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**A REVIEW OF SOME ASPECTS OF THE LOW-INCOME COUNTRY
DEBT SUSTAINABILITY FRAMEWORK**

Attached for the October 5, 2009, Development Committee Meeting is a report entitled "A Review of Some Aspects of the Low-Income Country Debt Sustainability Framework", prepared by the staff of the World Bank and the International Monetary Fund.

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WORLD BANK
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A Review of Some Aspects of the Low-Income Country Debt Sustainability Framework

Prepared by the Staffs of the World Bank and of the International Monetary Fund

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ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
AsDB	Asian Development Bank
CIRR	Commercial Interest Reference Rate
CPIA	Country Policy and Institutional Assessment
DRC	The Democratic Republic of the Congo
DSA	Debt Sustainability Analysis
DSF	Debt Sustainability Framework
DSGE	Dynamic Stochastic General Equilibrium
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
FDI	Foreign Direct Investment
HIPC	Heavily Indebted Poor Country
GDP	Gross Domestic Product
IDA	International Development Association
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
IMFC	International Monetary and Financial Committee
LIC	Low-Income Country
MDRI	Multilateral Debt Relief Initiative
MTDS	Medium-Term Debt Management Strategy
NCBP	Nonconcessional Borrowing Policy
PEFA	Public Expenditure and Financial Accountability
PPG	Public and Publicly Guaranteed
PRGF	Poverty Reduction and Growth Facility
PV	Present Value
SOE	State-owned Enterprises
TFP	Total Factor Productivity
WAEMU	West African Economic and Monetary Union
WDI	World Development Indicators
WEO	World Economic Outlook

Executive Summary

The Bank-Fund Debt Sustainability Framework (DSF) is a standardized framework for analyzing debt-related vulnerabilities in low-income countries (LICs). It aims to help countries monitor their debt burden and take early preventive action, to provide guidance to creditors in ensuring their lending decisions are consistent with countries' development goals, and to improve the Bank and Fund's assessments and policy advice. The DSF was last reviewed in 2006, and a reconsideration of some aspects of the framework is timely.

As requested by the International Monetary and Finance Committee (IMFC) and called for by the G-20, the paper focuses on options to enhance the flexibility of the DSF. In doing so, it seeks to address concerns that the DSF has unduly constrained the ability of LICs to finance their development goals and, in light of the current crisis, that the DSF may be too procyclical.

Building on current features of the DSF that provide for flexibility, such as its 20-year framework and the requirement to exercise judgment in assigning debt distress ratings, and considering also the existing flexibility in the Fund and Bank policies on nonconcessional borrowing, the following broad analytical and operational issues deserve further consideration:

- ***Recognizing adequately the impact of public investment on growth.*** This is important to ensure that Debt Sustainability Analyses (DSAs) do not lead to excessively conservative borrowing policies. The paper suggests continuing a multi-pronged approach to improve growth analyses underpinning DSAs. Specifically, it calls for current Fund and Bank research on the investment-growth nexus to be made operational and incorporated in DSAs as much as possible.
- ***The role of remittances.*** Remittances have become an increasingly important source of external financing in LICs, which makes a strong case for incorporating them more formally into the DSF. However, given serious data limitations, it does not seem possible to re-estimate DSF thresholds for the universe of LICs. Instead, staffs recommend greater recognition of remittances in DSAs for countries where they are large, including in the determination of risk ratings.
- ***Addressing “threshold effects”.*** Small fluctuations of countries' CPIA scores may translate into large changes in debt distress thresholds and ratings. The paper considers two options to reduce these threshold effects: one that increases the inertia of changes in applicable debt thresholds following changes in countries' CPIA scores, and another that adds granularity to the DSF thresholds. Staff recommend the first option, which addresses threshold effect problems for all countries.
- ***Rule governing changes of the discount rate.*** The application of this rule dictates a lowering of the discount rate from 5 to 4 percent now. The paper finds the rule to still be

appropriate and the impact of a reduction in the discount rate on members' present value (PV) of debt to be relatively small.

- ***Treatment of the external debt of state-owned enterprises (SOEs).*** The paper considers applying greater flexibility as regards the inclusion of SOEs' external debt in DSAs. It recommends that such debt be excluded from public and publicly guaranteed external debt when the SOE can borrow without a public guarantee and its operations pose a limited fiscal risk for the government.
- ***On the content of DSAs,*** the paper proposes that the authorities' views be better represented in DSA documents. It also suggests streamlining DSAs in the absence of major changes in the debt sustainability outlook or in Bank-Fund operational requirements.

I. INTRODUCTION¹

1. **Use of the Debt Sustainability Framework (DSF—Box 1) over the past four years has increased significantly.** It forms the basis for all Bank-Fund analyses on debt vulnerabilities and advice on lending and borrowing in low-income countries (LICs). Thanks to extensive outreach efforts to raise awareness and encourage creditors to act in broad accordance with the DSF, many official creditors are gearing their lending practices to risk assessments under the DSF.² In parallel, significant efforts have been made by the Bank and the Fund to train LIC officials to use the DSF, and feedback on the instrument has generally been positive.

2. **The DSF was last reviewed in 2006, and a reconsideration of some aspects of the framework is timely.** At previous Board discussions of the DSF, Directors asked the staffs to review the framework periodically, based on the experience gained during its implementation. More recently, the G-20 and the IMFC called on the staffs to review the DSF to determine if some aspects could be made more flexible. Questions have been raised as to whether the DSF has unduly constrained the ability of LICs to finance their development goals.³ The current crisis has also highlighted concerns that the DSF may be “procyclical”, inasmuch as a deterioration in macroeconomic conditions leads to escalating debt ratios, “risk of debt distress” rating downgrades, and consequently, tighter borrowing limits at a time when financing needs are on the rise.

3. **Underlying these concerns are two related but distinct sets of issues.** The first has to do with the effectiveness of the DSF, as an analytical tool, in capturing countries’ debt vulnerabilities. The issues here are essentially technical in nature, and are the primary focus of this paper. Separate from this is the question of how the results of country-specific debt sustainability analyses (DSAs), based on the DSF, are used in the context of the lending policies of the Bank and the Fund. This topic is also touched on in the paper. One of the critical issues in this regard—namely, the design of limits on nonconcessional borrowing in

¹ This paper was produced by a team consisting of Boris Gamarra, Naoko Kojo and Mona Prasad (all World Bank), Era Dabla-Norris, Claire Gicquel, Douglas Hostland, Marie-Hélène Le Manchec, Shannon Mockler, Perry Perone and Felipe Zanna (all IMF), and supervised by Leonardo Hernandez (World Bank) and Bhaswar Mukhopadhyay (IMF). Carlos Braga (World Bank), Dominique Desruelle and Hervé Joly (both IMF) provided overall guidance.

² These include the International Development Association (IDA), the Inter-American Development Bank (IaDB), the African Development Bank (AfDB), the Asian Development Bank (AsDB), the European Bank for Reconstruction and Development (EBRD), European Investment Bank (EIB), and the International Fund for Agricultural Development (IFAD).

³ See for instance the “Nouakchott Declaration on the Financing for Development in Africa: The role of nontraditional donors”, August 1, 2008, Nouakchott, Mauritania.

Fund-supported programs—is discussed more fully in a related paper produced by Fund staff.⁴

4. **The DSF in its present form, and in its interaction with the lending policies of the Bank and the Fund, already provides for significant flexibility.** Section II addresses the criticism of procyclicality, arguing that the DSF’s inter-temporal framework, and the requirement to exercise judgment in assigning risk ratings, are important safeguards against mechanical downgrades of risk ratings in the face of temporary shocks. Section III points to existing flexibility in policies on nonconcessional borrowing; flexibility will be further enhanced at the Fund if the proposed reform of the debt limits policy is approved.

5. **Nonetheless, in the context of the DSF, several broad analytical and operational issues deserve further consideration to determine if modifications may enhance members’ scope to borrow.**

- ***How can DSAs better reflect the impact of public investment on growth?*** If this is not sufficiently recognized, as some argue, DSAs may lead to excessively conservative borrowing policies. The issue of the public investment-growth nexus, which goes well beyond the DSF, and how it is addressed by staffs in DSAs is discussed in Section IV.
- ***Should remittances be taken into account more systematically in DSAs?*** In recent years, remittances have emerged as a sizable and stable balance of payments inflow for a number of countries. However, they are not explicitly considered in the empirical model underlying the DSF. This issue is discussed in Section V.
- ***How can “threshold effects” in the DSF be reduced?*** A parsimonious set of indicative policy-dependent thresholds is a practical solution to the need to have a manageable framework, while still distinguishing between countries’ ability to manage debt burdens. However, with the present set of thresholds small changes in the CPIA score may entail large changes in their applicable threshold levels for some countries, with possible implications for ratings. This issue is discussed in Section VI.
- ***Is the rule governing changes of the discount rate still appropriate?*** Mechanical application of this rule would lead to a lowering of the discount rate from 5 to 4 percent now, with potential implications for debt burden indicators in DSAs at a time when many LICs are facing adverse macroeconomic shocks. The discussion in Section VII assesses whether this implication of the rule is a problem and if greater flexibility may be desirable.
- ***Should the external debt of certain state-owned enterprise (SOEs) be excluded from DSAs to derive the risk rating?*** This issue is discussed in Section VIII.

⁴ See IMF (2009b) *Debt Limits in Fund Supported Programs: Proposed New Guidelines*.

6. **The paper also discusses the content of DSAs.** Section IX proposes that the authorities' views be better represented in DSA documents. It also suggests streamlining DSA requirements where appropriate.

II. FLEXIBILITY INHERENT IN THE DEBT SUSTAINABILITY FRAMEWORK

7. **An important source of flexibility that is already present in the DSF is the need to exercise judgment in assigning the rating.** The guidance note on applying the DSF⁵ explains how the determination of a risk rating should be informed by the comparison of a country's current and projected external public debt burden indicators with the thresholds under the baseline, together with alternative scenarios, and stress tests (Box 1). However, the note also states that "the assessment of the risk of debt distress needs to strike a balance between a mechanistic use of this classification and a judgmental approach. There may be cases where staff judge that a mechanistic approach would imply an unreasonable rating. These could include, for instance, a marginal and temporary breach of thresholds, or an ability to pay that is not captured in the templates but evidenced from the level of foreign exchange reserves; or problems in compiling the relevant CPIA scores." In practice, flexibility along these lines has indeed been exercised on a number of occasions (see Box 2 for some recent examples).

8. **Some of the DSF's features also ensure that ratings are not excessively affected by short-term macroeconomic fluctuations,** addressing the concern about its possible procyclicality and impact on LIC financing.

- The DSF has a dynamic approach to debt sustainability assessments. As noted in Box 1 above, such assessments, and more generally risk ratings, are not based only on current debt ratios, but on 20-year projections, both in the baseline scenario and in alternative scenarios.
- Thus, a temporary negative shock to exports and revenues is likely to have a limited impact on the debt sustainability assessment. As indicated above, a temporary and minor breach of an indicative DSF threshold would not automatically lead to a downgrade of the rating.
- If the shock is expected to be permanent, the DSA will in all likelihood (and appropriately) point to the need for adjustment, and/or for donors to increase their concessional assistance.

⁵ IMF (2008b, SM/08/317), IDA (2008, IDA/SecM2008-0441)

Box 1. Debt Sustainability Framework for Low-Income Countries

The DSF, a standardized framework for analyzing debt-related vulnerabilities, was introduced in 2005 and reviewed in 2006.

The main objectives of the DSF are to:

- Monitor the evolution of a country's debt burden indicators, help detect potential crises early, and allow preventive actions to be taken;
- Provide guidance to ensure that creditors' decisions to lend and allocate grants to LICs are consistent with progress towards their development goals and long-term debt sustainability;
- Guide the borrowing decisions of LICs to match their financing needs with their ability to repay; and
- Improve World Bank and International Monetary Fund (IMF) assessments and policy advice in these areas.

How the DSF works

The DSF consists of a set of indicative policy-dependent thresholds against which baseline scenario projections of external debt burden indicators over the next 20 years are compared in order to assess the risk of debt distress. Vulnerability to external and policy shocks are explored in alternative scenarios and standardized stress tests. The indicative threshold for each debt burden indicator is graduated based on each country's policy and institutional capacity measured by three year moving averages of the World Bank's Country Policy and Institutional Assessment (CPIA) scores. The specific thresholds are as follows:

Debt Sustainability Framework Indicative Policy-Dependent Thresholds

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

Based on the assessment, one of four possible risk of debt distress ratings are assigned.

- *Low risk:* When all the debt burden indicators are well below the thresholds.
- *Moderate risk:* When 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:* When one or more debt burden indicators breach the thresholds on a protracted basis under the baseline scenario
- *Debt distress:* When the country is already experiencing difficulties in servicing its debt, as indicated perhaps by the existence of arrears (irrespective of capacity to repay based on a forward looking DSA).

A public sector DSA is also routinely undertaken, although it is not formally linked to the risk ratings.

What is the CPIA?

The CPIA is an index of 16 indicators grouped into 4 broad categories: (1) economic management; (2) structural policies; (3) policies for social inclusion and equity; and (4) public sector management and institutions. Countries are rated on their current status in each of these performance criteria, with scores from 1 (lowest) to 6 (highest). The index is updated annually.

- In countries highly dependent on commodity exports, it is common practice for DSAs to include alternative scenarios with lower prices when such prices are high, as was the case in 2008. This practice leads to more nuanced (and less cyclical) assessments than one based just on current prices and projections.⁶

9. **More generally, the objective of the DSF is not to constrain new financing, but to provide an assessment of whether financing plans are consistent with debt sustainability.** In particular, if an expansionary fiscal policy is required to mitigate the impact of the current crisis, the DSF should signal whether borrowers and donors need to seek an improvement in the terms of financing (e.g., get/provide more grants), rather than curtailing the volumes.

Box 2. Examples of the Use of the Flexibility Inherent in the DSF

- *Mongolia (2009)*: A rating of low risk of debt distress was retained despite the PV of debt-to-GDP ratio breaching the threshold under stress tests. The increase in debt levels was judged to be on account of one-off borrowing to recover from a major terms of trade shock, and the debt outlook was expected to recover subsequently, warranting the exercise of flexibility.
- *Madagascar (2008)*: The PV of debt-to-exports ratio breached its threshold under one of the stress tests, demonstrating Madagascar's vulnerability to export shocks associated with its concentration of exports in textiles and mining products. Nevertheless, a low risk of debt distress rating was retained. The justification emphasized the ongoing structural reforms underpinning the favorable baseline scenario (debt indicators well below their thresholds) and the expected growth dividend from two large mining projects (see Annex 1).
- *Mali (2008)*: The PV of debt-to-GDP ratio breached the indicative threshold in the outer years when subjected to a one-time 30 percent depreciation of the currency. But as there were important factors that mitigated this risk—Mali is a part of the West African Economic and Monetary Union (WAEMU) zone and studies indicated that misalignment of exchange rates was modest, and because the breach occurred at the end of the projection period, providing ample time for policy reactions—a low risk of debt distress rating was retained.
- *Bhutan (2007)*: The incorporation of two new largely debt financed hydropower projects in the baseline scenario caused some external debt indicators to breach their thresholds in both the baseline and the alternative scenarios/stress tests. On this basis, Bhutan could have been classified as a high risk country. However, on account of several country-specific mitigating factors—including the near absence of commercial risk of the projects and Bhutan's high level of reserves in relation to external indebtedness—a moderate risk of debt distress rating was retained.

⁶ Examples include the DSAs for Niger (2008) and Nigeria (2008) which consider the impact of lower oil prices, and the DSA for Mongolia (2009) which assesses the possible effect of lower copper prices.

III. FLEXIBILITY OF THE NONCONCESSIONAL BORROWING POLICIES OF THE BANK AND THE FUND

10. The DSF interacts differently with the nonconcessional borrowing policies of the Bank and the Fund.

- At the Bank, the risk rating assigned in DSAs based on the DSF determines the grant/loan mix in IDA allocations.⁷ IDA-only countries judged to be in debt distress or at high risk of debt distress receive 100 percent grant financing from IDA; countries at moderate risk receive a 50/50 blend of grants and IDA credits; while countries at low risk receive 100 percent IDA credit financing. Moreover (as described below), all countries that are recipients of IDA grants, and/or recipients of debt relief under the Multilateral Debt Relief Initiative (MDRI), come under the purview of the Bank's Nonconcessional Borrowing Policy (NCBP).⁸
- At the Fund, there is no formal link in the current policy between the risk ratings and external debt limits (including concessionality requirements). However, DSAs do inform the specific debt limits applicable in each program.

11. **Although Fund-supported programs in LICs share the same overall design for external debt limits, these limits have been applied with a degree of flexibility.**⁹ Debt limits have tended to be tighter in countries with higher debt vulnerabilities, and conversely looser than usual when the situation warranted it.¹⁰ For instance, about a third of programs in LICs include a nonzero limit on nonconcessional borrowing, generally: (i) to finance critical large-scale projects, mostly infrastructure, for which concessional resources were not available; or (ii) to support, in a few cases, a gradual shift from concessional to market-based finance. Waivers have also been provided in a number of cases.

12. **The Fund's debt limits policy is under review with a view to enhancing its flexibility.** The main proposal is to move away from a single design for concessionality requirements toward a menu of options. This approach would reflect better the diversity of situations in LICs, in particular with regard to the extent of debt vulnerabilities and macroeconomic and public financial management capacity. For all countries other than the

⁷ However, in cases where there is a major change in a country's economic outlook that has not been reflected in the last DSA, IDA's grant-loan allocation decisions is not based on the joint Bank-Fund DSA, but on an update.

⁸ This policy does not apply to IDA-blend or gap countries even if they are grant-eligible or MDRI recipients.

⁹ The standard practice has generally been to not allow nonconcessional external borrowing while not restricting concessional borrowing. The standard concessionality requirement in programs has been a grant element of at least 35 percent.

¹⁰ See IMF (2009a, SM/09/56).

most vulnerable (i.e. with high debt vulnerabilities and lower management capacity), the proposed new framework would provide room to pursue more flexible borrowing strategies.

13. **IDA's NCBP offers the same flexibility as current Fund policy (Box 3).** IDA's concessionality requirements are basically the same as the Fund's where there is a Fund-supported program. Elsewhere, the NCBP requires a minimum 35 percent grant element. Waivers can be granted in cases that have a strong economic justification and where debt sustainability is not at risk based on country and loan-specific factors.¹¹ Last year, IDA also introduced further flexibility, such as the possibility to consider requests for ex-ante approval of nonconcessional borrowing, and the possibility to consider a financing package as one single loan for concessionality calculation purposes, provided the elements of the package are sufficiently integrated—a form of flexibility also available under current Fund policy.

¹¹ Country-specific factors include overall borrowing plans of the country, the impact of the additional borrowing on the macroeconomic framework, the effect on the risk of debt distress, and the strength of the country policies and institutions. Loan-specific factors include the development content of the loan, expected rates of return, the equity stake of the lender, whether there are additional costs, and the concessionality of the financing package as a whole. Other considerations include the magnitude of the breach, the size of the nonconcessional loan relative to the country's IDA allocation, the incidence of previous violations, and whether the information on non-concessional borrowing was provided by the country ex-ante or discovered ex-post. In practice, IDA has responded to breaches of the minimum concessionality requirement using a case-by-case approach.

Box 3. IDA's Nonconcessional Borrowing Policy (NCBP): Country examples

IDA's non-concessional external borrowing has been implemented on a case-by-case basis, in a flexible manner, as the country examples below illustrate.¹

- In 2007, *Mali's* non-concessional external financing agreement with the Islamic Development Bank was granted a waiver from the NCBP on the basis of: (i) an urgent need for additional electricity generation capacity; (ii) high expected economic and financial rates of return of the project; (iii) Mali's strong policies and institutions; (iv) the small size of the loan (equivalent to about 1 percent of Mali's 2007 GNI); and (v) the minimal impact on debt sustainability.
- In 2008, *Rwanda* financed an energy project with a loan that had a grant element of 40 percent, below the minimum threshold of 50 percent specified in its PRGF program. Rwanda was granted a waiver on the grounds that: (i) the project provided significant development benefits; (ii) more concessional financing was unavailable; and (iii) the minimal impact on debt sustainability.
- In 2008, *Senegal* borrowed about US\$160 million (1.4 percent of GDP) on commercial terms from the Government of France to finance the clearing of outstanding arrears with domestic suppliers. Senegal was granted a waiver from the NCBP on the basis of a simultaneous occurrence of the following: (i) the significant macroeconomic benefits associated with restoring the credibility of the State and strengthening private sector balance sheets; (ii) the IMF Board's, and other donors' endorsement of the government arrears clearance program and its financing; (iii) the limited scope for alternative financing in the deteriorating global context; (iv) the modest impact of the non-concessional loan on the debt sustainability situation; and (v) the strength of policies and institutions in Senegal and Senegal's commitment to sound debt management.
- In 2008, the *Democratic Republic of Congo* (DRC) borrowed €55 million (less than 1 percent of GDP) from the European Investment Bank (EIB) with a grant element of 28 percent. This loan formed a part of an integrated financing package for two projects for which IDA was a co-financier. In this case, the DRC was granted a waiver from the NCBP requirements on the basis of three factors: (i) the package satisfied all the criteria of being "integrated" in terms of purpose, disbursement schedules and other parameters; (ii) the weighted grant element of the package exceeded 35 percent; and (iii) the IMF also considered the package to be integrated under its rules.

¹ On two occasions, in response to countries' increased market access IDA also hardened its terms—in Ghana, the maturity of IDA financing was lowered from 40 to 35 years, and in Angola, it was lowered from 40 to 20 years.

IV. THE PUBLIC INVESTMENT AND GROWTH NEXUS

14. **Some observers have raised the concern that DSAs do not take sufficiently into account the impact of debt-financed investment on growth.**¹² It is argued that a scaling up of public investment may have a different fiscal impact depending on the time horizon. Borrowing to finance productive public investment increases fiscal deficits and debt burden ratios in the short run. Over the long term, however, productive public investment can pay

¹² See, for instance, Commission on Growth and Development (2008).

for itself and generate future fiscal benefits, resulting in declining debt ratios (Box 4).¹³ Failure to recognize the asset-creating nature of investment and the inter-temporal tradeoffs involved could create an anti-investment bias.¹⁴

Box 4. Asset-Creating Nature of Debt-Financed Public Investment

Proponents of scaling-up public investment in LICs argue that fiscal and debt assessments do not sufficiently take into account the assets and the future income that public investment may generate. Public investment can yield both direct and indirect returns that the government can capture. The direct financial returns relate to the government's capacity to capture revenues from investment through user fees (e.g. utilities and transport projects). Public investment could also generate indirect financial returns if investment projects increase growth and future tax collection by contributing to the expansion of tax bases. Increased public spending for projects that have high social returns but do not generate financial returns (for instance to halt environmental degradation, support better governance or judicial systems, and improve health and education outcomes) would act indirectly by increasing long-term growth prospects. As long as public investment is productive, and borrowing to finance public investment can pay for itself over the long run, debt-to-GDP ratios will decline.

The growth dividend from additional debt-financed investment depends on a number of factors:

- *Quality of public investment.* The link between public investment and capital accumulation can be tenuous if investment involves significant waste or inefficiencies. In the absence of appropriate screening, monitoring, and evaluating mechanisms for investment projects, governments may incur large borrowing costs to finance investments with low rates of financial, and even social returns.
- *Composition of public expenditures.* On occasion public funds could have higher *social* rates of return in uses other than infrastructure investment. For instance, some investment projects could serve social objectives which yield growth dividends with a considerable lag.
- *Crowding-in effect of public investment.* If public and private investment are complements, productive public investment can raise the marginal productivity of private capital thereby encouraging additional private investment. However, the private sector response also depends on the broader business environment within a country.
- *Initial endowment of public capital.* The marginal productivity of additional investment is likely to be highest in countries where the initial endowment of public capital is low (relative to other productive assets). While low-income countries are generally capital scarce, the marginal productivity of investment may not necessarily be high due to weaknesses in the institutional and policy framework.
- *Government's ability to realize the fiscal dividends of growth.* If the country's tax system and its administration are deficient, and thus the output elasticity of fiscal revenue is low, then even investment projects with a potentially high growth impact may weaken public finances. This, in turn, could have adverse consequences for macroeconomic stability and growth.

¹³ This critique has generally been applied to excessive reliance on short-term deficits and gross debt indicators when assessing fiscal and macroeconomic stability.

¹⁴ On the asset-creating nature of investment and anti-growth bias, see Collier (2007), Easterly et al. (2008) and Serven (2007), among others. See also IMF (2004b)

15. **Policy recommendations based on the DSF need to be based on realistic investment and growth projections.** The DSF, with its explicit inter-temporal framework, is well-designed to consider the trade-offs between short and long-term horizons. Yet, it is important to ensure that the impact on growth of a scaling-up of public investment is properly accounted for, to avoid squeezing the fiscal space for public investment. While some observers have suggested that growth projections in DSAs are too conservative, suitably long data series do not exist to systematically evaluate this criticism (Box 5).¹⁵

Box 5. Assessing IMF Growth Projections in Countries with High Levels of Public Investment

The analysis below is based on data from the World Economic Outlook (WEO) database, which includes medium-term growth projections and public investment only from 2003. Existing records of DSAs which include long-term growth projections are not available prior to 2005.

Descriptive analysis provides little evidence that Fund staff has tended to underpredict growth in countries with high levels of public investment. The April 2003 WEO projections predicted that developing countries and emerging markets with high public investment as a ratio to GDP (the top quartile) would grow at an average annual rate of 3.0 percent in 2004-08, which turned out to be half of a percentage point below the actual outcome (Table). The April 2003 WEO projections underpredicted growth in countries with low levels of public investment (the bottom quartile) by a greater margin (two percentage points).

Table: WEO Projections of Investment and Growth in LICs and Emerging Economies

	Public investment¹ / GDP				Real GDP growth per unit of investment			
	<i>Projected</i>		<i>Actual</i>		<i>Projected</i>		<i>Actual</i>	
	2003	2004-08	2003	2004-08	2003	2004-08	2003	2004-08
<i>Top quartile</i>								
Mean	12.2	12.0	10.1	10.3	1.7	3.0	2.9	3.5
Median	12.2	11.1	9.5	9.6	2.1	3.1	2.8	3.4
<i>Bottom quartile</i>								
Mean	3.1	2.9	3.7	4.5	2.4	3.1	4.1	5.1
Median	3.0	2.9	3.4	3.9	2.0	2.9	3.3	5.0

Source: April 2003 and April 2009 WEO databases

¹ Gross public capital formation as percent of GDP in current prices.

Regression analysis indicate that staff projections slightly underpredict growth in countries where public investment was expected to increase. Estimates from cross-country regressions indicate that the forecast errors (actual minus projected values of real GDP growth over the period 2004-08) are not correlated with the level of public investment, but with the expected change in public investment between 2003 (the year when the projection was made) and 2004-08 (the average level projected over the medium term). The estimate implies that the medium-term growth rate projection for a developing country where public investment is expected to increase by 1.6 percentage points (the cross-sectional standard deviation) should be increased by 0.6 percentage points. Such a revision is small relative to the large variation in medium-term growth projections across countries—the April 2003 WEO projections had a cross-sectional standard deviation of 4.1 percentage points.

¹⁵ It should be noted that some critics also argue that growth projections are on average too optimistic.

16. **The staffs have recognized the importance of understanding better the public investment-growth nexus, and this issue was discussed in detail by the Executive Boards in 2006.** The paper supporting the discussion highlighted the complexity of the relationship between public investment and growth and pointed to the following considerations.¹⁶

- In the right environment, the returns on public investment could be high. However, whether particular investments were successful depended on the quality of the investment, the economic environment (including susceptibility to shocks) and the institutional and policy framework. Moreover, the time period for the payoff of investments varied with the nature of the investment.
- Successful implementation of public investment programs depended on the presence of complementary factors, including skilled labor and managerial capacity. Hence, such programs needed to be conceived in a broader environment that would also ensure that complementary inputs would be available throughout the life of the program.
- Macroeconomic absorptive capacity could also affect the marginal productivity of additional investment. Adverse effects could be related to Dutch disease or, in the presence of scarce external financing resources, crowding out. However, the right investments could also lead to crowding in by exploiting the complementarities between private and public capital.

17. **Noting the multiplicity of channels at play and the ambiguous empirical evidence at the time, Directors recommended a country-specific approach.** To guide the country-specific analyses, a list of indicators was suggested, subject to relevance and availability. This list includes indicators on the projected rates of return, structural and macroeconomic constraints, as well as aggregate trends in growth rates of per capita GDP and total factor productivity (TFP). No quantitative benchmarks were provided; rather the need for a holistic approach relative to the country and regional characteristics was emphasized. A number of reality checks were also viewed to be important in light of the difficulties in establishing a reliable relationship between public investment and growth.¹⁷ A few recent examples of the application of this approach are presented in Annex 1.

¹⁶ *Applying the Debt Sustainability Framework for Low-Income Countries Post Debt Relief* (IDA/SecM2006-0564 and SM/06/364)

¹⁷ These included: (i) caution about projecting prolonged growth accelerations that make debt-led scaling up appear feasible; (ii) focus on the overall return to aggregate public investment in assessing debt sustainability; (iii) emphasis on reforms to improve the quality of policies and institutions; (iv) caution about economic volatility and shocks; and (v) an analysis of the nature of aid inflows, especially their volatility.

A. What does the recent empirical and theoretical literature tell us about the investment-growth nexus?

18. **Although recent evidence strongly supports the 2006 findings, the literature falls short of providing unambiguous results on the size of the impact of investment on growth.** While a large number of studies seem to suggest a positive relationship between public investment and growth, particularly in the case of infrastructure investment, the magnitudes of these contributions vary considerably from one study to another because of differences in the econometric methodology employed, the level of data aggregation, and the type of public investment considered. However, a majority of recent studies—especially those using physical indicators to measure investment in infrastructure—find significantly positive effects of public capital on growth.¹⁸ In contrast, the findings are less robust among those studies that use public investment flows (or their cumulative value).¹⁹ This likely reflects the fact that investment spending may be a poor proxy for the accumulation of productive assets owing to waste, inefficiencies in public procurement, corruption, or inclusion of current expenditures (e.g. wages and salaries) in reported investment figures.²⁰

¹⁸ See the recent surveys of this literature by Romp and de Haan (2007) and Straub (2008a,b) and the references therein.

¹⁹ Roache (2007) finds that public investment flows may have had a negative effect on growth in the Eastern Caribbean Currency Union. Also, in a recent survey, Straub (2008a) reviews 140 different specifications from 64 studies undertaken between 1989 and 2007, which include some measure of infrastructure as an independent variable and a measure of development performance (output level, growth, productivity and others) as the dependent variable. Overall, less than half of the empirical studies using measures of public capital stocks or infrastructure spending flows find significant positive effects. In contrast, over three fourths of the studies using physical indicators (e.g. electricity generation capacity, mileage of roads, number of telephone lines, etc.) find a significant positive contribution of infrastructure. There is also some evidence to suggest that there are robust measurable impacts on growth of investing in education (see Bose et. al. (2007)).

²⁰ See Easterly and Rebelo (1993), Pritchett (2000), Keefer and Knack (2007).

19. **The recent empirical literature confirms the importance of the quality of policies and institutions in determining the impact of public investment on growth.**²¹ More specifically:

- ***The institutional context within which investment decisions are undertaken.*** Factors such as the level of political openness and transparency, the strength of contract enforcement, corruption and bureaucratic efficiency, as well as the strength of fiscal institutions are important in explaining the returns on public investment.²²
- ***The quality of project evaluation, selection, and management.*** Public investment decisions, especially in case of infrastructure, may respond to political economy motives rather than simple economic efficiency considerations. Where such motives drive public investment decisions, returns are typically low.²³
- ***The regulatory and operational framework.*** Better quality regulatory governance, including independent regulation, leads to higher returns on public investment. In contrast, weak regulatory frameworks may increase the likelihood of political interference that leads to the expropriation of sunk private investments, jeopardizing the realization of medium term returns when there are complementarities between private and public investment.²⁴

20. **The idea that the link between public investment and growth depends on the quality and efficiency of public capital is also supported by a growing body of economic theory.**²⁵ Annex 2 presents an example of a simple, stylized model that captures important insights from the recent empirical and theoretical evidence. Despite its simplicity, the example shows that the relative efficiency of public investment not only affects growth, but has implications for debt sustainability too.

²¹ The channels noted here are not an exhaustive list of the factors affecting growth. As indicated in Box 4, the composition of spending may also influence both the level of growth rates and the time frame over which it materializes. Moreover, the public expenditure process must also be well managed and run, with adequate provisions for maintenance and other recurrent expenditures.

²² Esfahani and Ramirez (2003), Haque and Kneller (2008), Dal Bo and Rossi (2007), Gupta et al. (2008).

²³ Henisz and Zelner (2006), Flyvberg (2007), Duflo and Pande (2007).

²⁴ Guasch et al. (2007), Cubbin and Stern (2006), Estache (2006)

²⁵ See Chakraborty and Dabla-Norris (2009), Blackburn et al. (2006).

B. How to improve further Bank-Fund analyses

21. **The guidance provided in 2006, which remains largely valid could, in light of some of the recent findings, emphasize more the following factors:**

- *Country efforts to “invest in the investment process”.* For most LICs, a significant increase in public investment is imperative to create the basis for the high levels of growth needed to materially alleviate poverty. For scaling-up of public investment to provide the required growth dividend, however, considerable efforts will be needed to improve the institutional and policy making environment in such countries.²⁶ The 2006 list already included indicators such as the CPIA, public governance indicators, doing business surveys, Public Expenditure and Financial Accountability (PEFA), and other public expenditure management indicators. These could be used not only to provide a snapshot of the existing institutional constraints, but also to evaluate ongoing efforts to alleviate such constraints, as measured by improvements in these and other indices over time.²⁷
- *The government’s ability to capture returns on public investment.* This is critical for debt sustainability, and needs to be assessed in determining the scope for scaling up investment. High ex-ante rates of return on investment are not sufficient indicators of the appropriateness of scaling up public investment and its growth benefits. Even public investment that has significant positive effects on growth may not be sustainable if governments are unable to realize the fiscal dividends of growth (e.g., because of a weak tax system or poor tax administration). This suggests adding a set of indicators to the 2006 list, such as the nature of public investment, the strength and coverage of the tax system, and the quality of tax administration.

22. **Beyond this indicators-based approach, a number of more formal approaches will continue to be explored.** Such formal approaches will provide a vehicle for understanding better, and considering systematically macroeconomic linkages in operational work, including by allowing empirics to be used in combination with judgment.²⁸ Although a definitive methodology is yet to be established, the approaches outlined below suggest ways to deepen the analysis of the public investment-growth nexus. Research is ongoing in these areas at the Bank and the Fund, and is expected ultimately to help underpin growth projections used in DSAs.

²⁶ Collier (2007).

²⁷ IMF (2009b) *Debt Limits in Fund Supported Programs: Proposed New Guidelines* contains a detailed discussion of indicators that could be used to measure capacity.

²⁸ It should be noted that in view of weaknesses in national accounts, fiscal and other data in LICs, a considerable degree of judgment would always be required to assess investment-growth linkages.

23. **Work is underway to construct formal general equilibrium models for LICs that provide a pragmatic, sensible, and consistent way to assess the complex interlinkages between public investment and growth.**²⁹ These models offer a synthetic representation of the inter- and intra-temporal tradeoffs faced by policy makers, ensure consistency in the analysis, can capture aspects of the analysis such as macroeconomic absorptive capacity constraints (private investment crowding out, Dutch disease, etc), and can be calibrated to simulate country-specific factors.³⁰ A number of studies using such models for LICs have already been undertaken at the Fund to study the macroeconomic effects of aid, as well as the effects of monetary and fiscal policies.³¹ In addition, work is currently underway to extend the Berg et al. (2009) model to examine the macroeconomic effects and debt sustainability implications of a debt-financed scaling up of public investment.
24. **Further research is also needed to extend these models to account for the quality and efficiency of public investment and its implications for growth and debt sustainability.** The next steps could include the development of a model that captures both macroeconomic and structural constraints that are relevant in analyzing the relationship between public investment and growth. It would be especially useful to simulate in such models the impact on growth of policies that improve the investment environment, and model the growth payoffs to a scaling-up of debt-financed public investment in such contexts.
25. **Other approaches could also be used more actively to explore the link between public investment and growth.**

²⁹ Some examples of these studies in the context of endogenous growth models include Chatterjee, Sakoulis and Turnovsky (2003), Chatterjee and Turnovsky (2007), and Agenor and Yilmaz (2008) who develop models that are calibrated for “typical” low-income countries to study the implications for growth and welfare of both permanent and temporary, tied and untied, increases in aid. Semmler et al. (2007) use a general equilibrium model that features a government with different types of public expenditures (education, health, infrastructure, public administration, transfers and public consumption facilities) to explore the effects of fiscal policy, including the composition of public expenditure, on economic growth.

³⁰ In this context, the study of scaling-up scenarios associated with megaprojects may be particularly important, as they could pose large risks to debt sustainability if they do not deliver the expected returns. Indeed, Bank-Fund staff are already pursuing detailed analysis of megaprojects (Annex 1). The guidelines too already call for special scrutiny of high projected growth dividends associated with ambitious borrowing plans. Specifically, the staffs are required to prepare an alternative “high investment-low growth” scenario in such circumstances.

³¹ At the Fund, Arellano et al. (2009) have constructed a dynamic stochastic general equilibrium (DSGE) model, calibrated using data for aid-dependent countries in Africa, to examine the effects of aid and its volatility on consumption, investment, and the structure of production. Berg et al. (2009) develop a New-Keynesian DSGE model for Uganda and examine how different fiscal and monetary policies can affect the “spending” and “absorption” of aid, implying different responses for inflation, real exchange rate, output, consumption, private investment and other macroeconomic variables. A recent project by the Fund and the United Nations utilized this model to compute the macroeconomic implications of scaling up aid, as promised by the G-8 at Gleneagles, in some African economies (see SM/08/306, SM/08/333). Adam and Bevan (2006) and Cerra, Tekin and Turnovsky (2008) also formally investigate the macroeconomic effects of aid.

- In this regard, the growth-diagnostic approach by Hausmann et al. (2005) offers a practical way to study the extent to which private investment and growth are in effect constrained by low social returns caused by poor infrastructure. Growth-diagnostic studies can also shed light on issues related to government effectiveness that are key to the provision of public goods for growth.
- In some cases, a detailed micro-level study of the physical and economic characteristics of the country, including infrastructural shortcomings, could also inform an assessment of the impact of public investment on growth. The Democratic Republic of the Congo (DRC) provides one example of such work being undertaken by Bank-Fund staff (Box 6).

Box 6. Assessing the Growth Dividend of Public Investment in the DRC¹

The Democratic Republic of the Congo (DRC) is planning to undertake large investment projects in 2009-12 to rehabilitate its dilapidated infrastructure (roads, railways, and education and health centers) and help spur economic growth and reduce poverty. In this context, Bank and Fund staffs are in the process of evaluating the impact of the proposed infrastructure on both sectoral and overall real GDP growth. To do so, a two-stage approach is being pursued. In the first stage, the analysis identifies the location/size of current economic activities (e.g., agriculture, forestry, and mining) and location-specific economic potential, thus allowing for the identification of output gaps. With the use of a cost distance algorithm, the impact of the proposed investments on transport costs between production locations and markets is estimated. Further, long-term elasticities based on cross-sectional reduced-form regressions are used to estimate the response of local production to a change in transportation costs. In a second step, a multiplier approach is used to capture the demand side effects of proposed infrastructure investments, especially during the project implementation phase. The results of the analysis will be used, inter alia, to assess the implications of proposed investment projects and their financing for debt sustainability.

¹ See Briceño-Garmendia, et. al. (2009)

C. Conclusion

26. Staffs suggest continuing a multi-pronged approach to improve the analysis of the public investment/growth nexus underpinning DSAs. This issue, which applies more fundamentally to the underlying macroeconomic framework and is not one specific to the DSF per se, continues to be the topic of active research, including at the Fund and the Bank. This research should be made operational and incorporated in DSAs as much as possible. Model-based approaches—including the one used in the DRC—remain highly resource intensive at this juncture and cannot be expected to be applied in all countries. Priority could be given to cases where a significant scaling up of investment is ongoing or imminent, or where relatively strong policy capacity or significant efforts underway to improve the investment environment increase the likelihood of such scaling up. Elsewhere, less time-intensive methodologies—relying on the indicators suggested in 2006 and/or a growth accounting framework where TFP tries to take into account the quality and efficiency of public investment—would continue to be applied for the time being. Staffs also suggest that this issue be covered in more detail in DSA write-ups, particularly if a full DSA is conducted only once every few years (see Section IX).

V. THE ROLE OF REMITTANCES

27. **Remittances are not formally included in the DSF, in the sense that they were not explicitly considered in the estimation of the empirical model underpinning the framework.**³² Only GDP, exports of goods and services, and government revenues are explicitly used in the DSF as proxies for the country's capacity to repay.³³

28. **From a debt sustainability perspective, remittances are equivalent to other measures of capacity to repay (exports and GDP).** Remittances and exports both enhance the foreign exchange available to a country. Although in some countries remittances may be largely used to finance imports, the same may be true for export proceeds. Remittances also ease domestic resource constraints in much the same way as changes in domestically-generated income (GDP).

29. **While flexibility exists in the DSF to consider the impact of remittances on debt sustainability, it has seldom been used.**³⁴ The Boards have already acknowledged the need for flexibility in considering the role of remittances in external DSAs. Box 7 shows that limited use of this flexibility has been made in practice.

30. **Workers remittances, however, have become an increasingly important source of (non-debt creating) external financing in LICs** (Figures 1-2). They have steadily increased in the past decades, with a significant acceleration since the early 2000s. In some countries, they have become larger than export proceeds (e.g., Haiti and Tonga) and often exceed 10 percent of GDP. In addition, workers' remittances tend to be counter-cyclical (see Chami et. al. (2008)).³⁵ They can therefore play a useful role in absorbing shocks, thereby lessening debt vulnerabilities.

³² See IDA (2004a) and IMF (2004a) and Kraay and Nehru (2004).

³³ See IDA (2004a) and IMF (2004a).

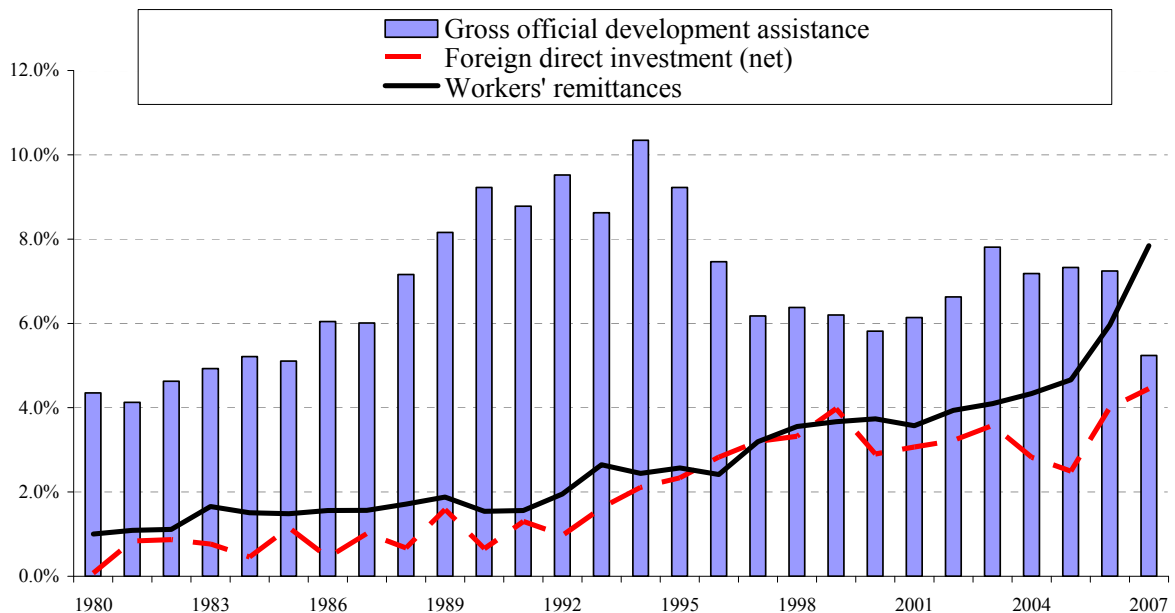
³⁴ IDA (2004a) and IMF (2004a) indicated that in the event that only one debt burden indicator exceeds its thresholds: "A careful interpretation of the results would also need to take account of other factors that influence a country's effective repayment capacity, such as high workers' remittances or significant re-exports (with a large import component) which would tend to ease or tighten a country's foreign-exchange constraint, respectively."

³⁵ It is, however, important to bear in mind that remittances may also sometimes be procyclical. Evidence suggests that this may indeed be the case in the current global crisis, with some countries in Europe and Latin America especially hard hit.

Box 7. Have remittances been incorporated in DSAs when they are large?

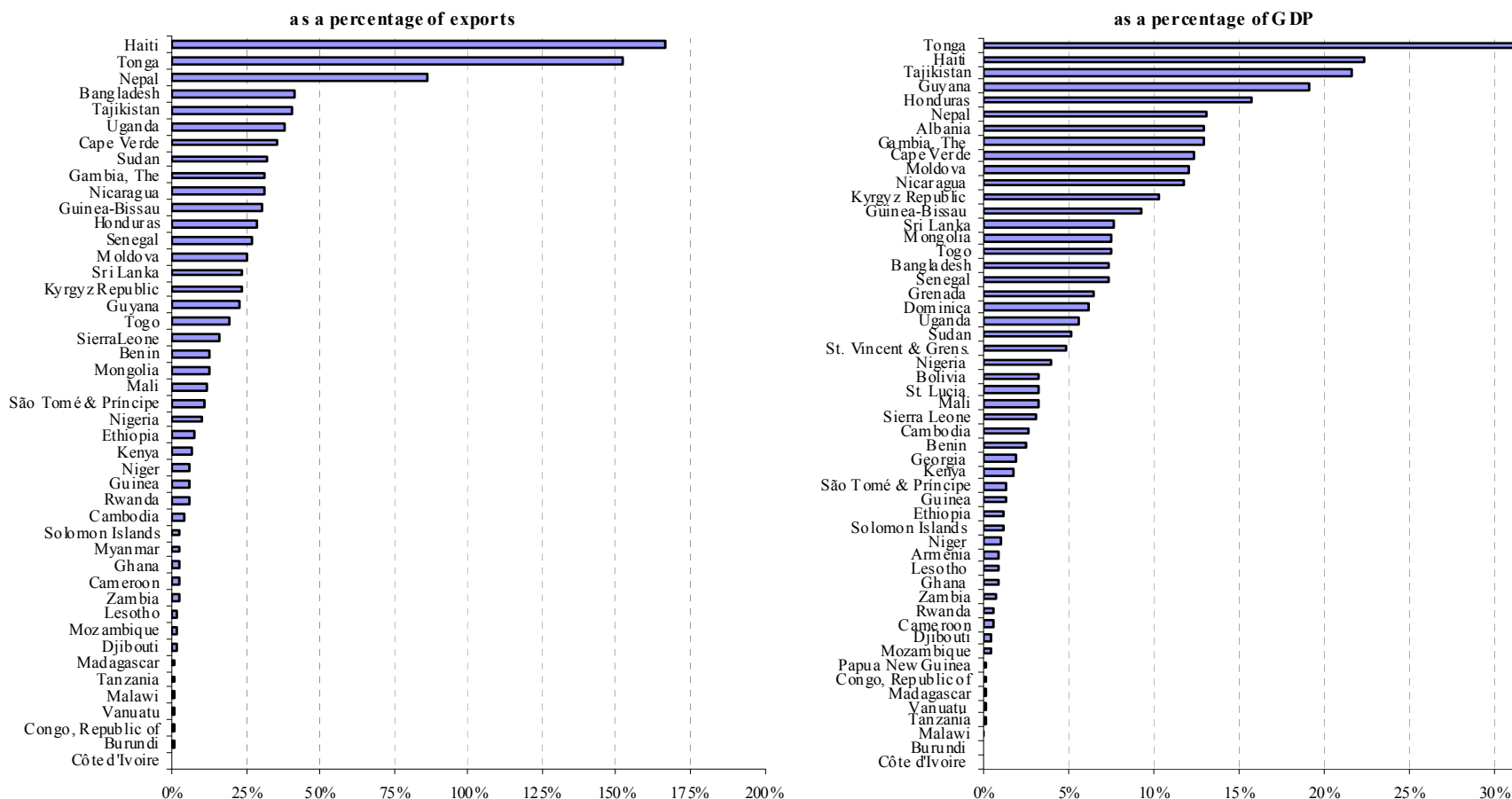
- *Haiti*: The DSA's conclusion highlights the positive role of remittances in reducing external vulnerabilities, but with no implications for the risk rating (high).
- *Tonga*: The DSA for Tonga discusses the magnitude of remittance inflows and its impact as a mitigating factor against liquidity risks, but with no implications for the risk rating (high).
- *Tajikistan*: Tajikistan is at a high risk of debt distress. The DSA did not explicitly consider the impact of remittances on debt sustainability, possibly reflecting the fact that the breach of the threshold was significant and protracted.
- *Nepal*: Nepal has a moderate risk rating. Though remittances are now around 16 percent of GDP, the DSA did not discuss their impact on debt sustainability.
- *Moldova*: Despite a temporary breach in the PV of debt-to-GDP ratio under a stress test (exploring the impact of a reduction in transfers), Moldova was characterized as at a low risk of debt distress. The justification for the risk rating was made in terms of the track record of the authorities and the exaggerated magnitude of the shock (implying that remittances are more stable than history would suggest), rather than the positive impact of remittances in terms of loosening resource constraints.

Figure 1: Workers' remittances and other inflows in low-income countries (% of GDP)



Source: World Bank, World Development Indicators (2009)

Figure 2: Workers' remittances as a percentage of exports and GDP (average 2002-2007) for PRGF-eligible and IDA-only countries 1/



Source: World Bank, World Development Indicators (2009)
 1/ Average over 2002-2007 of available data.

31. **These trends beg the question of whether remittances should be taken into account more explicitly in DSAs.** Since remittances can ease the constraints on foreign exchange and augment national income, they could be considered in measures of the capacity to repay, for instance by being added to exports or GDP.³⁶

32. **A number of factors argue for a formal reassessment of the role of remittances—i.e., for a re-estimation of the policy-dependent DSF thresholds.** Specifically, (1) in a number of countries remittances are suitably large, so as to materially influence debt sustainability assessments; (2) remittances are equivalent (or nearly so) to other measures of capacity to repay in respect of debt sustainability assessments; and finally, (3) they are reasonably stable (see below).

33. **The growing importance of workers' remittances is underpinned by the impact of globalization.** This suggests that the increased importance of remittances could be persistent. In DSAs, this would permit greater confidence to be placed on remittances as a means to alleviate countries' income and foreign exchange constraints. In addition, Chami et al. (2008) and IMF (2005) find that remittances to developing countries are less volatile than official aid flows, foreign direct investment (FDI), and exports.³⁷

34. **However, the lack of adequate data on remittances is a serious limitation to a re-estimation of the thresholds.**³⁸ As discussed in World Bank (2006), the quality and coverage of data on remittances leave much to be desired. In particular, data on workers' remittances from the World Bank's World Development Indicators (WDI) database are consistently available since 2000 for only 23 of the 64 PRGF-eligible and IDA-only countries.³⁹ In addition, the available data are likely affected by significant measurement changes. With

³⁶ If one were to proceed in this manner, three of the five DSF debt burden indicators would be affected.

³⁷ However, preliminary indications suggest that remittances, like exports and FDI, have been severely affected by the current global crisis.

³⁸ The current DSF thresholds are based on empirical analysis (See IDA and IMF (2004) and Kraay and Nehru (2004)). The analysis relates a country's probability of debt distress to its: (i) debt burden; (ii) quality of institutions; and (iii) shocks affecting the economy. Formally including remittances in the DSF would require re-estimating the probability of debt distress using debt burden measures that take into consideration remittances. Since the empirical analysis was based on historical data from 1970-2002 covering 132 countries (Kraay and Nehru (2004)), remittances data of similar scope would be needed to re-estimate the framework.

³⁹ In the literature, remittances conceptually consist of three components: (i) workers' remittances; (ii) employee compensation; and (iii) migrants' transfers. Workers' remittances is the most appropriate concept of remittances to be used within the context of DSAs, as it represents a periodic transfer of resources from a nonresident to a resident. In contrast, employee compensation represents earned income of a resident in a foreign country (which can be spent in the host country), rather than a formal transfer. Migrants' transfers are associated with a one-time repatriation of assets (migrants returning home with savings) or a reclassification of assets (residents vs. non-residents) arising from individuals' change of residency. The latter would not necessarily involve any real financial flows.

increasing capital account liberalization remittances are increasingly made through official channels, particularly since 2001. The recent increase may therefore partly reflect better recording, rather than only higher volumes.

35. Formally including remittances in the DSF could lead to changes in countries' risk ratings that would need to be carefully considered. Specifically, incorporating remittances explicitly in DSAs would lead to lower debt ratios but also lower DSF thresholds. The impact on risk ratings would depend on the relative importance of remittances to exports and GDP. Countries with relatively high levels of remittances would most likely benefit while countries with relatively low levels of remittances could experience a deterioration of their risk rating.

36. On balance, staffs recommend against re-estimating the thresholds at this juncture. While the case for taking remittances into account is strong, data availability and quality issues are likely to raise serious problems for a re-estimation of thresholds. Going ahead, efforts to improve the quality and coverage of data are needed to allow more formal consideration of remittances in the DSF.

37. Staffs recommend greater use of flexibility in terms of the recognition of remittances in DSAs. Flexibility should be applied in countries where workers' remittances are relatively large in comparison to exports or GDP—the two cases where remittances may be seen as significantly supplementing domestic resources available for debt service. In such cases, where breaches of thresholds under the baseline or stress tests are neither large in relation to the size of remittances, nor very protracted, the existence of remittances could be the basis for a more favorable risk rating than might otherwise be the case. Another consideration should be the recent developments in remittances and their prospects for the future, which should be discussed in the DSA write-up.

VI. THRESHOLD EFFECTS

38. The current operational rules of the DSF are associated with large threshold effects. In particular, even small fluctuations of countries' CPIA scores located near the boundaries of the policy performance categories may translate into large changes in applicable debt distress thresholds and hence, the assessment of a country's risk of debt distress. While changes in countries' policy or institutional environment should be reflected in a changed threshold, sometimes the magnitude of the change in the threshold, and a consequent change in the rating, has not reflected a material change in its debt outlook (see Box 8).

Box 8: Impact of CPIA Fluctuations on the Risk of Debt Distress Classification

Assessing a country's policies and institutions is an integral part of the DSF. However, incorporating policy-dependent thresholds is not without difficulties. In particular, small fluctuations in CPIA ratings at the frontiers of the performance categories may translate into large changes in thresholds and upgrades or downgrades of a country's risk of debt distress rating that do not reflect a material change in the country's debt outlook.¹

39. **Notwithstanding measures implemented to reduce the impact of CPIA fluctuations, threshold effects remain a concern for a number of countries.** This concern was already evident at the time of the 2006 review, when the Executive Boards of IDA and the IMF approved the use of the three-year moving average CPIA rating (as opposed to the single-year rating) to determine the country's performance category, smoothing out the impact of CPIA fluctuations. A number of countries, however, continue to be at risk of changes in their debt distress classification due to threshold effects.⁴⁰

40. **The staffs considered two possible approaches for addressing the problem of threshold effects:**

- **Increase the inertia in the changes in policy-dependent debt thresholds relative to changes in CPIA scores.** This approach would reduce the frequency of the events associated with threshold effects. Following this approach would be a further change along the lines of the move to the use of a three-year average CPIA rating endorsed by the Boards in 2006.
- **Increase the granularity in the policy-dependent debt thresholds associated with the CPIA.** This would imply smaller changes in applicable thresholds following changes in policy performance categories. Under this approach, the frequency of events where the applicable policy-dependent thresholds change as a result of changes in CPIA ratings could increase. However, the likelihood of changes in the policy-dependent thresholds leading to a change in countries' risk of debt distress ratings could be lowered.

41. **To introduce greater inertia in the policy-dependent debt thresholds, the following rules could be considered (Option 1):**

- Retain the use of a three-year moving average CPIA rating (as opposed to a single-year rating) to measure performance.
- For countries where a newly available three-year moving average CPIA rating breaches the applicable CPIA boundary:
 - If the size of the breach exceeds 0.05, the country's performance category would change immediately.
 - If the size of the breach is at or below 0.05, the country's performance category would change only once the breach is sustained for two consecutive years.

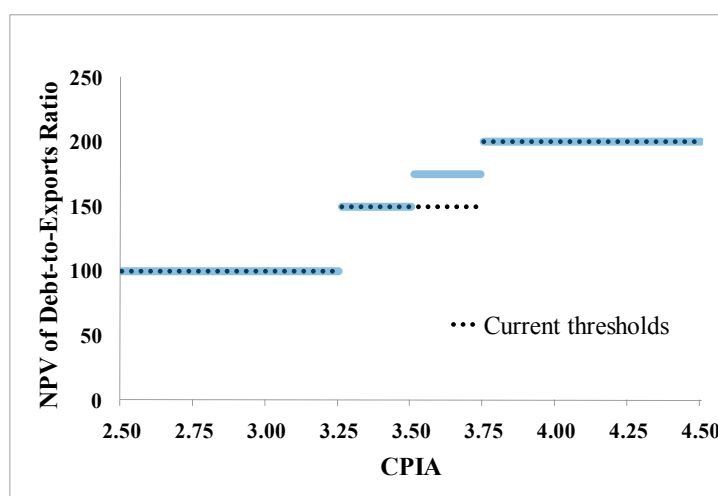
⁴⁰ Based on the average CPIA scores for 2006-08, five PRGF-eligible countries will change their performance category compared to the one using the average for 2005-07. Of these, three are IDA-only countries. In addition, fifteen PRGF-eligible countries have their average CPIA scores within 0.05 of the applicable CPIA boundary (3.25 or 3.75). Of these, nine are IDA-only countries.

42. To introduce greater granularity in the policy-dependent debt thresholds, the current medium-performer category could be divided into two equally-sized categories (Table 1, Figure 3) (Option 2). This proposal is based on a consideration of a number of alternatives on granularity. The debt thresholds applicable to the new upper-medium performer category, derived by interpolating the current adjacent thresholds, are broadly consistent with the methodology used to derive the original policy-dependent thresholds (Box 9). With these thresholds, the implied probability of debt distress is only slightly higher than the 18–22 percent range implied by the existing thresholds (Figure 4).⁴¹

Table 1: Indicative Policy-Dependent Thresholds under the Proposed Option
(Applicable to external public and publicly guaranteed debt)

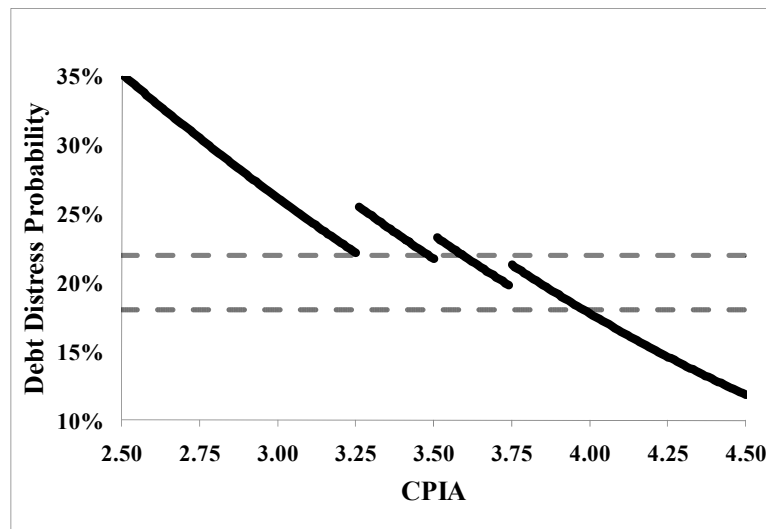
	Quality of policies and institutions			
	Weak CPIA<3.25	Medium 1 3.25<CPIA<3.50	Medium 2 3.50<CPIA<3.75	Strong CPIA>3.75
NPV of debt-to-GDP	30	40	45	50
NPV of debt-to-exports	100	150	175	200
NPV of debt-to-revenue	200	250	275	300
Debt service-to-exports	15	20	22.5	25
Debt service-to-revenue	25	30	32.5	35

Figure 3. PV of Debt-to-Exports Ratio
Indicative Thresholds Under the Proposed Option



⁴¹ As indicated in Box 9, the benchmarks where the implied probabilities of debt distress are measured are the two cutoff points 3.25 and 3.75, and the mid-point of the medium performance category, 3.5. With the modifications proposed under Option 2, there would be two new benchmarks, corresponding to the mid-points of the two new performance categories.

**Figure 4. PV of Debt-to-Exports Ratio
Debt Distress Probability Under the Proposed Option¹**



¹ The parallel diagonal lines show the debt distress probability corresponding to the applicable thresholds for the PV of debt-to-exports ratio. For instance, for CPIA scores below 3.25, the diagonal line on the left shows the evolution of debt distress probability corresponding to a threshold for the applicable PV of debt-exports ratio of 100 percent. Similarly, the remaining diagonal lines correspond to PV of debt-exports ratio thresholds of 150, 175, and 200 percent respectively.

43. The two approaches have a number of pros and cons:

- *Comprehensiveness*: Option 1 more comprehensively addresses threshold effects when countries' CPIA scores deteriorate, in the sense that all countries with CPIA scores near the performance category boundaries would benefit from the added inertia. By contrast, under Option 2, only the countries near the upper CPIA cutoff point (3.75) would be affected.
- *Rigidity*: Conversely, Option 1 has the drawback that sustained improvements in CPIA scores may be reflected in higher applicable debt thresholds only with a lag. One implication of this is that temporarily, countries with higher CPIA scores may face a lower applicable debt threshold than others with lower scores.⁴² Under Option 2, increases in applicable thresholds resulting from improvements in CPIA scores will have a smaller lag.

⁴² For instance, country A, whose 3-year average CPIA score may have increased from 3.74 to 3.76 in the last year would face an indicative debt threshold of 150 percent of PV of debt-exports. On the other hand, Country B whose score has moved in the other direction, from 3.76 to 3.74, in the last year, would face a threshold of 200 percent.

- *Simplicity*: While both options could be implemented relatively easily, the change proposed in Option 1 could be easily communicated to a broader audience. The logic underlying Option 2, by contrast, may be harder for a broader audience to absorb. Furthermore, Option 2 does entail some increase in the complexity of the framework associated with splitting the present medium performer category.

44. **On balance, the staffs recommend introducing greater inertia in the CPIA rating used to determine performance categories, i.e. Option 1.** Although, as indicated in the discussion above, the two options have different merits, the staffs consider that the first option has the key advantage of dealing more comprehensively with the problem of threshold effects, while at the same time keeping the framework manageable.

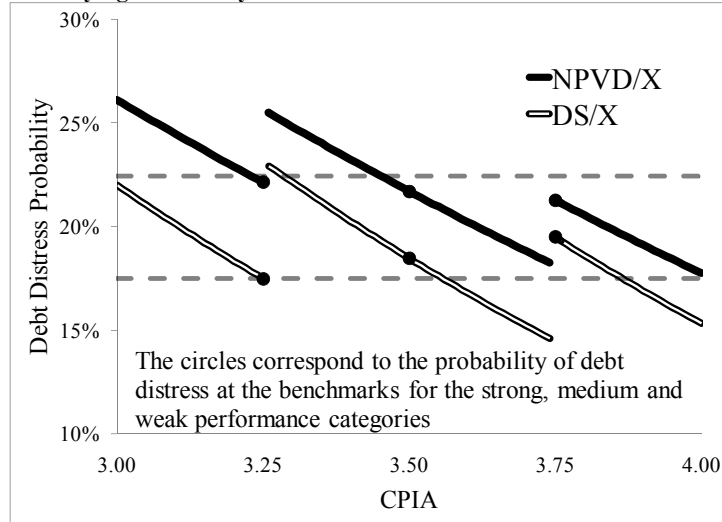
Box 9. Analytical Underpinnings of the DSF Policy-Dependent Indicative Thresholds

The DSF approach for assessing a country's risk of debt distress is based on country-specific thresholds which depend on the quality of the country's policies and institutions. This approach reflects empirical evidence that the quality of a country's policies and institutions is a significant predictor of debt distress episodes. In particular, Kraay and Nehru (2004) examined the determinants of 'debt distress.'¹ Using probit regressions, they found that three factors explain a substantial fraction of the incidence of debt distress episodes: the debt burden, the quality of policies and institutions, and shocks. Among others, these findings imply that country-specific debt thresholds reflecting the quality of policies and institutions, as opposed to a single debt threshold for all countries, are more appropriate for assessing the country's risk of debt distress. These empirical findings were corroborated by other analysis.²

The Table in Box 1 above presents the current set of indicative thresholds for debt burden indicators applicable to each performance category. As with any "early-warning" system, a crucial decision is which probability of debt distress is considered tolerable. The indicative policy-dependent thresholds approved by the IDA and IMF Boards correspond to probabilities of debt distress ranging between 18 to 22 percent for CPIA ratings of 3.25, 3.5 and 3.75 (the benchmarks set for strong, moderate and weak performers, respectively). The approval of such a set of thresholds by both Boards was based on: (i) its consistency with the empirical findings mentioned in the paragraph above; (ii) its coherence with the international community's approach to debt sustainability in low-income countries; and (iii) its financing implications.³

A parsimonious set of indicative policy-dependent thresholds is a practical solution to the need to have a manageable framework. Such an approach, however, has its shortcomings. One of them is the uneven tolerance for debt distress across countries, particularly at the lower/upper end of the weak and strong performance categories. For example, for a country with a three-year average CPIA rating of 2.36, a 100 percent PV of debt-to-exports ratio corresponds to an estimated probability of debt distress of about 38 percent. Similarly, for a country with a three-year average CPIA of 4.14, a 200 percent PV of debt-to-exports ratio correspond to an estimated probability of debt distress of about 16 percent.⁴ The Figure below presents the estimated probability of debt distress under the current DSF operational rules in relation to the PV of debt-to-exports (NPVD/X) and debt service-to-exports (DS/X) ratios.

Underlying Probability of Debt Distress under the Current DSF Rules



Note: The circles correspond to the CPIA benchmarks for the strong, medium and weak performance categories.

¹ Defined as periods in which countries resort to exceptional finance in any of three forms: (i) significant arrears on external debt, (ii) Paris Club rescheduling, and (iii) nonconcessional IMF lending.

² See Appendix I of IDA (2004a) and IMF (2004a).

³ See IDA (2005) and IMF (2005)

⁴ These examples correspond to the minimum and maximum average CPIA for the period 2006-2008.

VII. THE DISCOUNT RATE

45. **In view of the recent decline of global interest rates, the rules of the DSF require a change in the discount rate used to calculate the PV of debt.** Since the DSF was put in place in 2005, a fixed discount rate of 5 percent—corresponding to the long-term U.S. dollar commercial interest reference rate (CIRR) at that time—has been used to calculate the PV of debt.⁴³ The rules of the DSF require the discount rate to be changed only when the U.S. dollar CIRR (six-month average) diverges from the discount rate by at least 100 basis points for a continuous period of at least six months. When this occurs, the magnitude of the change in the discount rate is required to be 100 basis points. As the six-month average of the dollar CIRR has not exceeded 4 percent since January 2009—it stood at 3.56 percent in July 2009—a change in the discount rate to 4 percent is required.

46. **The resulting increases in the PV of debt are relatively small.** The results of simulating recent DSAs with a change in the discount rate to 4 percent are provided in Table 2 below. Such changes are on average limited in relation to debt thresholds under the DSF, even those applying to the members with weaker policies and institutions.⁴⁴

47. **Nonetheless, a few members are likely to be at risk of seeing their debt distress risk ratings deteriorate,** either because the change would be sizeable or because their debt ratios are already close to their respective thresholds. While a full DSA would be needed to properly assess risks, the simulations noted above suggest that only 5 members rated as being at moderate risk of debt distress would experience small and temporary breaches of their respective thresholds.⁴⁵ No members appear to be at risk of having their ratings move from low to moderate.

48. **Two additional factors would also have an impact on the extent to which changes in the discount rate affect debt distress ratings.**

- The present global recession is likely to lead to a deterioration of LICs' debt outlook, pushing their debt ratios up closer to their respective thresholds. In these circumstances, a further increase in the PV of external public debt on account of the change in the discount

⁴³ The CIRR is used as a proxy for market interest rates in a number of contexts, including the Highly Indebted Poor Country (HIPC) Initiative and for calculating concessionality. The base rate for the long-term dollar CIRR is the interest rate on the 7-year US Treasury Note.

⁴⁴ As indicated by the small average change and the low standard deviation in Table 2 below, the range of increases is clustered near the lower bound.

⁴⁵ For an additional 5 members, where debt ratios exceeded their thresholds even under a 5 percent discount rate, but were nonetheless rated as being at moderate risk of debt distress, the size of the breach increases slightly.

rate could cause a larger number of members to migrate to higher risk of debt distress categories.

- Were a finer partition of the applicable debt thresholds, in line with Option 2 in Section VI, to be adopted, it would mitigate the impact of a change in the discount rate. Simulations suggest that, everything else equal, it is unlikely that any countries would see their debt distress ratings worsen.⁴⁶

Table 2. Increases in PV of External Debt Ratios With a Change in the Discount Rate From Five Percent to Four Percent

	Average 1/	Stdev 1/	Min 2/	Max 2/	Threshold 3/
(In percent of)					
<i>In debt distress</i>					
GDP	2.2	0.4	0.4	11.2	30
Exports	7.8	1.7	0.8	33.7	100
Revenue	13.1	2.6	2.1	62.1	200
<i>High risk</i>					
GDP	2.5	0.8	0.5	9.8	30
Exports	11.6	3.6	5.1	42.4	100
Revenue	12.6	3.7	5.9	54.9	200
<i>Moderate risk</i>					
GDP	1.9	0.4	0.9	5.8	30
Exports	6.5	1.3	2.7	23.7	100
Revenue	10.0	2.2	5.5	20.1	200
<i>Low risk</i>					
GDP	1.0	0.3	0.5	3.6	30
Exports	3.6	1.0	1.8	13.3	100
Revenue	5.2	1.2	1.8	14.9	200

Source: Fund staff estimates.

1/ Average and standard deviation are calculated based on the full sample--all projection years for all countries.

2/ For each country, the increase in the PV of debt varies over the projection period. The minimum and maximum figures reported are based on the maximum increase for each country. For instance, the Min column compares the maximum increases across the entire projection period for all countries in the group, and picks the smallest of these numbers. Similarly, the Max column reports the largest number from this set.

3/ Levels applicable for members with weak policies.

49. **The impending change of the discount rate provides an opportunity to reconsider whether the rules in this regard remain appropriate.**⁴⁷ In earlier Board discussions on the DSF, Directors endorsed the following broad considerations to guide the

⁴⁶ Some countries who do not see an increase in their thresholds continue to experience small and temporary breaches under Option 2.

⁴⁷ These issues were discussed by the Bank and Fund Boards in 2004 (I DA/SecM2004-0051, IDA/SecM2004-0629 and SM/04/27, SM/04/318) and 2005 (IDA/R2005-0056, SM/05/109). The 2005 paper noted that the rule was to be reviewed periodically to ensure that it is the most appropriate way to calculate PVs of debt stocks.

choice of the discount rate—the ultimate choice of the discount rate and the rule governing its changes were intended to be a pragmatic operational solution reflecting these considerations.

- The Boards recognized that changes in the PVs on account of movements in interest rates were hard to interpret from a debt sustainability perspective, since the actual payments on fixed-rate concessional debt did not change in line with changes in the interest rates in advanced economies.
- Nonetheless, Directors were of the view that global interest rates contained useful information on expected future world inflation, and hence the prospects for export earnings in the future, an important determinant of a country’s capacity to carry debt.^{48,49}
- On this basis, the Boards agreed that the discount rate should reflect movements in market interest rates. However, they recognized the need to strike a balance between using the most current information and limiting fluctuations in PVs in response to temporary interest-rate movements.

50. **Some aspects of the global environment also call for a reconsideration of the rules.** The need to tailor monetary policy in advanced economies to the challenging global economic conditions and considerable uncertainty about the outlook have likely rendered market interest rates more volatile and “noisy” than usual, a situation likely to persist for some time. While such considerations do not negate the view that the discount rate should be related to market interest rates, they do suggest that the present rule for adjusting the discount rate ought to be reviewed to determine whether it may give rise to movements in PVs that do not properly reflect LICs’ debt burdens.

51. **On the basis of the present rule, the changes in the discount rate lag movements in market interest rates, sometimes by a significant period of time.**

- The present rule (notably the six-month averaging) introduces a strong element of inertia to discount rate calculations. In the present circumstances, the dollar CIRR has remained below 4 percent for a period of 7 consecutive months before requiring a change in the

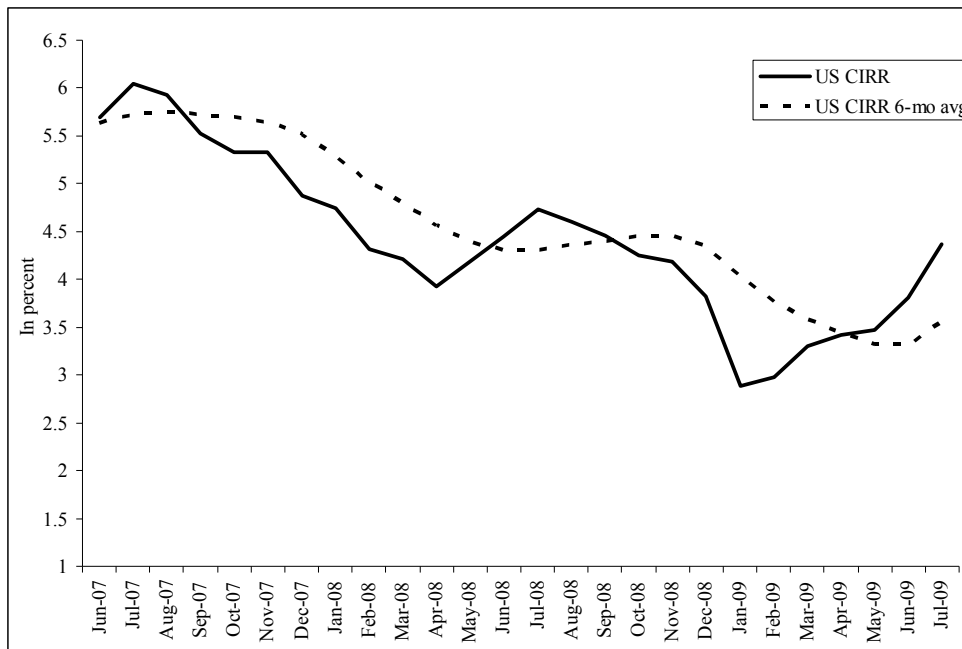
⁴⁸ IDA (2004a) and IMF (2004a) state that, “... to the extent that world interest rates embody information on expected future world inflation (consistent with the Fisher equation), lower (higher) interest rates would signal weaker (stronger) export earnings of borrowing countries in the future. In this wider interpretation of the NPV (that also embodies repayment-capacity considerations, but is hard to prove empirically) lower world interest rates are indicative of higher debt service-to-exports ratios, and thus, a higher risk of debt servicing difficulties, in the future.”

⁴⁹ The same argument has been used in the HIPC Initiative to consider as an exogenous negative shock a decrease in discount rates in the context of discussions on the need for additional HIPC relief (“topping up”) at the completion point.

discount rate. Furthermore, this period could have been longer still had the CIRR not declined as sharply as it did in the current recession. Such inertia could be problematic if a rapid change in market interest rates was on account of a shift in long-term prospects, rather than “noise”.

- During periods of significant volatility in market interest rates, as at the present time, the rule may require a change in the discount rate in the opposite direction to the current movement in market interest rates. Figure 5 below indicates the sharp increase in recent weeks of the U.S. dollar CIRR which, in July, rose to 4.37 percent.

Figure 5. Developments in the Long-Term US dollar CIRR and its Base Rate



52. **In the period ahead, the current rule for the discount rate is not expected to increase significantly the volatility of the PV of debt.** With global interest rates enjoying a period of relative stability, the discount rate has remained unchanged at 5 percent since the DSF was introduced in 2005, introducing no volatility in the PV of debt calculations. While greater volatility of global interest rates may be expected going forward, for the reasons noted below, staffs expect volatility on this account to remain limited.

- Changes in the discount rate are still expected to be limited in the foreseeable future. WEO projections expect long-term bond yields in the U.S. to remain close to 4 percent over the next 3 years, which would suggest that the discount rate would not exceed the original 5 percent rate during this time.
- Step changes of 100 basis points appear to have a moderate impact on PVs.

53. **The rule does not allow the discount rate to diverge far from market rates for long periods of time.** While inertia could, on occasion, cause the discount rate to diverge from the CIRR for extended periods, the rule does not permit large divergences (greater than 100 basis points) for longer than eleven months. Divergences could be larger with alternative rules providing more smoothing. Table 3 below illustrates this point by comparing the present rule to an alternative rule where the discount rate adjusts only after the six-month average of the CIRR has diverged from the discount rate by at least 100 basis points for 12 consecutive months.

Table 3. Minimum Number of Months before a Discount Rate Change
Under the Present and Alternative Rule

	Size of Divergence (in basis points)		
	100	150	200
Present Rule	11	9	8
Alternative Rule	17	15	14

54. **Staffs recommend to keep the rule and adjust the discount rate to 4 percent in new DSAs.** Staffs consider that the rule strikes an appropriate balance between limiting volatility, while being market-based. The requirement to review the rule for setting the discount rate in light of experience should however be maintained, particularly in light of the uncertainties in the global economic outlook.

VIII. THE TREATMENT OF STATE-OWNED ENTERPRISE DEBT IN DSAS

55. **Some critics of the DSF argue that the current treatment of external debt owed by public enterprises is too rigid, and that staffs should consider greater flexibility as regards its treatment and inclusion in public and publicly-guaranteed (PPG) debt.** Such considerations may have implications for the risk rating which is derived from the analysis of PPG external debt. Some even advocate excluding entirely public enterprise debt from the DSF all together. At present, the DSF uses the definition of public and publicly-guaranteed (PPG) external debt contained in the *External Debt Statistics: Guide for Compilers and Users*. Specifically, it comprises: (i) external debt of the public sector, defined as central, regional and local governments, central bank, and public enterprises—the latter subsumes all enterprises that the government controls, such as by owning more than half of the voting shares—and (ii) private sector debt guaranteed by the public sector. This treatment implicitly assumes that the government would take full responsibility for all liabilities incurred by

public enterprises (guaranteed or not) that it controls but, in other enterprises, it takes responsibility only for debts that are specifically guaranteed.⁵⁰

56. **Flexibility as regards the treatment in DSAs of the debt of those public enterprises that pose a limited fiscal risk for the government could be considered.** In particular, staff proposes excluding from PPG external debt in DSAs the debt of those SOEs that can borrow without a public guarantee and whose operations pose a limited fiscal risk for the government.⁵¹ This would avoid situations where such debt could unduly influence the risk rating. Since this proposal would also be consistent with the proposed treatment of SOEs' debt for concessionality requirements under the Fund's new debt limits policy,⁵² it would be easy to operationalize in cases where there is an IMF-supported program.⁵³ Otherwise, the broad criteria applicable to such decisions could be used to guide decisions in this regard on a case-by-case basis.

IX. CONTENT OF DSAs

A. Reflecting Authorities' Views in DSAs

57. **Full DSAs should better reflect the authorities' views.** Country authorities are expected to be closely consulted in the production of DSAs and, to this end, Bank and Fund staff have provided training on the DSF to country authorities at a number of workshops and seminars. It is expected that the authorities will be given opportunities to provide their views on issues of concern, including, but not limited to, macroeconomic and financing assumptions and CPIA scores. The authorities' views, however, are rarely presented explicitly in DSAs. A more systematic presentation of the authorities' views would be desirable for DSAs to achieve their objectives—to inform program design, inform broader policy dialogues with the authorities and their creditors, and enhance country ownership. This could be done in a separate short section. In addition, should the authorities' views

⁵⁰ While a 50 percent ownership stake in a public enterprise would ensure government control, in some instances the government may have control of such enterprises even with a smaller ownership stake.

⁵¹ The following specific considerations could also be used to guide decisions: (i) managerial independence, including pricing policy and employment policy; (ii) relations with the government, including existence of subsidies and transfers, quasi-fiscal activities, and the nature of the regulatory and tax regime; (iii) governance structure, including periodic outside audits, publication of comprehensive annual reports, and shareholders' rights; (iv) financial conditions and sustainability, including market access, less than full leveraging (debt-to-asset ratio comparable to the industry average), profitability, and record of past investment; and (v) other risk factors, including vulnerabilities stemming from contingent liabilities, and the importance of the public enterprise.

⁵² See IMF (2009a, SM/09/56) for a discussion of this issue.

⁵³ In such cases, a Technical Memorandum of Understanding would typically identify the appropriate coverage of SOEs for the purpose of the nonconcessional debt limits policy.

differ significantly from those of staffs, alternative scenarios may be prepared in the DSA based on assumptions provided by the authorities.

B. Streamlining DSAs

58. **DSAs are highly resource-intensive**, even in cases where a new DSA is not significantly different from the previous one. This begs the question of whether DSA requirements could be streamlined, where appropriate, so as to free up resources for more urgent and critical work, including improving the quality of DSAs (e.g., additional work on the public investment-growth nexus).

59. **In the absence of major changes in the debt sustainability outlook and of program requirements, full DSAs could be done every three years.** Annual updates between two full DSAs would still be produced, including for the purpose of having an annual risk rating. These updates would be significantly lighter exercises and consist of a very short write up and the usual set of tables and charts. Long-term macroeconomic assumptions would not be expected to be significantly revised. While this streamlining may not become effective immediately because of the ongoing crisis, it could reduce significantly the workload of country teams in the medium term.

X. NEXT STEPS

60. **Following the Boards' discussions, the staffs will update the Guidance Note on Applying the DSF to reflect the outcome of the discussions.** This revision will reflect the key operational aspects that may be modified on the basis of the above proposals.

XI. ISSUES FOR DISCUSSION

- Do Directors agree that DSAs should report in more detail staff efforts to analyze the investment-growth nexus?
- Do Directors agree that greater flexibility could be applied in assigning risk ratings by taking into account the size of remittances?
- Do Directors agree that greater inertia in changes of indicative policy-dependent thresholds as defined in Option 1 is desirable?
- Do Directors agree that the present rule for setting the discount rate remains appropriate?
- Do Directors agree that the external debt of state-owned enterprises that pose a limited fiscal risk for the government (based on the criteria specified in paragraph 56) should not be included in PPG external debt for the purpose of DSAs?
- Do Directors agree that the paper's proposal for streamlined DSAs is appropriate?

Annex 1. How Have DSAs Taken Account of the Investment-Growth Nexus

An important criticism of the DSF is that it does not fully take into account the impact of investments on growth and, as a result, constrains borrowing to finance productive investments. The cases discussed below suggest that, despite the inherent difficulties in assessing the growth effect of public investments, recent country DSAs have attempted to take into account such effects.

(i) Madagascar:

The 2008 DSA for Madagascar included two large mining projects, namely the construction of an ilmenite mine (US\$805 million, 11 percent of GDP) began in 2006, and the construction of a nickel and cobalt mine and processing facility (US\$3.2 billion—including a private commercial loan of US\$2.1 billion, 44 percent of GDP) commenced in 2007. The projects are expected to be completed over the next three years. As a result average real GDP growth was projected to be at about 7 percent per annum over 2008–2028, compared with a historical average of 5 percent (1998–2007, if the impact of the political turmoil of 2002 is excluded).

(ii) Mauritania:

The 2008 DSA for Mauritania assumed an ambitious public investment program between 2008 and 2012, to be financed by donor funds pledged at the Consultative Group meeting in December 2007. The baseline scenario assumed disbursement of US\$1.6 billion of loans (54 percent) and grants (46 percent) pledged over 2008–2012, representing an average annual gross aid inflow of about 12 percent of GDP between 2008 and 2012. As a result of these investments and other reforms, real GDP growth was projected at 7.2 percent per year on average over 2008-2012, compared with a historical average of 4.4 percent. After 2013, growth was projected to return to a sustainable level averaging 4 percent per year.

(iii) Bhutan:

In addition to the ongoing Tala hydropower project, the baseline scenario in the 2007 DSA of Bhutan incorporated two new hydropower projects and their impact on the country's debt dynamics. With Tala going on stream in 2006/07, real GDP growth was expected to increase to 17 percent from 9 percent in the previous year. Another spike in GDP growth rate was projected during 2015/16-2016/17 with the commissioning of another hydropower project. The DSA also projected a higher domestic revenue-to-GDP ratio on account of increased revenues from hydropower projects and the widening of the tax base. These assumptions were based on Bhutan's past performance with hydropower projects. For instance, during 2006/07, the Tala project increased electricity sales by 80 percent and exports by over 90 percent, and was the main source of the estimated increase in GDP to 17 percent. The financing terms of the two new hydropower projects are given below:

- *Punatsangchu I* is expected to have a capacity of 1095 MW. The project would be financed through a 40 percent grant and a 60 percent loan at 10 percent interest rate. The entire financing will be in Indian rupees.
- *Dagachu* project would add another 114 MW to the overall power generation capacity of the country. It would be financed through a 25 percent equity participation from the Royal Government of Bhutan and the remaining 75 percent through loans, at 7 percent. The loans are being provided by the Government of Austria and the Asian Development Bank.

Annex 2. The Efficiency of Public Investment, Economic Growth, and Debt Sustainability

Efficiency of Public Investment and Economic Growth

The main insight of the importance of the efficiency and quality of public investment for growth can be grasped within a simple endogenous growth model of a closed economy. The model is based on Barro (1990) and has three components that correspond to the demand side, the supply side, and the description of fiscal policy:

1) The demand side determines consumption (and investment) over time. This is captured by the Euler equation for consumption:

$$\gamma = \left[\frac{1 + (1 - \tau)MP_k - \delta}{1 + \rho} \right]^{1/\sigma} - 1, \quad (1)$$

where $\gamma \equiv c_{t+1} / c_t - 1$ is the growth rate of consumption (and the economy), MP_k represents the marginal productivity of private capital, τ is the tax rate, ρ corresponds to the subjective discount rate, δ is the depreciation rate of private capital, and $1/\sigma$ is the intertemporal elasticity of substitution. Loosely speaking, this equation implies that if the marginal productivity of capital, net of taxes and depreciation, is higher than the subjective discount rate, then consumption will be postponed, while investment increases generating growth.

2) The supply side is described by the following Cobb-Douglas technology that firms use to produce output, y_t , mixing private capital, k_t , and public investment, g_t :

$$y_t = A(k_t)^\alpha (\theta g_t)^{1-\alpha}, \quad (2)$$

where A is a time-invariant total factor productivity, and $\theta \in (0,1]$ measures the degree of efficiency of public investment in the spirit of Hulten (1996). This is a parsimonious way to capture some of the inefficiencies that arise in the execution of public investment. When $\theta = 1$, public investment is fully efficient. But the presence of inefficient and corrupt bureaucracies, poor selection and monitoring of projects, may imply that only a fraction θ of g_t units that are spent in public investment get translated into “productive” units of public investment.⁵⁴

3) The fiscal policy is a budget balanced rule whereby the government collects taxes to finance public investment, so that

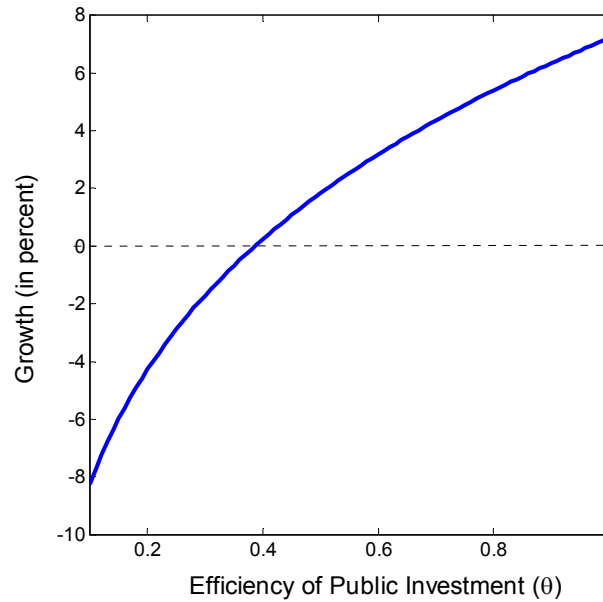
$$\tau y_t = g_t. \quad (3)$$

⁵⁴ It is possible to show that there is an isomorphism between this specification and the approaches followed by these Dabla-Norris (2009) and Sarte (2001).

In this setup the efficiency of public investment affects the marginal productivity of private capital and the growth rate of the economy. This can be seen from combining equations (2) and (3) to show that the marginal product of capital corresponds to

$MP_k = (1 - \tau)A\alpha(\tau A)^{\frac{1-\alpha}{\alpha}}(\theta)^{1-\alpha}$, implying that the marginal product of capital is positively correlated with the degree of efficiency of public investment. In addition, as the growth rate of the economy depends positively on the marginal product of capital (see equation 1), then growth is also positively correlated with the efficiency of public investment. Simulations of the model for parameter values, which are in line with the growth literature, confirm this result: more efficient public investments are associated with higher growth.⁵⁵ Interestingly, if the degree of efficiency of public investment is too low, then the economy may face no growth or even negative growth rates.

Figure A2.1. Growth vs. Efficiency of Public Investment



Efficiency of Public Investment and Debt Sustainability

The efficiency of public investment can play a key role for debt sustainability. A simple partial equilibrium analysis of the public debt dynamics helps to underscore this point. Consider the following equation that describes the evolution of external and domestic public debt:

$$b_t = \frac{1+r}{1+\gamma(\theta)} b_{t-1} + g_t + x_t - \tau_t \quad (4)$$

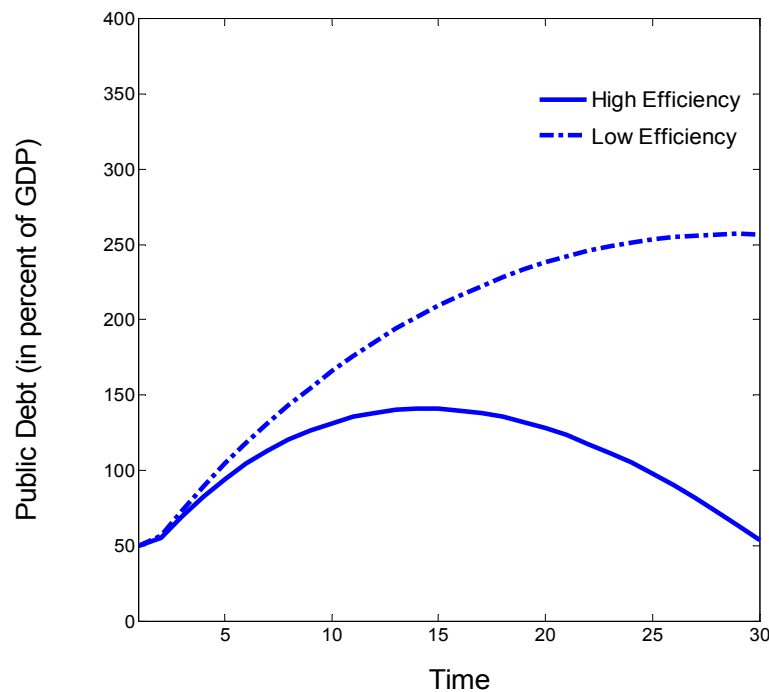
where b_t , g_t , x_t , and τ_t represent public debt, public investment, non-productive public spending, and taxes, respectively. All of them expressed in percent of GDP. In addition, r is

⁵⁵ The parameterization corresponds to $\rho = 0.04$, $\sigma = 1.5$, $\alpha = 0.65$, $\tau = 0.25$, $A = 1.4$, and $\delta = 0.05$

the real interest rate and $\gamma(\theta)$ corresponds to the growth rate of the economy that, as explained above, depends on the relative efficiency of public investment θ . That is, higher public investment efficiency is associated with higher growth rates.

If public investment efficiency is low, the economy may be more prone to debt sustainability problems, especially when public investment is scaled up. To illustrate this, consider two economies that over time face the same paths of tax revenues and public expenditures in percent of GDP, including a scaling-up of public investment. However, they differ in their degree of public investment efficiency and hence face different growth rates. In this case, simulations of the debt accumulation equation (1) reveal that the debt-to-GDP ratios of the high efficiency economy are always below those of the low efficiency economy. In addition, the high efficiency economy shows a sustainable path for debt, while the low efficiency economy faces a path that could become unsustainable.

Figure A2.2. Public Debt and the Efficiency of Public Investment



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