compared to East Asia. Fig.13 shows a trend in bilateral ODA allocated to both social and economic infrastructures in SSA and East Asia in current prices as percent of total ODA since the early 1970s. Clearly, there was a sharp decline of bilateral ODA going to economic infrastructure in SSA from late 1980s to mid 2000s in favour of social infrastructures (health and education spending), whereas economic infrastructure has consistently got a high share in bilateral aid allocation in total ODA as well as in relation to social infrastructure in East Asia.

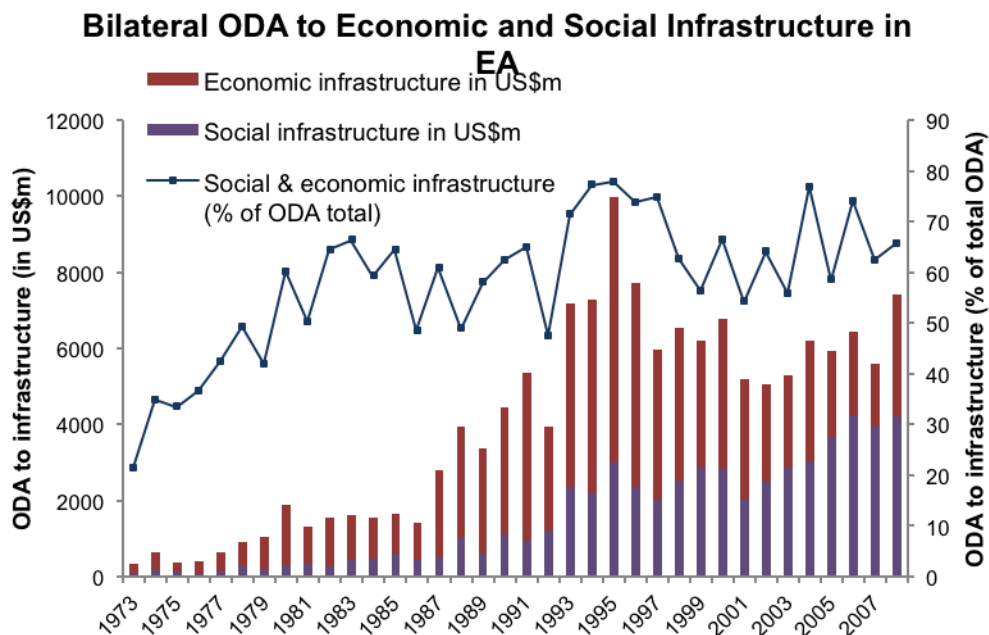
Fig. 13 Bilateral ODA allocated to social and economic infrastructures in current prices, US\$million and as percent of total ODA

A. Sub-Saharan Africa (SSA)

⁵³ . See Nissanke and Shimomura (2013) for more detailed discussions on comparative analysis of aid flows in the East Asia and SSA.



B. East Asia



Source: OECD Data Set on Bilateral ODA Commitments by Purpose

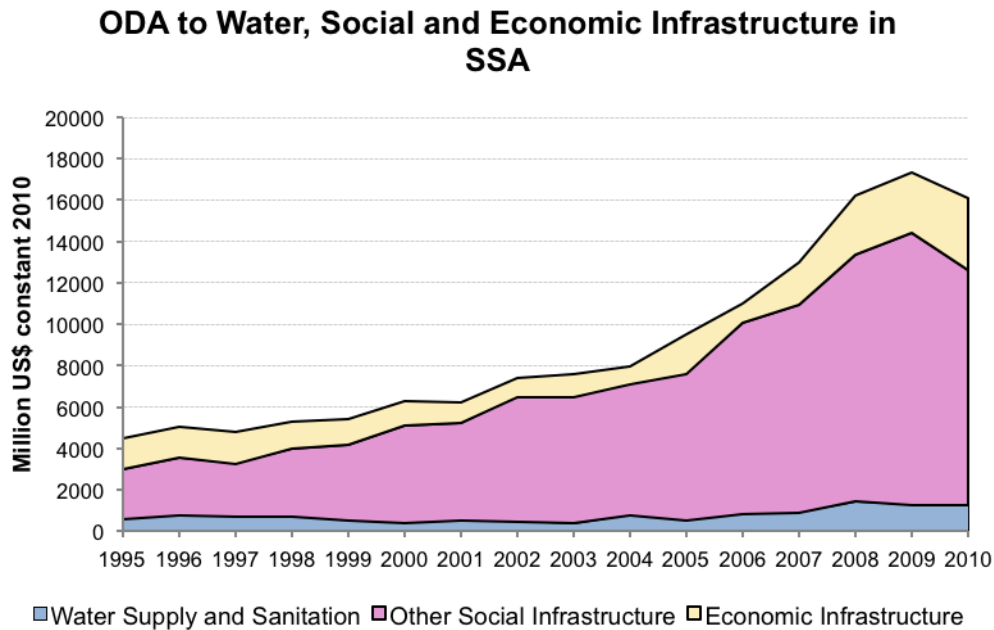
Fig. 14 A-B shows a breakdown of ODA allocated to each of three components (economic and social infrastructures and water supply), while Fig.15 A-B shows a breakdown of bilateral and multilateral aid by economic and social infrastructures. Both Fig. 14 and Fig.15 drawn from the OECD-CRS system illustrate the trends of changes in distribution of infrastructure aid by categories in 2010 constant prices of US\$ millions since 1995.⁵⁴ These

⁵⁴ The OECD-CRS data are available only since 1995.

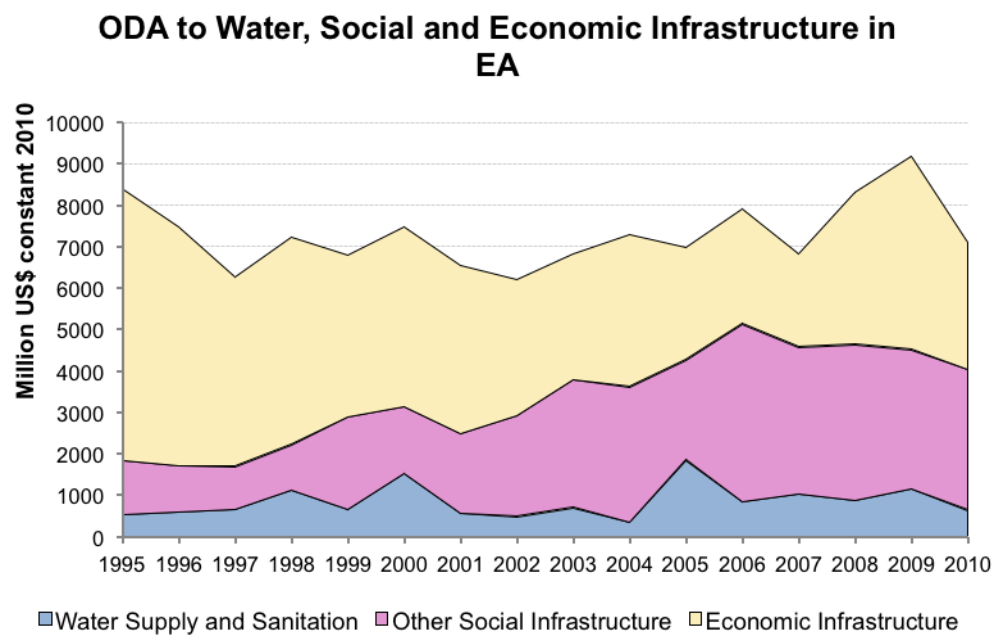
four figures again confirm that both bilateral and multilateral aid to economic infrastructure declined proportionately, as aid increasingly directed more to spending on social infrastructures in SSA, whereas aid for economic infrastructures in general and bilateral aid in particular has maintained well in East Asia.

Fig. 14. Bilateral ODA to Economic and Social Infrastructure Projects and Water Supply and Sanitations in 2010 constant prices

A. Sub-Saharan Africa



B. East Asia

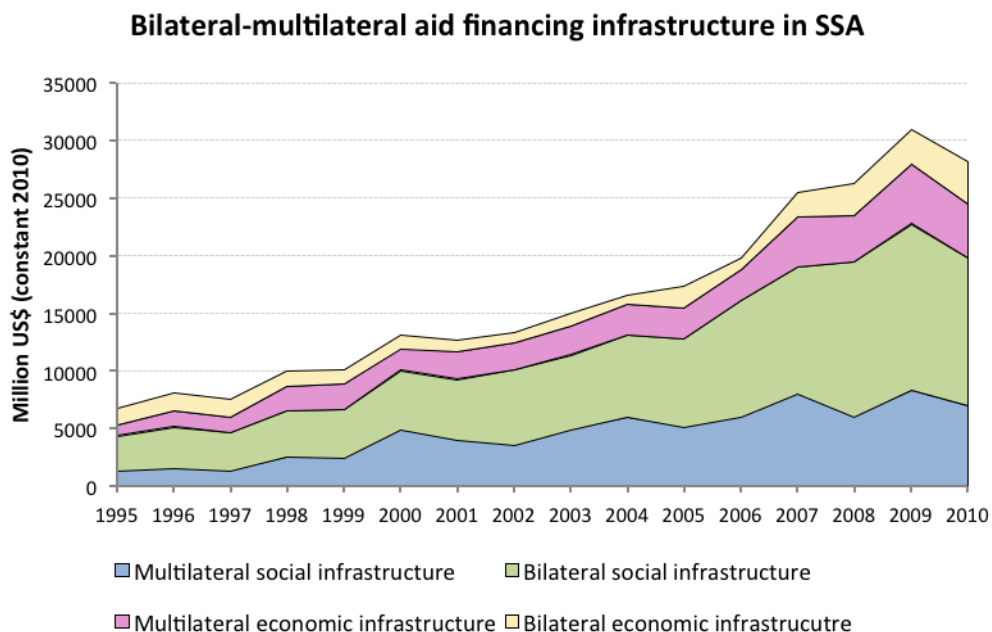


Sources: OECD- CRS Data set

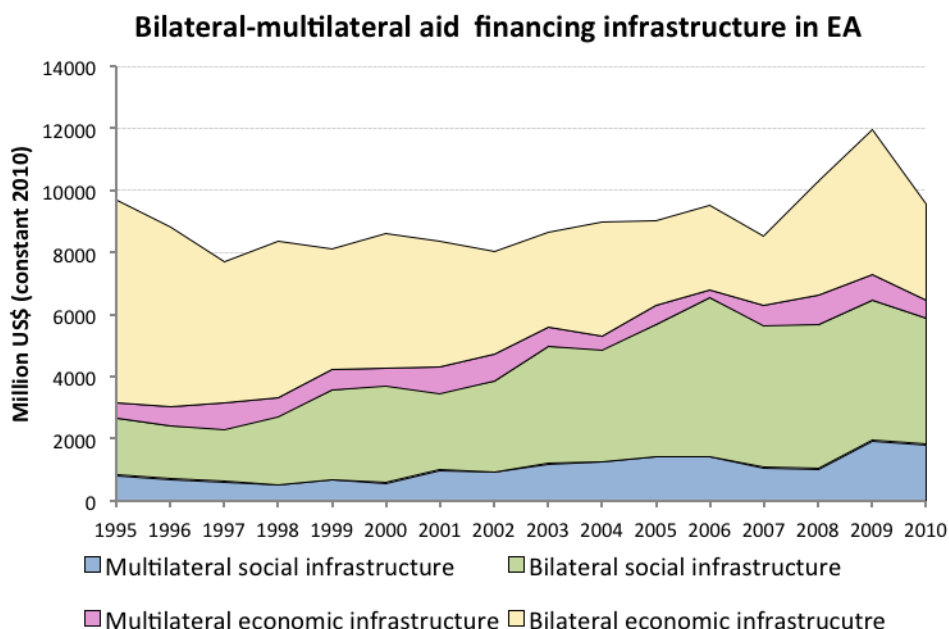
Note: CRS is the Creditor Reporting System used for compiling OECD data

Fig.15. Aid to social and economic infrastructure by multilateral and bilateral aid in 2010 constant prices

A. Sub-Saharan Africa



B. East Asia



Sources: OECD- CRS Data set

Three reasons can be given for the sharp reduction in aid allocation to economic infrastructure in Africa for those two decades. The first is the perceived failure of many

donor- and government-funded infrastructure projects in the past, dubbed often as ‘white elephants’. Some of these projects were manifestly ‘wrong’ from the inception, as they were motivated almost exclusively by political considerations, rather than carefully justified in economic terms. The others failed because of inadequate provision for recurrent and maintenance costs, unrealistic pricing or prevalence of regulatory forbearance or gross mismanagement. The second reason is the relentless drive for public divesture, privatization and deregulation across infrastructure sectors, including provisions of water, telecommunications, transport and power in the 1990s. The third reason is the powerful advocacy for shifting public spending towards social sectors such as health and education partly as result of the deliberations of the Copenhagen Social Summit in 1995.⁵⁵

It is only over the last decade or so, and after the newly emerged literature on Africa’s ‘growth tragedy’ in the late 1990s identified the region’s geographical disadvantages as one of the most binding growth constraints, that the need for massive infrastructure investment is officially recognized as critical for accelerating economic and productivity growth as well as for poverty reduction. This unfortunate delay in reinstating the critical importance of infrastructure investment for African development reflects largely the unhealthy situation evolved since the early 1980s, wherein the priority of the development agenda for Africa is predominantly set by the donor community, in particular by IFIs.⁵⁶ Thus, we suggest that the belated official recognition of Africa’s disadvantages in infrastructure development has entailed a heavy cost in terms of forgone economic growth and poverty reduction.

Today, after such a costly neglect, the vital role of economic infrastructure for development is widely acknowledged as evident in the Commission Africa Report (2005). Given the enormous infrastructure deficits, in its call for an immediate doubling of ODA to Africa to \$50 billion a year, the Commission for Africa reckoned about a half of ODA to be spent in infrastructure building. It is at this particular historical juncture that China, along many other emerging economies such as Brazil, India and Malaysia, has increased aid and investment in Africa, offering a new kind of development partnership, without any *policy* conditionality attached, on the basis of a “coalition” engagement, i.e. a collaborative state-business approach through aid-trade-investment as a package. So far, one of main focuses of China’s aid has been exactly on economic infrastructure building, which is now universally seen as critical for Africa’s future.⁵⁷

As Chinese aid for infrastructure projects to Africa under the “resources for infrastructure” format, known as the “Angola mode”, is provided in preferential loans, a fear has been raised over the debt sustainability arising out of Africa’s new debt obligations to China and other non-DAC members. Some concerns are also expressed, almost accusing China and other new lenders for essentially free-riding on the debt cancellation of US\$43 billion granted to the HIPC countries through the MDRI in 2005 (World Bank 2006). However, Reisen and Ndoye (2008) find very little evidence of “*imprudent lending*” to debt relief beneficiaries in the figures up to 2006 in their empirical analysis of debt dynamics for three country groups:

⁵⁵ See Ndulu (2006) for this particular point..

⁵⁶ The diagnoses offered by the donor community for development failures in Africa has in fact evolved from the “capital shortage” in the 1960s and 1970s, to the “policy failures” in the 1980s, and finally to the “institutional failures” in the 1990s (Adam and O’Connell, 1997). Only in the 2000s, the ‘infrastructure’ failure in Africa has got due attention eventually.

⁵⁷ . See Nissanke and Soderberg (2010) and Nissanke and Shimomura (2013) for more detail discussions of China’s engagement with Africa including such questions as: China’s domestic imperatives for its drive in Africa; its adoption of the economic cooperation model practiced by Japanese government in Asia as China’s chosen aid modality with some notable variations: and its impacts on African development, which have raised both hopes and fears in the region.

African HIPC, HIPC-China (High China Presence), and Resource-rich IDA-only. China has also been granting debt relief to African countries on its own loans rather readily so far.

Indeed, these concerns may prove to be exaggerated or misplaced, if new lending from these emerging creditors could produce higher growth dividends, than from loans by traditional aid providers, by concentrating on investment in critical bottlenecks for development in Africa, such as in infrastructure and agriculture. Seen from this perspective, the IDA's non-concessional borrowing policy (NCBP) adopted in 2006 to prevent excessive non-concessional borrowing by grant-eligible countries may be seen to be anti-developmental. Though more flexibility has been introduced over recent years, the NCBP is used to threaten LICs with cuts in highly concessional financing from IDA and other concessional lending windows, if they borrow on non-concessional terms from commercial or new sovereign lenders, which is viewed as placing debt sustainability at risk. Certainly, this may be an example of how the DSF is applied too rigidly and mechanically to justify certain concerns by the IFIs and the traditional donor community without much due regard to possible dynamics that could emerge in the debt-investment-growth nexus in many LICs.

Indeed, the surge in interests in resource rich Africa from China, India and other emerging creditors has also had other tangible spill-overs, unforeseen hitherto in Africa. For the first time, private investors have increasingly started taking Africa seriously as one of key destinations of their direct and portfolio investment. Accordingly, debt dynamics in Africa could change dramatically with these private capital flows. Their absorptive capacity of aid and debt carrying capacity may increase gradually with these investment activities as well. After all, whether a potential *virtuous* cycle of growth-cum-debt could be finally established in LICs would depend critically on productivity of investment made with new capital and economy-wide rates of social returns from investment.

Therefore, appropriate, invaluable lessons can be drawn from historical experiences of LICs to understand under which conditions debt cannot be growth-enhancing, and what should be done to avoid the repeat of the low equilibrium of low growth with high debt. Key to this is the rate and efficiency of investment where loans are deployed. Therefore, a critical analysis of what debt is used for should be a part of debt sustainability analyses. Good appreciation of country-specific history in this regard is indeed valuable for inserting back “investment” into analyses of debt sustainability.

V. Policy Implications

V.1. Applying the DSAs as a monitoring mechanism for prudent sovereign debt management

Clearly, the DGE model introduced as a coherent macroeconomic framework to underpin calibration and stress tests has made substantial improvements to DSAs in critical technical aspects. However, an increasing sophistication of the models and computation techniques applied to DSAs by itself does not substitute for efforts in engaging with the concept of debt sustainability at a deeper level. From this perspective, we argue that the present DSF as an overarching framework requires substantial rethinking for its operational use as the definite tool for ensuring debt sustainability. Much more care and caution should be exercised when the DSAs are used for lending/borrowing decisions as a prescriptive tool. This is particularly so in light of problems associated with the CPIA-determined debt burden thresholds. Instead,

the DSAs should be treated as an indicative guide for monitoring debt profiles and one of useful informational bases for prudent debt management. The mechanical application of the DSAs is certainly harmful than useful.

The IMF itself warns against a mechanical use of the DSA as a prescriptive tool, and emphasises the need for striking the balance between an outcome of the DSA and a judgemental approach based on country specific factors and circumstances in assessing the debt distress risk and making borrowing/lending decisions for a particular country. However, it also notes a number of advantages of the DSA on the basis of: self-regulating (automatic calibration to historical economic performance); operational ease (an ease of the application) for lending decisions such as the risk rating; provision of timely updated information; transparent and uniformity across countries and over time.

Indeed, by claiming that “DSAs provide an indication of the terms and volumes that a country should receive in order for its debt to remain sustainable (Barkbu et.al. 2008:16)”, the IFIs overstate the utilitarian value of the DSF in relation to today’s highly uncertain world. No economic forecasting exercises performed in advanced countries with a more sophisticated modelling and better and more reliable data available can claim to pass an accuracy test of small margins of error even for a shorter period of up to five years, let alone for a 20-year period made in the DSAs.⁵⁸ Any forecasting of debt burden indicators beyond a five year period or so is likely to lose a predictive power. Hence, much less weight should be attached to a predicted debt profile of a longer time horizon, even though forecasting over a 20 year period is still performed because concessional loans given to LICs are characterised by a long maturity period of 40 years or so often with a grace period of 10 years as the case with the IDA loans. For this very reason, a frequent updating in the light of changing circumstances is necessary and if (and when) unanticipated events affecting a country’s debt profile takes place, the DSAs should be revised in a timely manner.

The uniformity of the analyses in the current DSF has certainly advantages for comparison across countries and over time. However, it also entails disadvantages in making the model less flexible for taking into account country specific features and circumstances. It should be noted that disadvantages often outweigh advantages when the DSAs are misused. The Non-Concessional Borrowing Policy (NCBP) originally adopted with reference to the DSF may be regarded as one of such unfortunate applications. Indeed, this is implicitly acknowledged, as another round of policy review was undertaken to allow more flexibility for non-concessional borrowing from non-traditional sources (IMF, 2009).

More generally, economic forecasting for debt sustainability inevitably involves the use of macroeconomic models, which require making various assumptions on variables included in the models. In this regard, Wyplosz (2007) reminds us that the usefulness of the DSAs is directly related to the validity of these assumptions, which by definition are neither safe nor testable and that any sustainability indicator will be both arbitrary and too imprecise to serve as a tool for policy prescription. Further, he reckons that the present methodological approach adopted in the DSAs is more likely to place a *debt ceiling* in attempting to define debt sustainability, which itself is “elusive and mission impossible”.

⁵⁸ . In this context, one of the commentators in Sunday Times news paper of the UK reminds us, referring to the large forecasting errors over recent years found in the inflation Reports by the Bank of England cites, the following remarks made by John. K. Galbraith some time ago, when he was asked about the point of economic forecasting: “the only function of economic forecasting is to make astrology look respectable”. He adds that though forecasting is still necessary and useful for macroeconomic management, people expect economists to be humble (Sunday Times, 23 August 2010).

Rather than the danger of drawing too optimistic scenarios as the IMF fears, the present framework could lead to conservative lending/ borrowing decisions if its predictions are taken rigidly at face value. This is because it does not consider adequately different uses of concessional loans. If the DSAs have an inherent tendency to produce systematically pessimistic projections of debt sustainability, the use of the DSAs for lending/borrowing decisions amounts to sacrificing economic growth and development on the basis of the imprecise nature of exercises, as concessional loans are meant for financing development in LICs. Certainly, we could not make sensible decisions affecting economic development only on the basis of a 25 % of probability of debt distress as the DSF implies presently.

To facilitate development processes, governments of LICs can be by nature indebted to development finance institutions and partner governments that provide aid. Development agencies are in business of providing development finance in concessional loans and grants. At the same time, we should bear in mind that indebtedness on its own would not pose a danger, so long as sensible debt management and an appropriate facility to deal with adjustments to various shocks are in place. LICs are by their nature much more vulnerable to exogenous shocks. An application of more refined analytical tools for prediction of debt distresses by itself cannot guarantee that the debt profile of LICs remain within a zone free from distresses.

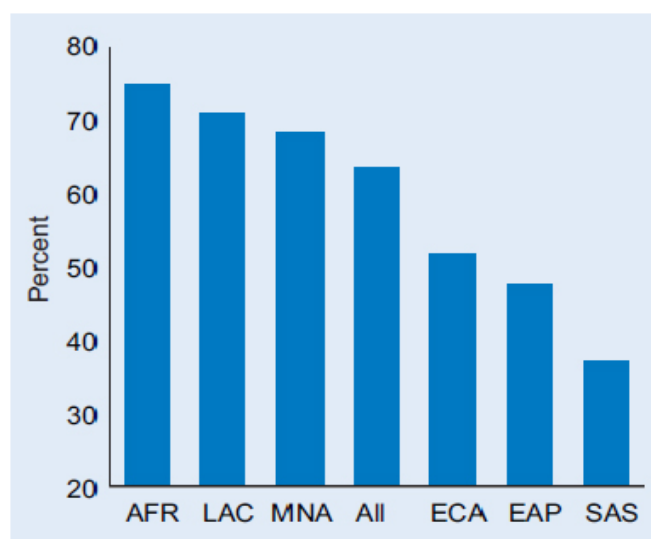
Meanwhile, to remain current and truly ‘forward-looking’, all DSAs should be regularly and timely updated in the light of fast changing conditions and new debt dynamics emerging with different types of investors, both private and official creditors, than those dominated by traditional donors so far in LICs.

V.2. Innovative Contingent Facility - A Missing Facility in the DSF

The IMF/IDA paper containing an original proposal of the DSF lists the following as characteristics of LICs that could exacerbate the debt service problems and adversely affect their ability to cope with high debt. These are: (i) risks of misuse and mismanagement of resources, due to weak public institutions, poor governance, and generally low implementation capacity; (ii) returns on investment that frequently accrue only over the long term, and whose benefits (such as, from improved security and healthcare) may be diffuse and cannot be easily captured by governments in the form of higher taxes to repay debts; and (iii) narrow and highly volatile production and export bases that make these countries particularly vulnerable to exogenous shocks that can significantly worsen their debt dynamics (IMF/IDA (2004a:10).

Thus, at least as a part of the last characteristic in the list, it recognises that one of the reasons why many LICs, mostly heavily dependent for revenues from exports of a few commodities, have a propensity to fall into a debt distress situation. Today, several decades after gaining political independence, the high primary commodity dependence remains one of the most conspicuous characteristics of the trade linkage of countries in many LICs with the rest of the world under globalisation. Further, the high commodity export dependence has a very specific regional dimension - a particular feature of many LDCs in sub-Saharan Africa. Fig 16 shows that among developing countries, Africa, Latin America and Caribbean (LAC), and Middle East and North Africa (MINA) have much higher dependence ratio, compared to South Asia, East Asia and Europe and Central Asia.

Fig.16. Share of Primary Commodities in Merchandise Exports of Developing Countries by Regions



Source: World Development Indicators, World Bank.
*As % of merchandise exports. Simple averages for country groups.

Source: Brahmhatt and Canuto (2010)

Economic cycles of commodity dependent LICs have been historically dominated by price movements of their major primary export commodities. The large scale of price movements observed in short-run fluctuations as well as over medium-term cycles has naturally had serious policy implications for managing their economies. The hypersensitivity to externally originated instability is one of the critical weaknesses of commodity dependent economies. An eventual transformation into more diversified economic structures is the real solution to the problems associated with the ‘commodity dependence trap’. For the transition/intervening period, however, skilful economic management over the commodity price cycles, which can reduce the amplitude of oscillations in market forces, are indispensable for productive investment that could facilitate the process of structural transformation.

Yet, the demand management of these economies is very complex, since an externally-induced balance of payments crisis, by its own force, leads to a sharp drop in domestic demand. The orthodox stabilisation policies adopted primarily to restore external equilibrium in such circumstances can move the economy further away from internal equilibrium, at least in the short-run. In the light of domestic aggregate demand, these policies can well be *pro-cyclical* to the direction of both internal and external market forces rather than *counter-cyclical* as they should be as noted in our earlier paper (Nissanke 1993, 2010 b&c). For commodity dependent economies, macroeconomic management is judged as counter-cyclical, when an appropriate policy configuration of fiscal, monetary, exchange rate and financial policies would allow softening the effects of commodity price shocks on both the external and the internal balances *simultaneously*.

Today, after experiencing the up-swing phase in the commodity price super-cycle for nearly 10 years since 2002, it is understandable that an attention of the policy makers of commodity dependent LICs is now directed towards the question as to how to make best use of resource rents for economic development. However, there is also a possibility that commodity prices may experience another sharp down turn in not a distant future, if the world economy

descends into a recession again as the recovery from the global financial crisis is at best fragile, and a threat of double-recession of the global economy is never far away, as many emerging economies which have been behind the recent commodity boom, started experiencing a notable slowdown amidst the sovereign debt crisis in Europe and other parts of the world. Furthermore, it should not be forgotten that the recent sharp commodity price increase of basic commodities has produced deficits of considerable size and hardships to LICs dependent on imports of foods, fuels and other essential commodities in their balance-of-payments and fiscal balances.

Counter-cyclical macroeconomic management through commodity stabilisation funds as practised in countries such as in Chile and Norway at the national level is usually presented as an effective solution to oil and mineral resource rich economies.⁵⁹ Although counter-cyclical macroeconomic policy at the national level is critical, many LICs find the opportunity cost of holding savings abroad high in the light of immediate pressing needs to accelerate economic development and to reduce debilitating poverty. Borensztein, Jeanne and Sadri (2009) argue that macro-hedging with derivative instruments could be viewed as an effective substitute for the counter-cyclical management through commodity stabilisation funds. However, this policy option is impractical and often too costly for LICs.⁶⁰

Therefore, there is a strong case to be made for a more effective facility for LICs at the global level. In the post-war period, we have seen a number of compensatory facilities established to offset shortfalls in commodity export earnings such as the Compensatory and Contingency Finance Facility (CCFF) by IMF and the STABEX by EC (Maizels 1994, Hewitt, 1993 and 2010). However, those operated in the past are not well designed and inappropriately structured to meet effectively the need facing the LICs. The original IMF Compensatory Financing Facility (CFF) was established in 1963 as a low-conditionality semi-automatic mechanism for temporary balance-of-payments support but unfortunately available on a non-concessional basis. The CCFF – a non-concessional facility established in 1988 to replace CCF- has become so highly conditional upon accepting pro-cyclical demand management that very few countries have turned to it for assistance since its inception. The Exogenous Shock Facility - a concessional loan facility for countries under the IMF's Poverty Reduction and Growth Programme established in 2000 - has continued to carry high policy conditionality to make it less popular and accessible to LICs than otherwise.

Similarly, the STABEX has met rather limited success because of its pro-cyclical disbursements due to the long time lags from income shocks for delivery of compensation. Further, since the compensation under the STABEX was delivered in the form of grants only to agricultural sectors affected by income shocks, it has been argued that there was a diversion from other forms of ODA and the STABEX tends to discourage diversification efforts.⁶¹ FLEX, which replaced STABEX and SYSMIN under the Cotonou Agreement of 2000, has been under criticism for slowness of disbursements and resource constraints so far.

Yet, notably, the DSF is silent on the question of enacting a contingent facility altogether. In fact, one of the fundamental weaknesses of the DSF is that while recognising LICs' vulnerability to exogenous shocks as one of main factors behind their high propensity to fall into a debt distress situation, the DSF discusses LICs' vulnerability to exogenous shocks as

⁵⁹ See Nissanke (2010d).

⁶⁰ See Nissanke and Keleshov for more detailed discussions on difficulties and impracticality of using derivatives instruments for macro-hedging and risk management by commodity producers.

⁶¹ Compensation for mineral products was administered under a separate facility- SYSMIN.

an issue only marginally through one of stress tests as part of routine DSA exercises. As noted in Section II.4 above, structural handicaps characterising LICs, which can be measured by the Economic Vulnerability Index (EVI) and the Human Asst Index (HAI) are not taking into account in calculating the likelihood of debt distress. Further, when stress tests conducted reveal a possible breach of at least one of the CPIA-determined debt burden thresholds, countries are classified as at medium risk (if more breached, they are considered at high risk, and accordingly discouraged to take loans or sanctioned against taking non-concessional loans through the Non Concessional Borrowing Policy (NCBP)).

Interestingly, Buffee et.al (2012) note in passing how accessing to a concessional loan facility would alleviate a debt distress situation arising out of financing for productive investment surge but facing external shocks such as TOT shocks down the road. However they stay out of discussing how to make such an access to concessional windows possible in the face of shocks. Indeed, the DSF systematically avoids addressing the critical question of debt distress management altogether, in particular, how to deal effectively with downside risks facing LICs subject to frequent exogenous shocks. In this context, we suggest that insofar as vulnerability to shocks represents a key determinant of debt distress, any debt sustainability framework that does not effectively translate vulnerability assessments into appropriate policy responses in terms of volume and timing of aid and debt relief is bound to fail in providing a lasting solution to debt distress of low-income countries. In a way, it is hard to interpret the failure for the DSF in this critical aspect as a simple technical omission. Under the current practice, the DSF can create a false sense of security as if they are free from debt distress altogether, so long as LICs adhere to the recommendation resulting from the DSA exercises.

We suggest that the protracted debt crisis in HIPC is associated with the absence of an effective and flexible facility of *contingency financing* to deal with external shocks facing HIPC on an *ex-ante* basis. Throughout 1980s and 1990, official creditors have instead kept applying *ex-post* debt relief mechanisms with policy conditionality attached in response to recurrent liquidity crises and the ensued ‘debt overhang’ condition. Given this history behind, there is an urgent need to establish a global counter-cyclical contingent financial facility for low-income commodity dependent countries that ensures fast disbursement of aid and debt payment relief with low policy-conditionality and high concessionary elements upon negative commodity price shocks or any other exogenous shocks.⁶²

For the purpose in hand, it is best to structure aid and debt contracts *ex ante* for LICs facing frequent exogenous shocks such as commodity prices shocks or any other shocks with an automatic debt relief mechanism incorporated already in original contracts. A strong rationale for such flexible contingent debt contracts comes from the fact that debt can be made sustainable in principle, so long as illiquidity facing debtors are attended efficiently and timely. There are several proposals on table, which can be considered with a view to designing efficient, flexible debt contracts with a contingent clause incorporated *ex ante*. For example, Cohen et al. (2005) and Cohen et.al (2008) presents arguments similar to those put forward in Section II.4 above, suggesting that subsidized *contingent* loans are superior to

⁶² . Even if the international community succeeds in reducing *excessiveness* in volatility in commodity prices by establishing new innovative stabilisation schemes such as those discussed in Nissanke (2010d, 2012), commodity prices would remain volatile due to very characteristics intrinsic to many primary commodities. As reported in Borensztein et.al (2009), shocks to commodity prices are very persistent. The year-to-year volatility in the price varies from 10-40 percent across primary commodities.

outright grants in financing productive investment in countries facing high vulnerability to external shocks such as natural resource price volatility. They show that debt and debt cancellations are two complementary instruments which, if properly managed, perform better than either standard loans or grants taken in isolation.

Taking these arguments further, Cohen et al. (2008) propose a new contingent facility: the Countercyclical loan (CCL). The CCL facility is assigned to transform the grace period of a typical concessional loan into a fixed initial grace period and a floating grace period, which the country can draw upon when a negative shock occurs. More concretely, they propose to reduce the grace period of a typical concessional loan, from ten to five years, and to keep the remaining grace periods as an asset that the country can draw upon, when a negative shock takes place.⁶³ This is a very concrete proposal deserving serious consideration.

Our proposal entails a contingency facility in which contingency is indexed to a verifiable *state of nature* rather than to debtor's capacity to pay such as GDP growth to eschew the potential 'incentive' problem. This is because *outcome* indicators such as GDP growth rates reflect the results originating from exogenous shocks/events outside of control of borrowers as well as efforts/inputs on the part of borrowers to honour debt obligations to their best ability, as discussed in Section II.2 above. Thus, we argue specifically for establishing genuinely flexible, *state-contingent* debt relief mechanisms in order to avoid a recurrence of debt crises. In environments dominated by high uncertainty, any inter-temporal financial contracts have to work out with difficulties in dealing with high risks of non-payments. In order to find an efficient solution from this kind of problems, it is instrumental to classify risks into two categories: i) idiosyncratic risks of non-payment originating from borrowers' ability and willingness; and ii) systemic risks stemming from external events which are not under control of a borrower/ a lender. Unlike equity contracts in which both parties share systemic risks, standard debt contracts usually obligate borrowers to make regular payments irrespective of what happens during these contractual periods. This means that in debt contracts systemic risks are usually assumed by borrowers. In an event, when a 'good' state prevails, a borrower would take all returns net of his/her payments obligation. However, if a 'bad' state happens to prevail, a borrower faces an illiquidity problem, i.e. difficulties in making regular payments even such a state is not under her/his control.

The 'state-contingent' schemes are designed to deal with such a problem stemming from illiquidity. Following the convention used in Burlow and Rogoff (1981), the literature on sovereign debt emphasises the existence of perverse incentives in sovereign debt contracts arising from the difficulty in making a distinction between ability and willingness to pay. Instead, the 'state-contingent' contracts are to address the resulting moral hazard issue by distinguishing between the consequences of a borrower's own efforts and events beyond her/his control. The state-contingent contract would specify their contractual obligations contingent on the 'nature of states', and hence deal explicitly and effectively with uncertainty associated with exogenous shocks and systemic risks. As Krugman (1988) notes, the trade-off between debt forgiveness and financing in a typical negotiation can be improved by indexing repayment to the 'state of nature', which can be verifiable.

Based on his analysis, we argue for drawing incentive-compatible, *state-contingent* debt contracts which would allow sovereign debtors *automatic* access to contingency financing

⁶³ . The negative shock in their proposal is defined as an export shock, whereby current exports fall below a moving average of the past five years.

when recipient countries are hit by adverse unforeseen events. Both the CCL and the state-contingent debt contracts involve an introduction of flexibility into standard debt contracts by adjusting the grace periods or subsidized interest rates slightly. Such a facility would facilitate adjustment processes required to deal with shocks and reduce the associated costs of adjustment, as depicted in Fig 4 in Section III.2 above. A genuinely flexible, state-contingent aid and debt contract is efficient by making protracted, time-consuming negotiations typical to ex-post debt restructuring unnecessary as well as by better aligning incentives of borrowers and lenders. By addressing the moral hazard problem directly, this can create incentives for sovereign borrowers to make efforts for attaining better performance than the current CPIA-centred performance based aid allocation and Debt Sustainability Framework. The presence of such an incentive compatible contingency facility can make policy makers more accountable to domestic stakeholders for their decisions on policies and subsequent courses of action, since the outcome of their efforts are made transparent by netting out external shocks and events.

Some technical details should be worked out how to identify a trigger point for such a facility and how to make debt payment schedule restructured upon an event of 'verifiable' exogenous shocks. However, technical issues associated with creating an 'efficient' contingent facility can be overcome if a strong political commitment to such a facility exists. Indeed, the original DSF proposal (IMF/ID, 2004a) mentions in passing the need to supplement the DSF with a contingent debt service facility, stating that "since an appropriate mix of concessional loans and grants would provide only limited capacity to absorb large, unforeseen, exogenous shocks, creditors may also wish to consider new or modified concessional lending instruments to deal with such eventualities".

The importance of instituting a *pre-qualified automatic line of assistance* at times of crises is also emphasized by Kanbur (2010), who calls for designing a flexible, comprehensive system of social protection for the poor as a response to global crises. In fact, there are several recent examples which point to more willingness, on the part of the IFIs and the donor community at large, to consider some facilities for dealing with large exogenous shocks. For example, in the wake of the devastating impacts from the recent global financial and economic crisis of 2008-9, the IMF's special SDR allocation in its emergency response, has greatly contributed to mitigating the decrease in foreign reserves in Low-Income Countries. For example, it increased its commitments to Poverty Reduction Growth Facility (PRGF) eligible countries from an average of SDR1.5bn in 2007 and 2008, to SDR7.9bn in 2009 and SDR4.9bn in 2010. At the same time, the IMF has streamlined its financial facilities to LICs and instituted three new windows of credit lines – Extended Credit Facility (ECF), Standby Credit Facility (SCF) and Rapid Credit Facility (RCF) with the first replacing the PRGF and the latter two – the Exogenous Shock Facility as well as the Post Conflict and Natural Disaster Facilities. There is some relaxation of the overall IMF conditionality, especially as regards the structural policies, while access to IMF credit lines as a proportion of quotas was doubled for LICs in April 2009, though it still remains very much lower than that available for MICs.

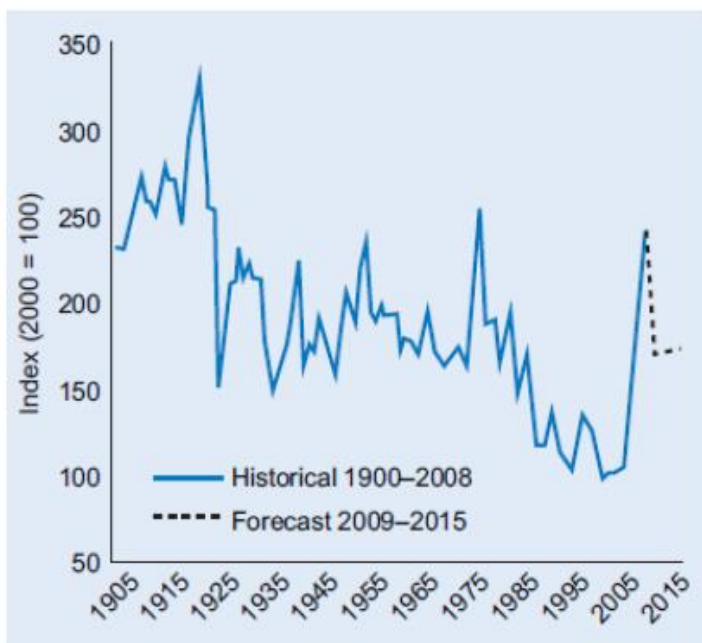
Similarly, the IDA has responded by establishing a one-off Crisis Response Window (CRW) - a window operating ex post - for the countries facing acute shocks. An automatic debt moratorium or relief has also a number of precedents. The donor community has in the past responded quickly to the urgent needs of countries hit by natural disasters such as flooding, tsunami or earthquakes, by not only providing emergency humanitarian aid but also making an option of debt moratorium or substantial debt relief measures available immediately.

However, most of these facilities are available only as *ex-post* responses to ‘unexpected’ events. Further, the new IMF’s facility, SCF, is designed to deal with both external and domestic policy shocks, which makes it easier to justify high (upper credit tranche) policy conditionality even in the face of external shocks. Except the very small RCF, which only reaches 25% of a country’s quota per annum, all these facilities are really not an automatic credit line with low conditionality in dealing with external shocks, which was the case with the IMF’s original Compensatory Financing Facility (CFF) established in 1963. The latter, available to MICs on non-concessionary basis, was so widely and successfully used by these countries in the previous decades but abolished and replaced by the CCFF with very high policy conditionality in 1988.

There is a very strong case for reinstating a truly automatic non-conditional credit line at the IMF, which is accessible upon encountering exogenous shocks by both MICS and LICs. We cannot help but conclude that the donor community has so far failed to show sufficient interest in devising an effective *ex ante* response system for protecting vulnerable countries against the negative impacts from other external economic shocks such as commodity price shocks on economic growth and debt sustainability.

It is also important to bear in mind that a contingent credit line provided on a temporary basis may prove to be not sufficient to make debt truly sustainable in the long-run for LICs when they face shocks of large proportions and of more permanent nature, such as the case with the continuously deteriorating terms of trade faced by commodity dependent countries in the 1980s and 1990s as shown in Figure 17. Should such a condition arise in future, an automatic access to a contingent financing would create a time and space necessary for an orderly restructuring of sovereign debt and a negotiation for further development finance assistance. Using a typology of shocks and desired international responses, Griffith-Jones and Ocampo (2009) also argue that when shocks prove to be permanent as opposed to the case of temporary shocks, official liquidity provision through a contingent facility should be supplemented by continuous flows of development finance and grants. This is to prevent disruption of LICs’ efforts in advancing the process of economic development in the face of such economic shocks, as in the cases of when LICs are hit by catastrophic natural disasters.

Fig. 17. Real Non-Fuel Commodity Prices: 1900-2015



Sources: Grilli and Yang (1988); Pfaffenzeller et al. (2007).
 World Bank estimates 2004–08, forecasts 2009–15.
 * Indexes, 2000 = 100. Deflated by unit value of
 manufactured exports.

Source: Brahmhatt and Canuto (2010)

V.3. Enhancing the Role of the AfDB as a Premier development finance institution for Regional Member Countries

In the previous sub-section, we have made a strong case for establishing a new innovative contingent facility embedded *ex ante* in sovereign debt contracts to deal with exogenous shocks as part of a programme to make debt sustainable for LICs. The two concrete proposals outlined above are a facility with a *pre-qualified automatic line of assistance* at times of debt distress by introducing a flexibility of adjustments to either the grace periods or subsidised interest rates into contracts. Giving assurance that liquidity is made available immediately upon shocks through such a contingent facility can create incentives for sovereign borrowers to make efforts for attaining better performance than the current CPIA-centred performance based aid allocation and DSF. It would also provide a space and time for more orderly sovereign debt restructuring without having pressures from immediate liquidity crises, even if shocks are not temporary, and of rather prolonged nature. Sovereign borrowers are then encouraged to focus on achieving development objectives. Indeed, such a contingent debt contract can in principle incorporate a clause of accelerating repayment schedules at times of positive shocks such as commodity booms.

As a premier development finance institution, the African Development Bank should consider taking an initiative of pioneering an effective contingent facility into its own concessional loan contracts offered to RMCs. The facility itself can self-finance such a scheme at least partially through making some adjustments to the grace periods or raising marginally subsidised interest rates of the standard loan contracts issued under the African Development Fund (AfDF). In fact, more generally, the terms of loan contracts currently offered under the AfDF may be too standardised to fit the purpose, i.e. different uses of loan

facilities. The AfDF provides financial assistance in the form of grants and regular loans to member LICs with the grant-loan mix determined according to the traffic light system of the DSF as practiced in the IDA allocation. As discussed in detail in Section II above, in our view, the decisions to use grants or loans should be made in light of what they are used for. For the same token, lending terms of loans should be more finely differentiated depending on their application.

Presently, lending terms of regular loans of the AfDF are a 50-year maturity with a 10-year grace period with no interest payments attached, and only 0.75 % of service charges and 0.50 % of commitment charges are applicable. The repayment schedule is 1 % for 11-20 years and 3% for 21-50 years. This makes estimated concessionality calculated with 6 % discount rate at 66% - one of the most generous loan terms available among all development financing facilities- more generous than those available under the regular IDA credit with its estimated concessionality at 61 %. The AfDF offers loan contracts a 30-year maturity and a 8-year grace period to blend/gap countries with interest rates of 1 % and the same service and commitment charges as in the regular loans to LICs. The payment schedule under this facility is 3% for 9-19 years and 6.1 % for 20-30 years with an estimated concessionality of 41 %.

The lending terms currently offered to LICs under the AfDF are more favourable compared with those offered by other MDBs and RDBs such as Asian Development Bank or Inter-American Bank. For example, lending terms of project loans provided currently under the Asian Development Fund or those of general loans offered by IADB carry estimated elements of concessionality of 41-7 % calculated at 6% of discount rates.

Reflecting improved debt carrying capacities of RMCs, there is a proposal to sub-divide regular loans into regular and advanced regular loans with a shorter grace/maturity period of 10/40 years and 5/40 years and some adjustments to repayment schedule respectively. These loan facilities are estimated to carry still high concessionality of 61 % and 51 % in place of 66 % presently available under regular loans. The terms of loans to blend/gap countries are also envisaged to change into ones with a shorter grace/maturity of 5/30 years with annual equal repayment schedule, which makes estimated concessionality drop from 41 % to 35 %. These new terms are still very generous for financing productive investment, so long as investment are well selected and managed and could generate high economy-wide social returns with high development dividend.

Naturally, the lending terms available through concessional windows of MDBs and RDBs are far less expensive and much more financially attractive than those available from commercial sources, including terms attached to sovereign bond issues as well as those offered by emerging partners through South-South Cooperation, as discussed in Section IV.1 above. In fact, comparison across the loan facilities currently available for financing productive investment reveals a huge difference in lending terms between concessional loan facilities offered by the traditional aid community and those available from commercial lenders. The gap is so large to have given rise to a very marked “missing middle” in the spectrum of financial products available only in the “bipolar categories”, either in highly concessional instruments or very expensive commercial ones.⁶⁴ Lending terms offered by emerging

⁶⁴ . See Martin (2013) for his remarks on this point. According to the estimates reported by him, the cost of different financial sources as net of amounts provided is vastly different: Grants-0%; official concessional loans – less than 10 %; official blend loans – over 20 %; official non-concessional – over 50 %, bonds – over 60 %; bank loans – over 70 %; domestic debt – 100 %; and PPP facilities – nearly 150 %. Though the methods applied to arrive at these figures are not clear, these estimates illustrate how vast the cost varies across different financing mechanisms.

partners such as China, India, Brazil and Turkey for infrastructure and other productive investment appear exactly to play a vital role of filling this critical “missing middle” by offering financial instruments that are between official highly concessional loans available to LICs on the one hand, and official non-concessional, hard credits on the other. This may well explain the popularity of taking up loans from these emerging partners, in addition to much quicker disbursement and no ‘policy’ conditionality attached.

Evaluated from this perspective, though the rationale given is understandable, the non-concessional borrowing policy (NCBP) enacted by the IFIs and other MDBs, including by the African Development Bank, in fear of “free-riding” on the part of non-traditional sovereign lenders and uncontrolled debt accumulation developing since 2006 may be somewhat misplaced. Naturally, monitoring of debt levels is always a part of prudent sovereign debt management, and this should apply to all kinds of non-concessional borrowing. However, the crux of the matter here is again more to do with questions such as whether these lending terms of non-concessional borrowings from emerging partners are carefully considered and negotiated in interests of RMCs, in prior to taking up, in their appropriateness for financing the project in question and whether investment thus financed would produce high growth and development dividends on time to honor repayment schedule.

In fact, the NCBP has been gradually relaxed since 2009 and been now applied on a case-by-case basis. The African Development Bank has introduced more flexibility in this regard in 2011. The IMF has become particularly more lenient towards LICs’ accessing to debt instruments available on commercial terms. However, financial instruments on commercial terms comes with a much shorter maturity and higher interest rates and commission charges, entailing often higher risk of threatening debt sustainability than under other debt instruments, as discussed in detail in Section IV.1 above.

Given this, what may be more helpful in this regard is for MDBs such as the AfDF to introduce more flexibility in their debt contracts, and provide a variety of financial instruments and products with a varied degree of concessionality, probably more differentiated and individually tailor-made and packaged for different usages in terms of appropriate grace/maturity periods, interest rates and repayment schedule etc. in a country-specific context.⁶⁵

However, one of real constraints that the African Development Bank faces for playing a leading role in provision of concessional development finance is its currently very limited size of the overall funding resource envelope for the AfDF, as it is mainly sourced from grant contribution by partner countries. It is reported that the AfDF approved average UA 590 million loans for infrastructure projects in 2010-12. Providing loans in differentiated products, in particular, shortening the grace/maturity periods, accelerating the amortization period, or charging slightly higher subsidized interest rates in some portions of the AfDF’s debt contracts would eventually enhance the AfDF’s resource base by increasing reflows from repayment of principals on outstanding credits. However, it will take some time for reflows in this way to contribute measurable to its funding sources from the current low base. Therefore, as part of its own resource mobilization, the African Development Bank may also consider

⁶⁵ . It may be noted here that the terms of concessional loans offered to East Asian countries for infrastructure and productive investments by Japan’s OECF and JBIC in the early periods were very flexible. Highly differentiated and tailor made to specific projects. Apart from the flexibility of loan contracts, their efforts were concentrated on local institution development, which were very successful sustaining in good infrastructure service provisions. See Nissanke and Shimomura (2013) for more detailed discussions and East Asian case studies of infrastructure development.

making resource transfers between its Fund and Bank facilities easier, whenever this is appropriate. This may be achieved partly by allowing an increasing number of RMCs in transition to graduation on different sets of blend terms that can be jointly financed by the Fund and Bank. It would lead the AfDF *indirectly* accessing to international capital markets on the terms available to the Bank operation, which currently enjoy the AAA rating.

Given the currently prevailing, historically low interest rate environments, there may be a temptation for the AfDF to go for raising funds directly from international capital market on a very limited scale on behalf of some RMCs, if prudential risk assessment would point to this possibility. However, in order to preserve the high credit standing, the Fund needs to establish first a good track record in its own operations and balance sheets. For this to materialize, it may be necessary and desirable to have the Fund's assets portfolio somewhat away from the current domination of highly concessional loans in its balance sheet. Hence, it may be some time in future before the Fund feels confident to go for debt financing of its operation, even on a limited scale. Instead, for the purpose of increasing its resource envelope, the Fund may opt for *additional* contribution from partner countries in concessional loans rather than relying solely on their grant contribution for its lending operation.

Meanwhile, the African Development Bank could back up large-scale transformational projects requiring private or other funding by providing partial credit guarantees based on its accumulated, solid country-specific knowledge and high quality technical assistance. This would allow RMCs leverage in additional funding from private sources on more favourable terms than otherwise possible. Encouraging co-financing projects with concessional loans from partner countries or other MDBs such as IDA would also allow many big investment projects to go ahead, which may prove to be impossible otherwise. It is also helpful to consider and encourage, wherever it is appropriate, a mixed financing mode combining concessional loans and equity participation from private sources through the PPP schemes, tailor-made for individual investment projects.

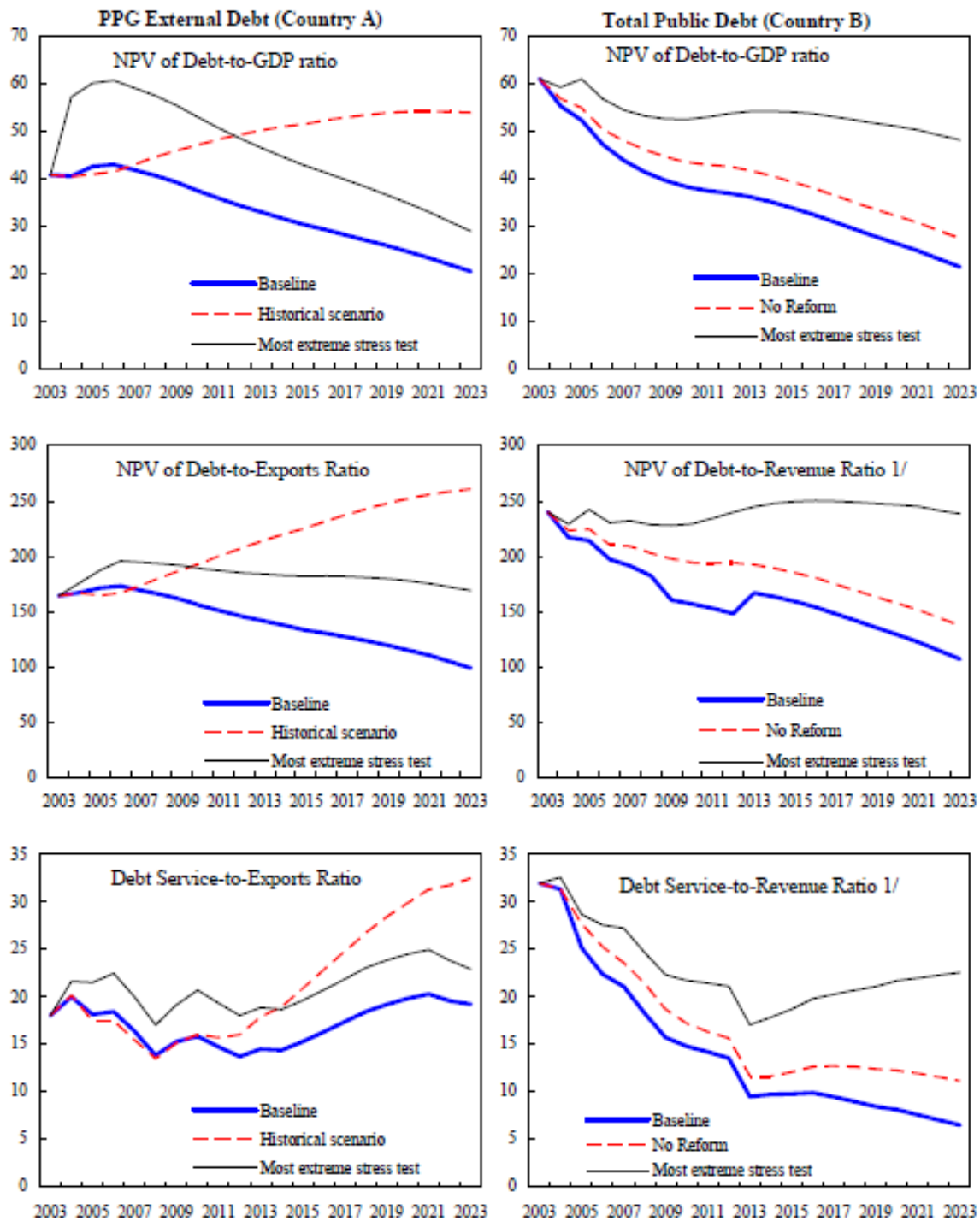
As final concluding remarks, we again highlight the importance to draw appropriate, invaluable lessons from the historical experiences of LICs to understand under which conditions debt cannot be growth-enhancing, and what should be done to avoid the repeat of the protracted debt crisis that had trapped many LICs in a low equilibrium of low growth with high debt. Key to preventing this is, first of all, the rate and efficiency of investment where loans are deployed. Therefore, a critical analysis of *what* and *how* debt is used for should be a part of debt sustainability analyses. Debt contracted by LICs can be made sustainable if concessional loans are effectively and responsibly deployed for efficient investment in projects with high social returns with a view to overcoming structural handicaps these countries currently suffer. Good appreciation of country-specific history in this regard is indeed necessary for inserting back “investment” as the critical link into analyses of the debt-growth nexus.

Second, it is important to design more efficient debt contracts so as to align better the incentives for sovereign borrowers and lenders as development partners. This would enable borrowers and lenders to forge a true partnership for engaging in the development *process* of LICs while strengthening sovereign borrowers' debt carrying capacity. Taking a long term view of economic development process, we should endeavor to create a forum for debt sustainability through participatory sovereign debt management as a way forward for making debt truly sustainable. It is up to responsible lenders and borrowers to make sure that concessional loans and debt instruments are used to facilitate actively the process of

transformation of their economic structures, while consolidating their debt servicing capacity over time. In this endeavour, the African Development Bank can assume a leading role by providing local institutions with technical assistance and expertise in project management from selection through planning to implementation as well as in structuring appropriate financial instruments, including debt contracts. The DSAs should be used in this process as one of monitoring devices, not the dominant prescriptive tool.

Appendix 1 Additional Figures and Tables

Figure A-1 Simulations of Debt-Burden Indicators under Alternative Scenarios, 2003-2023 under the DSA

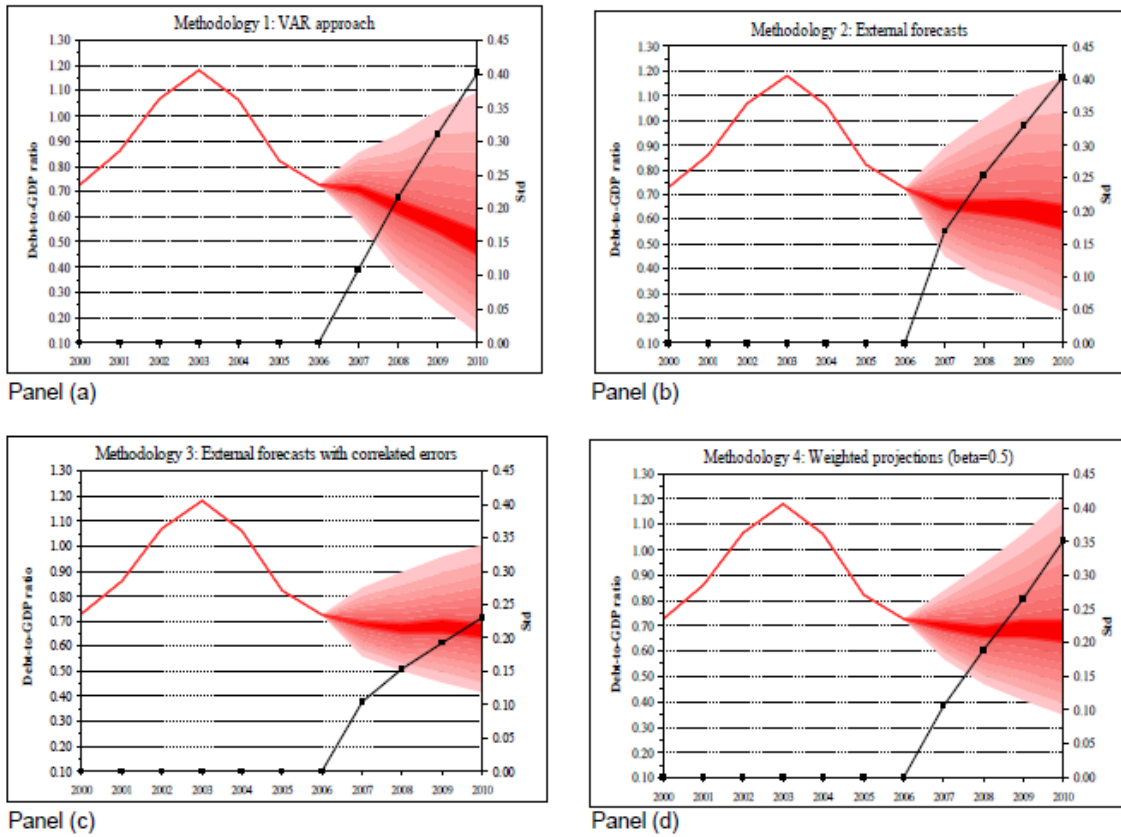


Source: Staff simulations.

1/ Revenues are defined inclusive of grants.

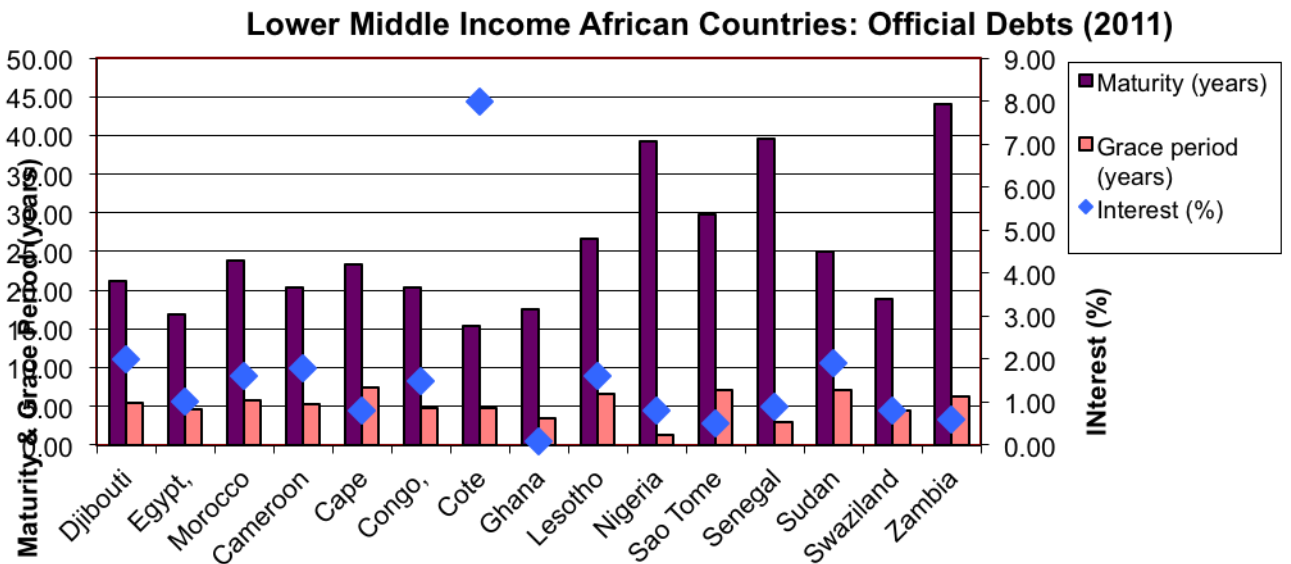
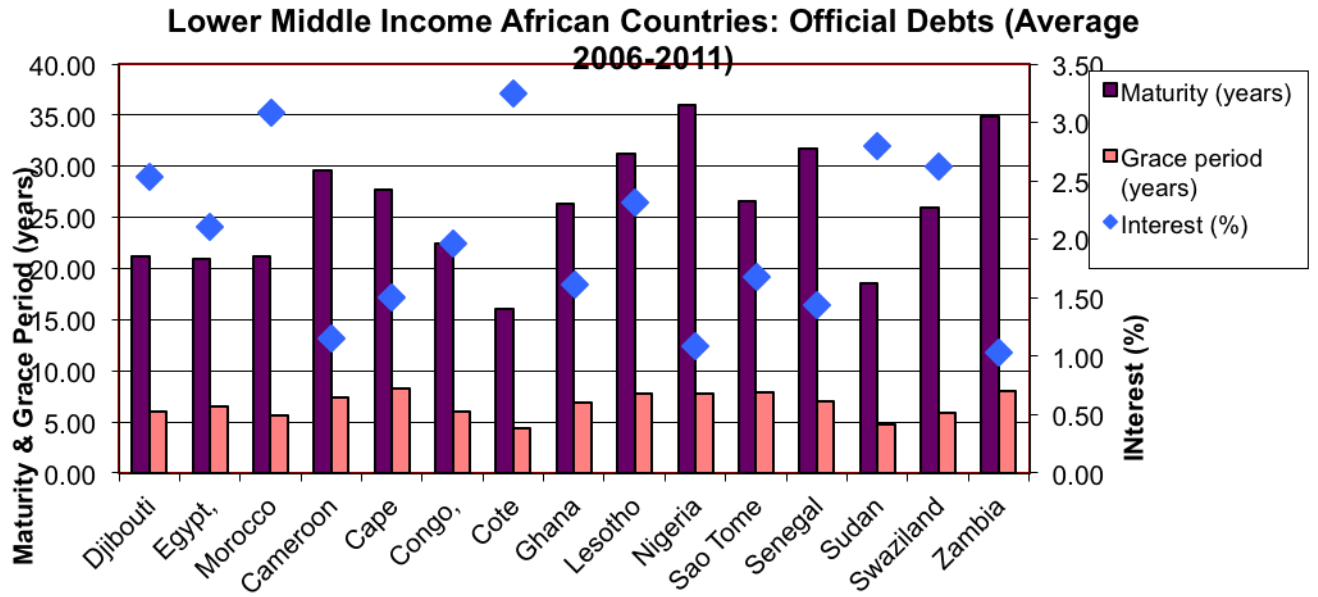
Source: Figure 4 in IMF (2004a)

Fig. A-2 Fan Charts for Uruguay Using Different Forecasting Methods



Source: Fig. 6 Arizala et.al (2008)

Fig.A-3 Terms of Public Debt and Private Debt offered to Lower Middle Income Countries



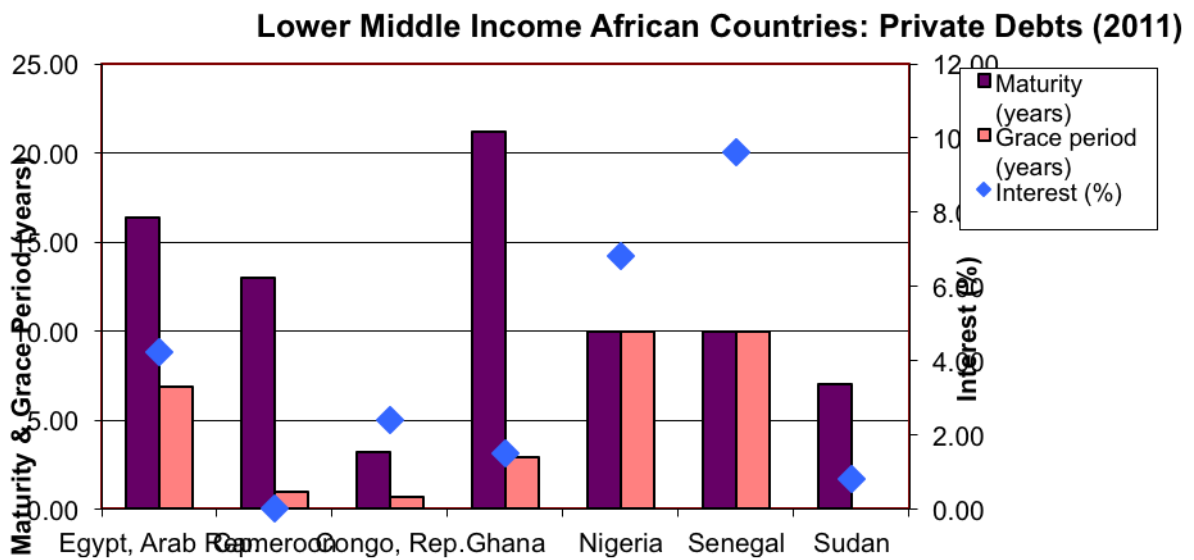
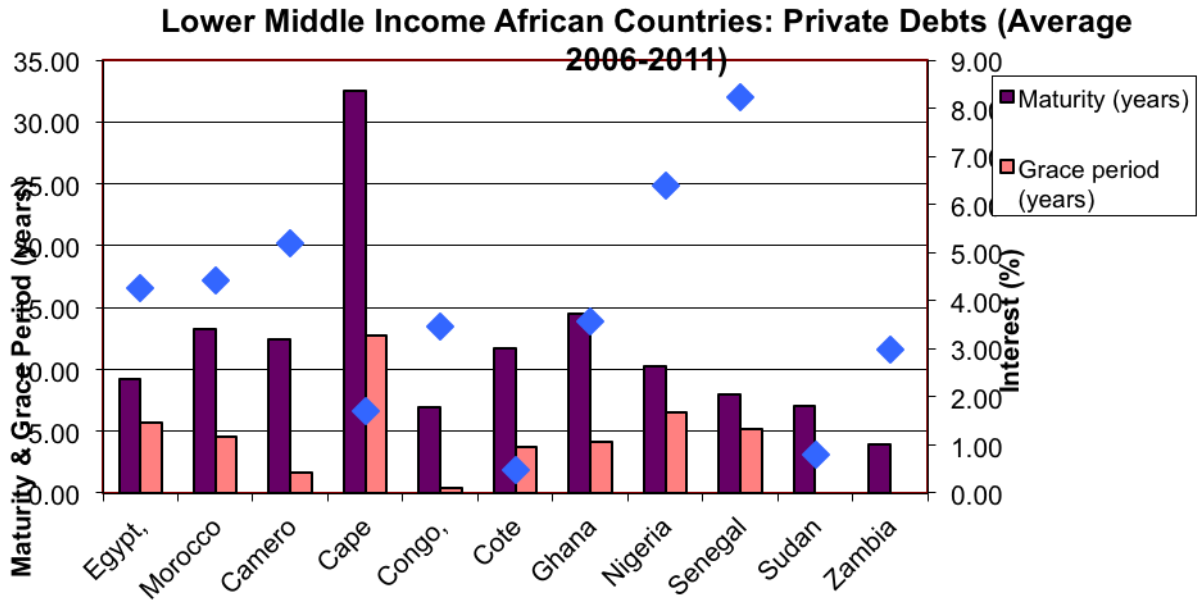


Table A-1. Summary Table of External Debts of countries in Africa 2009-2011

		Total external debt, 2011 (\$ millions)	Present value of debt, 2011 (\$ millions)	Ratio of total external debt to exports (%), 2006	Ratio of total external debt to exports (%), 2009-2011	Ratio of present value of debt to exports (%)	Ratio of total external debt to GNI (%)	Ratio of present value of debt to GNI (%)	Ratio of debt service to exports, 2006	Ratio of debt service to exports, 2011
North Africa										
Upper middle income	Algeria	6,072	3,737	9.8	9	6	4	2	22.5	0.8
	Tunisia	22,335	19,215	114.9	99	85	53	45	15.6	10.7
Lower middle income	Djibouti	767	491	165.7	173	110	63	40	7.7	8.1 1)
	Egypt, Arab Rep.	35,001	27,719	78.1	74	58	17	13	6.2	7.4
	Morocco	29,049	23,443	89.0	102	82	32	26	16.9	9.9
Sub-Saharan Africa										
Upper middle income	Angola	21,115	17,705	29.5	39	33	27	23	13.2	4.2
	Botswana	2,396	1,553	6.7	74	48	16	11	1.0	1.4 1)
	Gabon	2,879	2,398	--	35	29	24	20	--	--
	Mauritius	1,435	961	15.3	16	11	14	10	5.9	1.4
	Namibia									
	Seychelles	1,779	1,636	127.6	170	157	201	185	20.6	3.2
	South Africa	113,512	60,121	66.6	110	58	33	17	8.6	5.3
Lower middle income	Cameroon	3,074	1,638	69.9	51	27	13	7	10.1	3.5 1)
	Cape Verde	1,025	555	106.7	151	82	62	33	6.4	5.0
	Congo, Rep.	2,523	1,830	105.3	25	18	28	20	1.4	-- 2)
	Cote d'Ivoire	12,012	12,374	134.8	96	98	54	55	2.8	4.7 1)
	Ghana	11,289	8,050	71.2	106	76	35	25	5.6	2.4
	Lesotho	792	452	44.4	53	30	30	17	3.1	1.9 1)
	Nigeria	13,108	7,767	13.0	17	10	7	4	11.2	0.4
	Sao Tome and Principe	231	80	1568.5	885	306	106	37	31.5	5.4
	Senegal	4,320	3,344	77.0	131	101	33	25	7.4	-- 2)
	Sudan	21,169	23,857	309.7	193	218	37	42	5.1	4.2 1)
	Swaziland	605	510	20.4	28	23	18	15	1.7	1.9
	Zambia	4,360	1,637	56.7	61	23	30	11	3.5	2.1
	Total		Present	Ratio of	Ratio of	Ratio of	Ratio of	Ratio of	Ratio of	Ratio of

		external debt, 2011 (\$ millions)	value of debt, 2011 (\$ millions)	total external debt to exports (%), 2006	total external debt to exports (%), 2009- 2011	present value of debt to exports (%)	total external debt to GNI (%)	present value of debt to GNI (%)	debt service to exports, 2006	debt service to exports, 2011	
Low income	Benin	1,423	960	66.3	95	64	21	14	4.2	2.5	1)
	Burkina Faso	2,420	1,736	155.4	231	166	27	19	6.1	2.5	1)
	Burundi	628	306	1404.0	346	169	30	15	19.6	3.4	
	Central African Republic	573	221	--	251	97	28	11	--	--	
	Chad	1,821	2,219	--	46	56	24	29	--	--	
	Comoros	278	189	448.4	322	219	50	34	5.9	--	2)
	Congo, Dem. Rep.	5,448	4,530	359.9	67	56	44	37	9.2	2.4	
	Eritrea	1,055	600	--	565	321	49	28	--	--	
	Ethiopia	8,597	4,445	101.8	185	96	28	14	6.2	6.1	
	Gambia, The	466	242	349.3	155	81	46	24	14.8	7.5	
	Guinea	3,139	1,932	284.9	223	137	74	45	13.6	11.2	
	Guinea-Bissau	284	132	1345.2	163	76	32	15	12.6	--	2)
	Kenya	10,258	7,052	110.5	114	79	32	22	7.1	4.2	
	Liberia	448	122	822.8	83	23	52	14	0.4	1.4	1)
	Madagascar	2,769	1,771	89.5	148	95	31	20	3.6	2.1	
	Malawi	1,202	751	109.1	86	54	24	15	8.9	1.3	
	Mali	2,931	1,793	83.6	118	72	32	19	4.4	2.5	1)
	Mauritania	2,709	2,479	103.8	115	105	78	71	5.8	3.6	
	Mozambique	4,097	2,240	95.4	127	69	39	21	1.6	1.6	
	Niger	1,408	1,630	127.3	113	131	26	30	26.7	--	2)
	Rwanda	1,103	790	143.3	170	122	19	14	8.8	2.4	1)
	Sierra Leone	1,049	369	476.5	232	82	53	19	7.8	3.8	
	Somalia	3,050	3,469	--	--	--	--	--	--	--	
	Tanzania	10,044	6,062	116.2	155	93	45	27	2.5	2.0	
	Togo	643	507	204.2	51	40	20	15	3.1	--	2)
	Uganda	3,858	1,930	71.5	106	53	24	12	5.6	1.7	
	Zimbabwe	6,275	5,158	--	187	153	83	68	--	--	

Sources: World Bank, International Debt Statistics, 2013. 1) Data for the ratio of debt service to exports under 2011 is for 2010. 2) No data available for the ratio of debt service to exports for 2011 or 2010

Appendix 2 Technical notes on the formulae used to generate debt dynamics in the DSA

For generating external debt dynamics, DSA uses the following formulae (Barkbu et al. 2008):

$$D_t = (1+i_t) D_{t-1} + TD_t - TR_t - FDI_t + \Delta R_t \quad (1)$$

- where D_t = nominal debt stock at the end of the period t ,
 i_t = average effective interest rate in period t (= interest payments in period t divided by the debt stock in the previous period);
 TD_t = deficit in the trade and services account;
 TR_t = sum of official grants and current transfers;
 FDI_t = Net non-debt-creating capital inflows; and
 ΔR_t = Change in official reserves and other foreign assets.

Since debt is provided in concessional terms and grant elements (GE_t) is defined as

$$GE_t = \frac{(D_t - PV_t)}{D_t} \quad \text{thus} \quad D_t = \frac{PV_t}{(1 - GE_t)}$$

Where the present value of debt is denoted by PV..

Now, substituting for D_t and further introduce X_t and ε_t for the dollar value of exports in period t and the growth rate of exports respectively, then the Equation (1) can be expressed as:

$$\frac{PV_t}{X_t} = \frac{(1+i_t)}{(1+\varepsilon_t)} \times \frac{PV_{t-1}}{X_{t-1}} \frac{(1-GE_t)}{(1-GE_{t-1})} + \frac{(1-GE_t)}{X_t} \times (TD_t - TR_t - FDI_t + \Delta R_t)$$

Now, assuming the grant element remains unchanged ($GE_t = GE_{t-1}$) and ε_t^2 is very small, close to zero if $\varepsilon_t \ll 1$, then we obtain the following equation, which expresses a debt burden as a ratio of the present value of debt stock to exports

$$\frac{PV_t}{X_t} - \frac{PV_{t-1}}{X_{t-1}} = \frac{(i_t - \varepsilon_t)}{(1+\varepsilon_t)} \frac{PV_{t-1}}{X_{t-1}} + \frac{(1-GE_t)}{X_t} \times (TD_t - TR_t - FDI_t + \Delta R_t) \quad (2)$$

For generating public debt dynamics, DSA uses the following formulae:

$$B_t = PE_t + i_t D_t - T_t \quad (3)$$

Where B_t , PE_t , $i_t D_t$ and T_t are new public borrowing, public expenditure, interest payments on the outstanding stock of debt and tax revenue respectively. If fiscal sustainability is defined as a path to keep new borrowing to be kept to the following condition;

$$B_t = D_t y_t \quad \text{where } y_t \text{ is the growth rate of nominal GDP.}$$

Then the long run budget constraint is:

$$D_t y_t = PE_t - T_t + i_t D_t \quad \text{or} \quad (i_t - y_t) D_t = T_t - PE_t$$

Using real interest rate (r_t) and real growth rate (g_t), it can be expressed as:

$$(r_t - g_t) D_t = T_t - PE$$

Then, the change in public debt to GDP (d_t) is:

$$\Delta d_t = \frac{\text{primary defecit}_t}{GDP_t} + (r_t - g_t) d_t \quad (4)$$

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