Working Paper

October 2008 | **73**

External Debt in Low-Income Countries:

Taking Stock and New Perspectives

Hélène Djoufelkit-Cottenet and Cécile Valadier (valadierc@adf.fr), Economists, Research Department, AFD

AGENCE FRANÇAISE
DE DÉVELOPPEMENT

Disclaimer

The analysis and conclusions of this document are those of the authors. They do not necessarily reflect the official position of the AFD or its partner institutions.

Contents

Introduction

In the wake of debt relief initiatives (Heavily Indebted Poor Countries and Multilateral Debt Relief Initiatives), there has been a lot of questioning on donors' lending strategies towards developing countries. Since then, attempts have been made to understand what went wrong in the past and to promote new ways of thinking about the financing of development. This paper tries to sketch this evolution as far as sovereign debt is concerned and to benchmark what we know on sovereign debt defaults from the economic literature and what has been done by the international financial institutions. It also makes some practical proposals in terms of lending strategies and donors' coordination.

1. Debt crises: why do countries default on their debt?

1.1 Theoretical highlights on international lending

In a seminal paper, Eaton, Gersovitz and Stiglitz (1986) pointed out the central role played by the enforcement problem and the absence of collateral in the international sovereign loan market. They develop a model of the willingness-to-pay of borrowing countries, which critically depends on their expectations regarding the lender's resolve to penalize a defaulting borrower and the lender's willingness to lend in the future.

There are two types of exclusions that creditors can impose on debtors: an embargo on future borrowing and various forms of interference with the debtor's international transactions and transfers (such as trade sanctions). Eaton and Gersovitz (1981) analyzed the assumptions under which the exclusion from future loans is an efficient threat. It is only when there is a possibility of transfers in both directions (from the debtor to the creditor and conversely)

that this penalty is operative: if the borrower's income alternates between high and low values and the borrower is risk-averse, then the demand for loans derives from a desire to smooth consumption. The cost of exclusion from future lending is that the country must find other ways to smooth consumption or accept fluctuations in its consumption pattern. Uncertainty in the form of income variation is crucial to the functioning of the penalty. It should be noted here that it is not the same thing to say that countries that need funds for development would suffer if excluded from international lending and that the penalty of exclusion will ensure the lender is repaid. Borrowing for productive investment implies that once the marginal product of capital equals the interest rate, there is no further gain from repaying one's creditors (the debtor loses nothing if he is denied access to financing).

1.2 Definitions

The debt literature distinguishes between two notions to characterize the type of debt crises a country can be confronted with: solvency and liquidity.

The intertemporal solvency constraint of a country states that a country is solvent if the sum of its current debt stock and the present value of all its future expenses is less than or equal to the present value of all its future revenues.[1] The external debt evolution is thus linked with the evolution of the current account and the evolution of domestic debt with the evolution of the primary surplus. Solvency does not require that in each period the debt stock be equal to the government's net revenues. It could be the case that high debt today is offset by high future net revenues. Similarly, the notion of solvency does not impose an ex ante upper bound on the debt level a country should not exceed in

order to be able to service its debt, since solvency depends on the future current account balance. Therefore, a country with high debt today could be more solvent than a country with a lower debt level, provided that it is able to generate enough surpluses in the future. Wyplosz (2007) has shown that the external debt of many developed countries has remained quite high, as has been the case for Great-Britain's domestic debt. For the last 300 years, its domestic debt/GDP ratio has on average been equal to 117%, and Great-Britain has never defaulted on its debt even though it was thought to be insolvent.

[1] See Appendix 1 for the debt dynamics equation.

A borrowing country's liquidity refers to another notion: in certain circumstances, a country can temporarily be unable to roll-over an existing debt coming to maturity or to issue new debt. A loss of confidence in the ability of the country to repay its debt may lead creditors to ask for higher spreads or to stop lending ("sudden stops"). In this case, a country can be forced into default even though its intertemporal solvency constraint is satisfied.

Wyplosz (2007) then defines the reunion of these two conditions (solvency and liquidity) as the debt serviceability.

The notion of debt sustainability is not used as such in the literature and it is difficult to find its definition, apart from the one used in the Debt Sustainability Framework:[2] "a situation in which a borrower is expected to be able to continue servicing its debts without an unrealistically large future correction to the balance of income and expenditure. Sustainability rules out any of the following: a situation in which a debt restructuring is already needed (or expected to be needed); a situation where the borrower keeps on indefinitely accumulating debt faster than its capacity to service these debts is growing (a Ponzi game); or a situation in which the borrower lives beyond its means by accumulating debt in the knowledge that a major retrenchment will be needed to service these debts (even if nothing in the external environment changes)". There is no clear distinction between solvency and liquidity here, but the emphasis is put on the participation constraint of the country. As shown in section 1.1, a creditor can only expect to be repaid if the debt burden is incentive-compatible. Put differently, the decision to default (or on the contrary, to repay one's debt) is the result of a maximization problem. The borrower has to be better off repaying its debt, which can be different from satisfying the intertemporal solvency constraint. It could be the case that a country could generate enough resources to service its debt but that it would be politically unsustainable, as it would divert money from other uses, such as paying civil servants. Default can be optimal in several cases even when the solvency condition is theoretically satisfied.

1.3   Early Warning Signals and Static Solvency Analysis

Determining the causes that trigger debt crises aims at being able to anticipate future debt distress events. The usual suspects in this respect are mainly solvency indicators such as debt stock standardized with respect to exports (attempt to assess the amount of external resources the economy will have to generate to service its debt; this ratio is even more important for low-income countries as they are more likely to be excluded from world financial markets and their main source of foreign exchange lies in their trade activities) or GDP (general measure of a country's ability to pay) but also liquidity variables such as short-term debt, reserves and debt service due.

The debt service due is the amount of resources diverted away from current spending for debt repayment. It is directly linked with the debt stock a country has as its total debt outstanding, translated into future debt service in the form of amortization and interest payments. The bigger the debt stock, the more resources the country must generate in the future to be able to reimburse its debt. There is a fine line between what constitutes solvency or liquidity: a sizeable debt stock does not necessarily lead to default as the debt structure has to be taken into account to evaluate the risk (concessional debt has low interest rates, a long-term maturity is less likely to raise liquidity problems, etc.). Debt service due is usually seen as a liquidity indicator: it is the amount of money needed to face repayments on a particular year, but for many low-income countries it is likely to also be a better proxy for the debt burden, as their external debt is mainly concessional.

To look at the debt burden ratios in a given year and compare them to "acceptable" values is called static solvency analysis. Two problems undermine this approach: the debt dynamics are not captured (a solvency analysis should be dynamic, as debt is the result of an intertemporal maximization problem), and an "acceptable" debt ratio is usually hard to determine. Practical use of this static solvency analysis has been made by the HIPC Initiative to delineate which countries should be eligible for debt relief (see section 2.1).

[2] See IMF (2002).

There are many definitions given in the literature of what constitutes a debt crisis. It can be outright default on external debt, liquidity tensions because of creditors' unwillingness to roll over debt coming to maturity or reaching a rescheduling agreement with creditors. For Detragiache and Spilimbergo (2001), the country has arrears of principal and interest on external obligations towards commercial creditors of more than 5% of total commercial debt outstanding or has a rescheduling or debt restructuring agreement with commercial creditors. It should be mentioned that no difference is made here between sovereign and private-sector debt. Another way of defining a debt crisis is to follow the classification by Standard and Poor's, which clearly states whether a country is in default on its debt. However, these definitions are more suited to countries which have market access and can issue international bonds, which is not the case for many low-income countries. Therefore, Kraay and Nehru (2006) added agreements reached by certain countries and the Paris Club in order to account for low-income countries' debt structure (mainly official lending). Moreover, many researchers argue in favour of including in the debt distress definition the episodes where the country has access to non-concessional IMF financing in excess of a certain percentage of its quota. This definition tries to capture the debt episodes that did not translate into real defaults because countries were helped by sizeable bailouts

from the international financial institutions (IFIs). Had they not had access to this exceptional balance of payments support, these countries would have had huge difficulties in avoiding a debt crisis. The definition of what constitutes a debt crisis is crucial to the econometric analysis of defaults, as it is likely to be driven by many factors which may be difficult to control. For example, obtaining balance of payments support from the IMF can be correlated with omitted political factors that can drive both control variables (level of reserves, debt maturity, etc.) and the dependent variable (debt crisis), leading to a bias in the estimate of the coefficients on the control variables. A mandatory step towards establishing causality in this kind of analysis should be robustness checks with regard to the definition of a debt crisis.

The literature on the determinants of debt defaults usually estimates the contribution of various explanatory variables to the probability of a debt crisis using the following model: $P(y_{ct}=1) = \Phi(\beta'X_{ct})$, where y_{ct} is a dummy variable equal to 1 when country c experienced a debt crisis at time t and 0 otherwise. X_{ct} is a vector of explanatory variables, β is the vector of estimated coefficients and Φ is usually taken as the cumulative distribution function of the normal distribution (probit estimation). Most of the studies on debt default find significant effects of the aforementioned variables as shown in Table 1:

Table 1.   **Effect on debt crisis probability of solvency and liquidity indicator**

	Effect on Debt Crisis Probability
Usual Solvency Indicators	
GDP growth	-
Debt Stock to GDP	+
Debt Stock to Exports	+
Overvaluation	+
Usual Liquidity Indicators	
Short-term Debt to reserves	+
Debt service to reserves	+
Debt service to exports	+
Interest on short-term debt	+

Source: Sturzenegger, 2004.

Some of these variables are likely to be subject to a problem of endogeneity as well. For example, the level of short-term debt to reserves can be positively correlated with debt crises because in the run-up to a debt crisis, the country may face difficulties in borrowing long term. In this case, a high ratio of short-term debt to reserves or exports must be viewed as a signal of the debt problem rather than a proximate cause of default. Other explanatory variables can be included in this kind of benchmark regression in order to search for other early indicators of default, such as credit ratings (Reinhart, 2002).

1.4 Empirics on Default Probabilities in LICs

As far as debt crisis in low-income countries (LICs) is concerned, Kraay and Nehru's paper (2005) established a benchmark, since it provided the empirical basis of the joint Debt Sustainability Framework (DSF) of the IMF and the World Bank. They define a debt crisis as the occurrence of one of the following three events: debt arrears (more than 5% of total debt stock outstanding), a Paris Club episode (debt relief in the form of rescheduling or cancellation) or an IMF program ("Standby Agreement" or "Extended Fund Facility" with financing in excess of 50% of a country's quota). Their explanatory variables are as follows: debt (expressed in net present value to take concessional loans into account) with respect to GDP and exports, debt service due on exports, measures of institutional quality such as the CPIA (Country Policy and Institutional Assessment) and measures of shocks (proxied by real GDP growth in local currency). Their results show that these variables enter significantly into the probability of debt default. The magnitude of the marginal effects estimated for their measures of institutional quality and debt burdens is quite important as well. For example, if the governance index and real GDP growth are set to their mean values, the default probability of countries whose debt service-to-exports ratio is in the lower 25th percentile of the sample is only 7%, compared to 27% for countries whose debt service-to-exports ratio is in the 75th percentile. If we focus on the effect of the CPIA on default probability, the magnitude is very similar to the debt burdens, which leads the authors to conclude that both good policies and debt level management are important to avoid debt crises. However, their empirical strategy does not allow them to remove several biases in the estimation of relevant coefficients. The choice of the CPIA as a governance proxy is highly questionable for many reasons. From a technical viewpoint, the definition of the index has been modified over the years: in 1998, the scaling changed from a grade ranging from 1 to 5 to a grade ranging from 1 to 6. This variable is only available from 1977 onwards, and it is replaced for the missing years with a particularly poor governance proxy (the CPIA is replaced with the fitted values of the regression of the CPIA on log (inflation +1)). Finally, the explanatory variables are lagged by one year, considering the beginning of the debt crisis, which goes in the right direction so as to mitigate the simultaneity bias (a deterioration of the debt burden could be the result of the crisis and not its cause if both variables are taken in the same year). However, two or three-year lags would have been more comforting in this respect. It is especially true as far as the CPIA variable is concerned, as it is likely to be influenced by the crisis itself, being a governance index and not a measure of long-term effect of the institutions on the probability of default.

2. What's new? Debt cancellations and the international governance of external debt

2.1 The HIPC Initiative and the MDRI: theoretical foundations

The analysis of debt sustainability and default occurrence requires a better understanding of the links between debt and growth. According to neoclassical theory, the investment return should be high in countries with low levels of capital and get lower as a country's stock of capital increases. If debt is used to finance productive investments, then the returns on these investments should generate enough money to cover the cost of debt. The induced growth should increase the government's revenues, allowing it to repay its debt. However, when the initial debt stock of a country is high, taking on more debt can threaten its growth performance by diverting money from investment into debt service. Debt is used to finance consumption rather than investment, as the country knows that any benefit from investing will be taken away by interest payments. The debt overhang literature empirically established a "Laffer curve" for debt: for high levels of debt, the incentive constraint of the country becomes tighter, and default is optimal. Patillo, Poirson and Ricci (2002) showed that debt and growth actually seem to be linked by an "inverted U" relationship. These models are mostly designed for middle-income countries whose debt is non-concessional. However, Koda (2006) developed a sovereign debt model suited to low-income countries and generated similar results. The model focuses on an incentive problem: if there is a level of income above which the country loses its eligibility for donors' aid, as is the case for IDA lending, for example,[3] then an LIC may have an incentive to accumulate a significant amount of debt and allocate resources to consumption rather than investment. The country manages its debt at a very low cost (it is concessional) around the cut-off, and may become permanently aid-dependent.

This literature provided the basis of the Heavily Indebted Poor Countries Initiative (1996), which was followed in 2006 by the Multilateral Debt Relief Initiative (MDRI), as their models seem to indicate that a one-time debt relief stock treatment may be effective in helping the country to get out of the Laffer curve zone, where additional debt does not generate any growth, and perhaps even harms it.

2.2 Facts and figures[4]

The international community provided debt relief to low-income countries through the Debt Relief Initiative for Heavily Indebted Poor Countries (HIPC), created in 1996, and the Multilateral Debt Relief Initiative (MDRI), created in 2006. Thirty-one countries are receiving debt relief under one or both of these Initiatives and ten other countries are potentially eligible. This debt relief is worth around US$69 billion in 2006 net present value (NPV) terms. In 2006, following the 2005 Gleneagles Summit of the G8 group of industrialized nations, the World Bank joined the IMF and the African Development Bank (ADB) in implementing the Multilateral Debt Relief Initiative, forgiving 100 percent of the eligible outstanding debt owed to these three institutions by all HIPC countries which reached the completion point of the HIPC Initiative. In 2007, the Inter-American Development Bank (IDB) joined the World Bank, the IMF and the ADB in providing 100 percent debt relief on eligible debt to HIPCs reaching the completion point.

[3] IDA loans and IMF financing under the PRGF are submitted to a per-capita-income eligibility criterion, among other criteria. For more details, see http://go.worldbank.org/83SUQPXD20

[4] Source: Worldbank Website, WDI and GDF.

A country is potentially eligible for the HIPC Initiative if it meets income and indebtedness criteria. Its annual per capita income must be below the threshold for eligibility for concessional borrowing from both the World Bank and the IMF, and external public debt must exceed 150 percent of its exports (or in certain cases, 250 percent of fiscal revenues). There are 41 such potentially eligible HIPCs (see Table 2). To become eligible, the country must also have had a program with the IMF at some point since the start of the Initiative in 1996. The first stage of qualification is the decision point, at which the country must have a current track record of satisfactory performance under IMF and IDA-supported programs, a Poverty Reduction Strategy (PRS) and an agreed plan to clear any arrears to foreign creditors. At the decision point, many creditors, such as the World Bank, the IMF, multilateral development banks, and Paris Club bilateral creditors begin to provide debt relief, although many of these institutions maintain the right to revoke this if policy performance falters. Debt relief from participating creditors becomes irrevocable at the completion point. At the decision point, the country agrees on a short list of completion point triggers, upon which the country will "graduate" from the HIPC Initiative.

Table 2.   Countries eligible for HIPC Initiative (as of March 2008)

Countries having reached the completion point (23)			
Benin	Bolivia		Burkina Faso
Cameroon	Ethiopia		Ghana
Guyana	Honduras		Madagascar
Malawi	Mali		Mauritania
Mozambique	Nicaragua		Niger
Rwanda	Sao Tome and Principe		Senegal
Sierra Leone	Tanzania		Uganda
Zambia	The Gambia		
Interim Countries (between the decision and the completion point) (10)			
Burundi	Chad		Congo, Rep.
Congo, Dem. Rep.	Central African Rep.		Guinea
Guinea-Bissau	Haiti	Liberia	Afghanistan
Countries potentially eligible (8)			
Togo	Kyrgyz Rep.		Sudan
Comoros	Eritrea		Nepal
Côte d'Ivoire			Somalia

The MDRI provides HIPCs that have reached the completion point irrevocable, up-front cancellation of debt owed to the IDA, the African Development Fund, the IMF, and the IDB. Debt cancellation under the MDRI will be in addition to debt relief already committed under the HIPC Initiative. The full benefit of the MDRI from all four institutions to the 22 countries that have so far reached completion point is broken down by country and by donor in Table 3.

Table 3.   Debt Cancellations under MDRI (in millions of current US dollars)

Country	ADB	IDA	IMF	IDB	Total Amount Cancelled
Ghana	480	2,955	388		3,823
Tanzania	608	2,778	342		3,728
Uganda	514	2,754	128		3,397
Ethiopia	738	2,315	164		3,217
Bolivia		1,503	235	1,000	2,738
Honduras		1,174	157	1,400	2,731
Zambia	241	1,857	589		2,687
Senegal	409	1,837	147		2,392
Madagascar	370	1,752	201		2,323
Malawi	383	1,800	44		2,227
Mozambique	542	1,294	156		1,992
Nicaragua		758	206	984	1,948
Mali	555	1,250	110		1,915
Cameroon	229	815	254		1,298
Burkina-Faso	342	727	91		1,160
Benin	360	683	53		1,096
Niger	193	741	114		1,048
Sierra Leone	194	500	176		870
Mauritania	259	543	48		850
Guyana		187	66	467	720
Rwanda	109	344	77		530
Sao Tome and Principe	39	36	2		78
Total	6,564	28,603	3749		38,916
Total African Countries	6,525	28,567	3747		34,630

In appendix 2, we also present the amounts cancelled in terms of 2005 GDP for each country. Sao Tome and Principe received the largest debt relief in proportion of their GDP (110%) while Cameroon received the lowest (7.7%). As a result of these Initiatives, total debt service has decreased in countries having already benefited from debt relief.

Figure 1. Total debt service for HIPCs 1996-2005

Total Debt Service
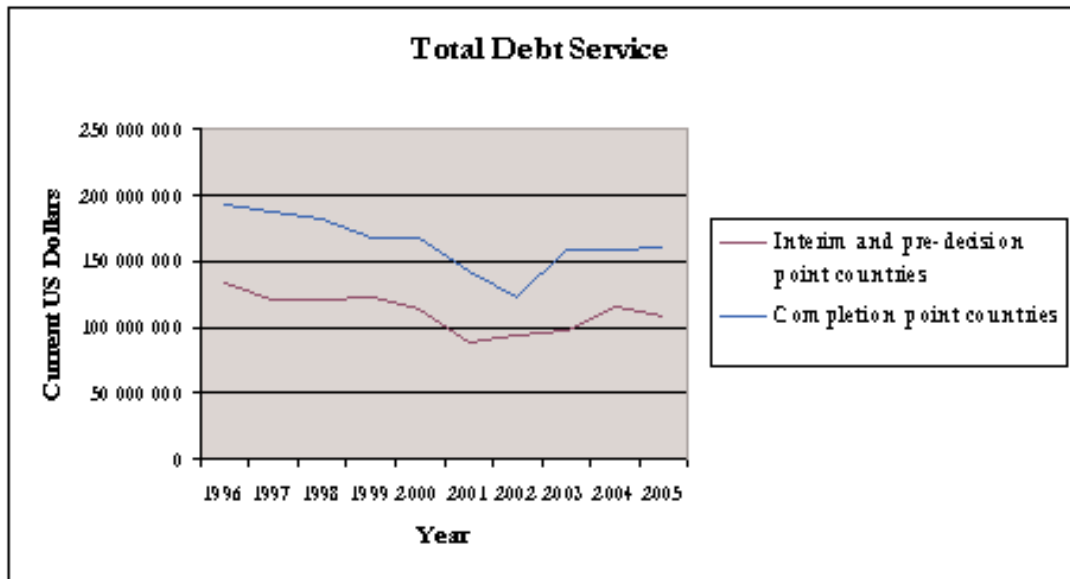
Official donors have shown concern with respect to the emergence of new donors (see IMF, 2006, on the issue of free-riding) in countries which benefited from debt relief. If countries take advantage of the fiscal space brought by debt cancellations to borrow more debt on non-concessional terms, it may seriously threaten debt sustainability in the medium term. Little is known as far as these donors' practices are concerned and we should not draw any hasty conclusions in this respect from particular cases. In an attempt to see whether this problem appears in the data, we looked at the share of concessional lending in total debt stock for HIPCs versus other low-income countries from 1996 to 2005. We see in Figure 2 that the share of concessional debt in total debt stock increased steadily from 1996 to 2005 for HIPCs (from 66% to 76%). The evolution of this share for other LICs is less clear-cut, but it seems to have been increasing recently (68% in 2005 compared to 60% in 1996).

Figure 2. Concessional Debt / Total Debt Stock for LICs and HIPCs (1996-2005)

Concessional Debt as a Percentage of Total Debt Stock
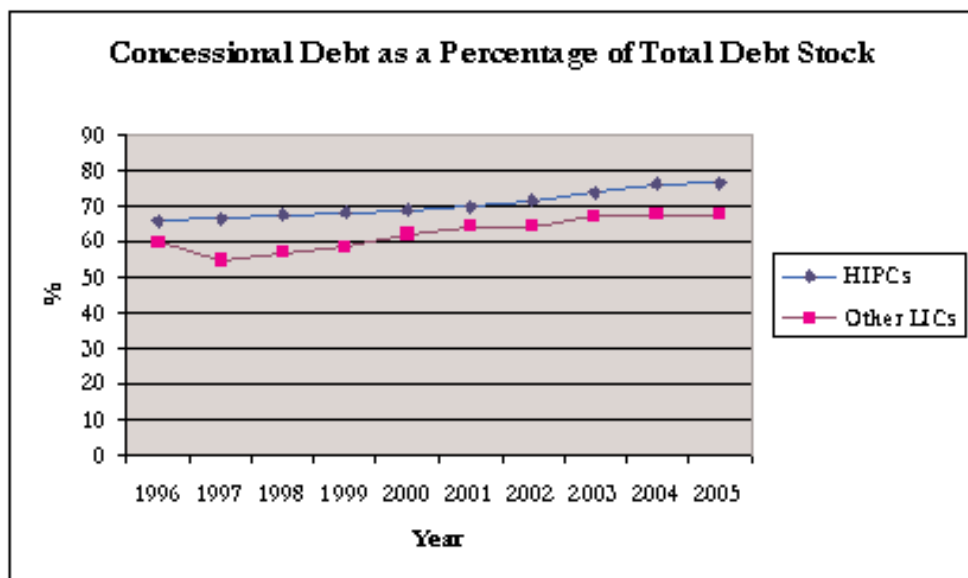
Figure 3.   Composition of HIPCs External Debt (by type of creditors), 1996-2005
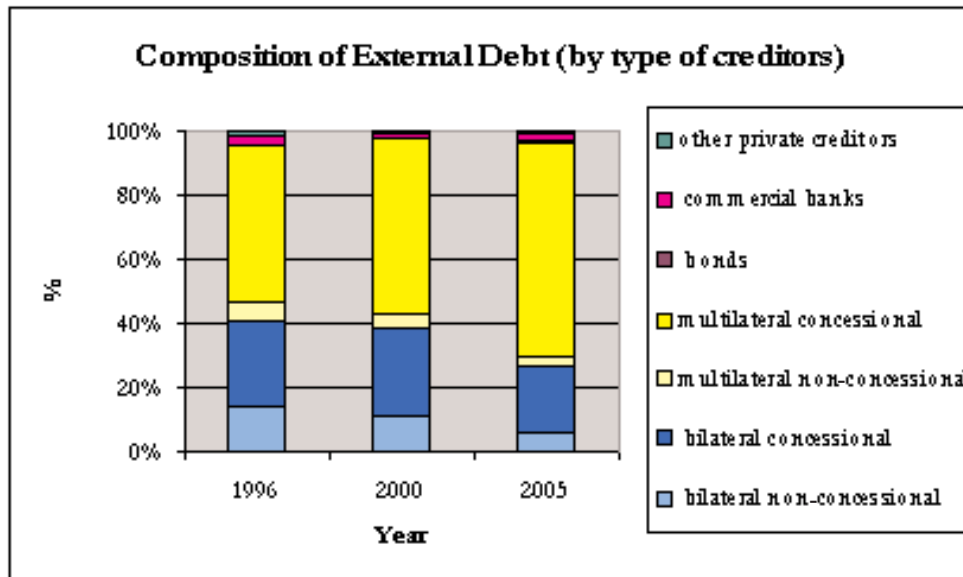
Due to data unavailability, we cannot see any evolution after the implementation of MDRI, which is a serious drawback. However, we tried to look at the evolution of the debt structure for HIPCs more precisely by breaking down public debt by type of creditor in 2000 and 2005 to see if the share of bonds, commercial lending or other private creditors has risen during the decade following the HIPC Initiative. As Figure 3 indicates, it does not seem to be the case yet. The main evolution that can be detected here is that the share of concessional multilateral lending has increased on average, mainly after the Enhanced HIPC (1999) at the expense of bilateral lending.

2.3   What can we expect from debt relief?

In a 2000 paper, Cohen assesses the true amount of resources released by donor countries under the HIPC Initiative by using a market perspective rather than the common net present value calculations on outstanding HIPC debt. More precisely, he tries to take into account the risk of non-payment for some of the debt that has been written down, and concludes that the significance of the HIPC Initiative should be scaled down considerably. On average, market values of HIPCs' debt is lower by more than two thirds of its net present value, meaning that debt relief only alleviates the debt burden by a limited amount. If the ratio of public debt to exports is lowered 200%, then the written-off debt corresponds to a market value reduction of only 8.6%. The decrease in debt service induced by debt relief was meant to be accompanied by an increase in poverty-reducing expenditures, such as health, rural infrastructure and education.

Kraay and Depetris Chauvin (2005) empirically assess the extent to which debt relief has been successful in meeting these objectives, using a newly constructed database measuring the present value of debt relief for 62 low-income countries (from 1989 to 2003). Therefore, their database does not allow them to include the effects of MDRI. Using a difference-in-difference estimator, they ask whether countries receiving more debt relief over a given five-year period were more likely to see improvements in average outcomes in the next five-year period relative to the first. The relevant outcomes are the level and composition of public spending (to test if freed up resources have helped increase productive investments), the incentives for good policy choices (in line with the debt overhang literature which states that if debt is too high, a country prefers to allocate money to

consumption rather than investments whose returns would be diverted into debt service) and per capita GDP growth. Their findings do not strongly support the idea that debt relief has succeeded in achieving these objectives: there is no significant effect of debt relief on subsequent per capita growth and on change in government spending (more strikingly, only a handful of the countries with positive debt relief in the initial period saw increases in government spending in the next period). However, they do find evidence of an effect on government spending on health and education (all the more so for countries that received substantial debt relief under the HIPC Initiative after 2000). However one cannot rule out the possibility that this effect merely reflects the conditionalities associated with HIPC debt relief.

One must be cautious in concluding from these studies that debt relief missed its objectives, as the effects of the MDRI have not been evaluated yet. If anything, they point to the need for upfront and massive debt relief to more substantially alleviate the low-income countries' debt burdens, which is underway with the MDRI. More recently, the World Bank has estimated that in post-decision-point HIPCs, health and education spending have increased on average from under 7 percent of GDP in 2000 to 9 percent in 2006. In nominal terms, poverty-reducing expenditures amounted to US$17 billion in 2006, which represent an increase of US$3 billion since 2005. These expenditures are more than five times the level of debt-service payments after debt relief.

2.4 How to prevent new debt crises? Comments on the Debt Sustainability Framework

The main concern of several IFIs in the aftermath of the HIPC Initiative and the MDRI was to avoid overborrowing on the part of low-income countries in order to prevent debt crises. Overborrowing is assessed with respect to the evolution of debt compared to the evolution of different measures of a country's ability to pay (exports, GDP, etc.). The benchmark scenario in a joint IMF/World Bank debt sustainability analysis is based on a simulation of the debt dynamics following the accounting identity mentioned in section 1.1. These debt dynamics are then submitted to stress tests affecting the evolution of the debt path: the average interest rate, real GDP growth and the current account are each in turn changed by half a standard deviation for five years, and then they are simultaneously changed by a quarter of their standard deviation for the same length of time. Finally, an exchange rate devaluation of 30% is computed for the first projection year. One initial criticism formulated by Wyplosz (2007) relates to the standardization of the stress tests and further, to the absence of correlation allowed between shocks affecting an economy. If a country's debt-to-GDP ratio does not show any sign of stabilization, the probability of a debt crisis is likely to increase as time passes, the main question being when it will no longer be able to service its debt obligations. The debt sustainability analyses conducted by the IMF and the World Bank gauge sustainability of the debt path with

respect to the path of relevant indicators such as GDP and exports. This approach in terms of thresholds is very close to the static solvency analysis mentioned before, the main difference being that the solvency analysis is brought to a dynamic framework. However, the only way to account for the dynamic evolution of debt is to make assumptions about the evolution of the main variables (current account, interest rates, GDP growth, etc.), which has been heavily criticized on the grounds that the assumptions could be politically biased, or just plain wrong, as it is certainly difficult to infer the probability of unpredictable events such as debt crises.

To assess debt sustainability, the Debt Sustainability Framework (DSF) sets a debt ceiling beyond which the risk of default is deemed too important. This ceiling is differentiated among countries with respect to the quality of their economic policies and institutions, as measured by the CPIA.[5] Countries are classified into three groups: weak, medium and strong capacity. Each group of countries is assigned a maximum debt ceiling. Table 4, below, provides these ceilings for each group:

[5] The Country Policy and Institutional Assessment (CPIA) rates countries against a set of 16 criteria grouped in four clusters: (a) economic management; (b) structural policies; (c) policies for social inclusion and equity; and (d) public sector management and institutions. Each cluster is given the same weight within the index.
For more details see http://go.worldbank.org/7NMQ1P0W10

Table 4.   Maximum Debt Ratios for each CPIA category

	NPV of debt stock in % of			Debt service in % of	
	Exports	**GDP**	**Fiscal revenues**	**Exports**	**Fiscal revenues**
Weak					
CPIA<3.25	100	30	200	15	25
Medium					
3.25<CPIA<3.75	150	40	250	20	30
Strong					
CPIA>3.75	200	50	300	25	35

Source: DSF, IMF/ World Bank.

The logic of this classification directly stems from the empirical analysis in Kraay and Nehru (2005) as mentioned before. For a same level of debt, a country with a weak institutional quality will more likely experience a debt distress episode than a country with strong governance. Therefore, the thresholds setting the maximum amount of debt that can be reached without endangering sustainability should be different along this dimension. However, it is the only dimension taken into account by the DSF and we have already pointed out why the empirical grounds for such a classification were unsound. It should be noted here that a debt ceiling based only on institutional capacity may not be appropriate as there are other channels through which a country may be vulnerable to debt crises. For comparable levels of the CPIA and debt indicators, two countries with different exposure to volatility (be it terms of trade, exports or GDP volatility) are more likely to be confronted with a debt distress episode (see section 3.2). The DSF does not directly account for this component of debt crises (stress tests are applied to the evolution of the debt dynamics but in a deterministic way, in reference to the past and without allowing for covariance between shocks). Some recent proposals have been made to frame a stochastic public DSF (Gray et al. 2008, Di Bella, 2008) in order to improve debt sustainability analyses.

The theoretical approach underlying debt sustainability in the DSF is based on the requirement of a stabilization of the debt-to-GDP ratio, following the idea that a rising ratio is the sign of overborrowing (with respect to a country's resources). However, a rising debt-to-GDP ratio does not necessarily mean that the debt dynamics are unsustainable. Countries may run sizeable deficits to smooth consumption or to increase expenditures to enhance future growth. The debt elasticity of growth is somehow left out of the DSF, but it is crucial to the analysis of debt sustainability. A country whose debt is rising rapidly in the short term might be solvent if its growth prospects are good in the medium term. If the country's CPIA is downgraded, then its debt dynamics may raise a red flag in the DSF while its likelihood of experiencing a debt crisis has not fundamentally changed. For understandable reasons, the DSF emphasizes the risk of overborrowing but in doing so it limits the possibility of virtuous debt dynamics, leading to more growth in the future (all the more so if the scale factor plays a crucial role in investments that have to be made to lead to growth, as may be the case for infrastructure, for example).

Debt sustainability analyses are the basis of the financing policy of IDA and its loans/grants mix. Countries are classified into four categories:

- Countries in debt crisis: the maximum thresholds are currently breached.
- Countries at high risk of debt distress (red light): the thresholds have been breached during the baseline scenario. IDA and ADF financing are available only through grants. IDA reduces the volume of financing available according to the usual allocating criteria by 20% in order to mitigate moral hazard.
- Countries at medium risk of debt crisis (yellow light): the thresholds are not breached in the baseline scenario, but during the stress tests. IDA and ADF have a 50% loans/50% grants financing policy. IDA reduces the volume of financing available according to the usual allocating criteria by 10% in order to mitigate moral hazard and give incentives to the countries to change categories.
- Countries at low risk of debt crisis (green light): the thresholds are never breached. IDA and ADF financing is only made available through loans.

Table 5 below illustrates this classification for post-HIPC and MDRI countries, based on the latest DSAs available. As of October 2007, only seven countries out of 21 are classified as having low risk of debt crisis although most debt relief has been taken into account. For the previous fiscal year, this number was 13. This clearly raises the question of the ability of the DSF to be satisfactorily forward-looking: how is it possible for a country to change categories in a year when the framework is supposed to make plausible assumptions on debt dynamics? Either countries have taken on huge amounts of debt, leading to a breach of the threshold during the stress tests less than two years after they benefited from debt relief, which is worrisome; or they have suddenly changed CPIA categories, reducing the appropriate debt they should carry to sustain its dynamics (see IMF, 2006, for concerns regarding the volatility of the CPIA); or the assumptions made about the evolution of macroeconomics variables in the baseline scenario were too optimistic.

Table 5. Impact of MDRI on debt sustainability threshold (as of October 2008)

Country/Last DSA date	Institutional quality based on CPIA	DSF thresholds (%)	Ratio 2006 after MDRI (%)	Risk Classificationt	Country/Las DSA date	Institutional quality based on CPIA	DSF thresholds (%)	Ratio 2006 after MDRI (%)	Risk Classification
Benin		VAN stock/Exp = 150	86.3		Mauritania		150	42.5	
Jan-08	Medium	VAN stock/PIB = 40	10.6		Jul-08	Medium	40	24.2	
		Service/Exp. = 20	5.5	Medium risk-Yellow light			20	5.9	Medium risk-Yellow light
Bolivia		150	64.5		Mozambique		150	24.5	
Jul-06	Medium	40	23.7	Low risk-	Jul-08	Medium	40	9.1	Low risk-
		20	8.1	Green light			20	2.5	Green light
Burkina Faso		150	85.8		Nicaragua		200	106.3	
Apr-07	Medium	40	10.6	High risk-	May-06	Strong	50	42.1	Medium risk-
		20	5.5	Red light			25	6	Yellow light
Cameroon		150	13.5		Niger		150	45.6	
Aug-08	Medium	40	3.5	Low risk-	Jan-07	Medium	40	7.4	Medium risk-
		20	2.4	Green light			20	2.3	Yellow light
Ethiopia		150	35.5		Rwanda		150	65.6	
Jul-08	Medium	40	5.6	Medium risk-	Mar-08	Medium	40	6.9	High risk-
		20	1.4	Yellow light			20	2.5	Red light
Ghana		200	45.9		Sao Tome		100	65	
June-07	Strong	50	17.5	Medium risk-	May-07	Weak	30	25.5	Medium risk-
		25	11.9	Yellow light			15	12	Yellow light
Guyana		150	87.6		Senegal		150	55	
Jan-06	Medium	40	80.2	Medium risk-	Jul-08	Medium	40	13	Low risk-
		20	3.9	Yellow light			20	6.2	Green light
Honduras		200	51.7		Sierra Leone		100	35.9	
Dec-06	Strong	50	21.3	Medium risk-	Jan-07	Weak	30	8.1	Medium risk-
		25	3.3	Yellow light			15	5.5	Yellow light
Madagascar		150	38.7		Tanzania		200	59.6	
Jul-08	Medium	40	12	Low risk-	Apr-07	Strong	50	15.6	Low risk-
		20	3.5	Green light			25	5.1	Green light
Malawi		150	39		Uganda		200	33.3	
Jan-08	Medium	40	10.9	Medium risk-	Jan-07	Strong	50	4.8	Low risk-
		20	16.2	Yellow light			25	9.9	Green light
Mali		150	95.6		Zambia		150	63	
Aug-08	Medium	40	27.5	Medium risk-	Jan-08	Medium	40	19.8	Low risk-
		20	6.8	Yellow light			20	3.8	Green light

Sources: IMF, WB, ADB, IDB.

The purpose of the DSF is clearly to provide guidelines regarding what can be called prudent borrowing on the part of low-income countries. The difficulties arising in framing the problem of debt sustainability should not discard this intention, and the emergence of an international governance of debt is certainly good. In our view, it should be accompanied by reflections on innovative forms of lending on the part of donors. Traditional concessional loans do not prevent countries from overborrowing, nor do they make them less crisis-prone. For many years, researchers have advocated contingent lending for low-income countries that are particularly vulnerable to external shocks. The borrowing country should have an element of flexibility in its repayment schedule in order to be able to manage shocks and avoid possible spillovers to its repayment capacity, as has been the case in the past. We present in the next section some practical ideas based on the AFD counter-cyclical loan and related work we have done on the links between debt and shocks.

3.   Debt and external shocks: some practical proposals

3.1   Debt Crises: Institutions or Shocks?

The question of knowing whether sovereign default is a purely opportunistic phenomenon on the part of the sovereign or whether default is acting as a partial (and costly) insurance against adverse economic outcomes has many implications on the way IFIs should approach lending and debt crisis management.

Reinhart, Rogoff and Savastano (2003) argue that a large group of middle-income countries has been affected by "debt intolerance" throughout history: although their external debt-to-GDP ratios are moderate, they are perceived as riskier and are charged higher spreads or are subject to tighter credit conditions than other countries. The main cause for this debt intolerance lies in their credit histories, which show several occurrences of default. This line of argument corresponds to the view that some countries are more debt crisis-prone than others, meaning that the main factor behind debt crises is idiosyncratic and has something to do with long-term effects of institutions (in a loose sense). However, Catao and Kapur (2006) question this reasoning, and argue that the underlying volatility of macroeconomic aggregates is a key driver of sovereign risk in developing countries. Part of this volatility may be rooted in institutional arrangements that tend to foster bad macroeconomic policies, but another stems from exogenous factors such as commodity price shocks. They examine the extent to which volatility and countries' repayment histories explain default risk, controlling for standard indicators. Output and terms-of-trade volatility are highly significant in explaining debt distress while credit history is no longer significant once introduced in the regression. Tomz and Wright (2007) use a new set of historical data on borrowing, default events and economic activity, and also find that, since 1820, there has been a broad tendency for a large number of countries to default in "bad times".

In Cohen et al. (2008), we investigate the links between export shocks and debt crises. As a simple yardstick, we defined as export shocks all episodes during which a country's export earnings fell below a moving threshold, defined as 95% of the average of the past five years. Such a definition aims to cope with exceptional export movements around the trend, but not to correct for the trend itself (which is a doomed enterprise, as many stabilization schemes in developing countries have experienced). Such a shock criterion is set in a way that benefits the country facing exogenous export shocks, while continuing to encourage appropriate adjustments to permanent and recurrent shocks. We defined a debt crisis episode from a slightly modified version of the database compiled by Kraay and Nehru (2006), which we updated in order to cover all debt distress events between 1970 and 2004. The largest sample allows us to identify 90 debt distress episodes, using their definition. As we are interested in the correlation between export shocks and debt crises, we ultimately deal with 68 debt distress events for which data on export earnings and other covariates are available. Using our definition of export shocks, we can identify their occurrence for 61 poor or emerging countries throughout the period. The average length of a debt crisis situation in our sample is 12.2 years and the median is 9.5, which shows that we are effectively dealing with relatively severe crises.

In this paper we find that the likelihood of a debt crisis is significantly triggered by the occurrence of an export shock in the years that preceded the crisis. The predicted probability that a country finds itself in a situation of debt distress increases from 16 to 18 percentage points (depending on the specification) when it has experienced at least one export shock in the preceding three years. The magnitude of this variable is quite substantial, considering the fact that the unconditional probability in our sample of a country facing a

debt crisis is 0.22. The coefficients on the debt burdens (measured in terms of PPP GDP or exports) are significant, and show that the probability of a debt crisis increases as the debt ratios go up. The debt service-to-exports indicator is likely to be a better measure of the debt burden, as the debt stock is expressed in nominal terms and not in net present value terms (this tends to overestimate the debt burden for countries whose loans are mainly concessional). Therefore, this measure allows more reliable comparisons between countries with and without access to financial markets. It is useful here to point out that the effect of the governance index is largely comparable to the effect of our export shocks variable, drawing attention to the fact that they are just as significant a determinant of debt crises (not the case in Kraay and Nehru).

This study sheds light on the effect of export shocks on a country's probability of default. Therefore, we think that a lending strategy which would take this vulnerability to export shocks into account, as well as its implication in terms of disruption of the ability to meet debt service obligations, could go a long way towards preventing the build-up of debt problems, especially in countries that have no market access. It could also be true that if the markets were capable of integrating contingent clauses to their debt contracts, the risk of default of theses countries would be considerably lowered, allowing them to borrow internationally. A debt instrument linking repayments to export revenues seems to be most needed to preserve debt sustainability. In fact, in the current literature on debt sustainability, too much attention has been given to expected levels of the relevant ratios (net present value of debt-to-exports and to-GDP, debt service-to-exports) while sustainability is much more about limiting the likelihood of bad outcomes and countries' vulnerability to the volatility of these ratios of debt service to exports.

3.2 The AFD counter-cyclical loan

Sovereign crises are long-lasting and persistent. The comparison of macroeconomic situations of countries that have defaulted against those in countries that have avoided default shows a negative effect of default in terms of financial costs and growth performance. Default is likely to raise the cost of financing (it can lead to exclusion from financial markets, but also, in the case of low-income countries, from official lending, as IFIs may switch towards a systematic grant policy, drastically reducing the volume of external financing). However, one should also bear in mind that there can be discrepancies among creditors' appreciations of a country's creditworthiness or its future ability to repay its debt. A good example of this is the renewed ability to borrow for countries that have benefited from HIPC and MDRI from new creditors (China), sometimes at market conditions.

Contingent lending aims at avoiding protracted negotiations and their adverse consequences on a country's economy in case of default. The case for counter-cyclical loans is made extensively in Cohen et al. (2008) and the AFD counter-cyclical loan is presented in detail. Here we present a summary of the loan's characteristics (for more details, see the previous paper).

Guillaumont *et al.* (2003) usefully discuss several ways to dampen the impact of price shocks. One of them consists in explicitly linking debt repayments to the economic environment. An automatic adjustment of the public debt service to the evolution of export prices would reduce debt service during crises, and require faster repayment during booms. In a similar spirit, Gilbert and Tabova (2004) investigate the feasibility of a loan indexation of commodity prices.[6]

We explored a somewhat simpler version of this idea of changing the repayment structure of a concessional loan in order to increase countries' flexibility in meeting their debt service obligations.

Concessional loans to the poorest countries usually take a very simple form: they have very long maturities, very long grace periods and low interest rates. For example, an IDA loan stretches over 40 years, has a 10-year grace period and carries a 0.75% interest rate. The logic of having low

---

[6] Donors are currently experimenting with similar ideas. For example, Agence Française de Développement (AFD) recently made a loan whose maturity depends on cotton prices.

In the same spirit, other proposals have been made to preserve debt sustainability by indexing concessional loans to real exchange rates (see Yi and Vostroknutova, 2005, for example).

interest rates is relatively straightforward: the country being poor, it cannot pay much. However, the logic of having a long grace period is less obvious. The grace period is generally intended to give time to the country to launch the project, which is financed through the loan once the financing decision is made. The need for long grace periods is less obvious if aid is geared towards sectoral or budgetary financing. Moreover, it encourages governments to take loans that they may not need, as the service of the debt actually starts far in the future. For a government whose time horizon is relatively short, there may be no clear distinction between a loan and a grant.

Based upon these ideas, we calibrated the potential profile of a concessional loan with the following features: a 30-year maturity with an initial fixed grace period of five years, as compared to a more traditional 10-year grace period. The remaining five years are not lost to the country, however, but can be drawn upon later, in the event of an adverse shock. We call them the "floating grace" periods.

Regarding interest rates, we calibrated two options. The first option is to charge an interest rate of 1%. In that case, if worst comes to worst, the country may have to draw on its five floating grace episodes immediately after the initial five grace years. The new loan is, ex post, identical to a 30-year loan with a 10-year grace period.

In general, however, this is not likely to be the case. The country will draw on its "floating grace" later on. As the amortization of the loan will typically start earlier (compared to the worst-case scenario) if the country does not experience a shock immediately after the initial 5-year grace period, it is possible to give value on the market to the repayments from years 6 to 10, for the benefit of the country. This allows the country to expand its right to suspend the payment of the principal as time passes.[7] If the country never draws on its floating grace, it can then shorten the length of its loans, net the grace period (repayment in advance without penalties).

We also calibrated an option with a 1.5% interest rate charged on the loan in order to increase the flexibility given to the country. The differential of interest rates is also returned to the country, in the form of additional years of suspension.

We showed how the number of suspensions evolves as time passes in both cases, under the assumption that a

3.5% interest rate is paid on the assets. The number of possible suspensions beyond the initial grace period of 5 years varies between 5 and 7 years of payment (which corresponds to 10 to 14 semi-annual repayments) when the interest rate charged on the loan is 1% and between 6 and 9 years of payment (12 to 18 semi-annual repayments) when the interest rate charged on the loan is 1.5%.

It is worth pointing out that mutualization between countries has been excluded from our scheme. In the end, the borrowing country receives the totality of its rights to suspension whether or not it has experienced shocks. This feature tries to mitigate the possibility of moral hazard. As a matter of fact, there is no reward for a country which uses its rights to suspension immediately after the initial grace period as compared to a country which saves its five rights to supension for a later use. As the number of suspensions is globally constrained, the borrowing country is thus not prompted to behave badly in order to immediately reap the benefit of payment suspensions.

In order to allow for the use of the floating grace period, we chose to link the repayments of the country with its export earnings, expressed in the same currency as the one in which the loan has to be repaid. As we argued in section 2, export earnings are a natural indicator of a country's ability to face its debt service obligations in foreign currencies.

Export revenues capture two types of shocks: price and quantity shocks. Commodity price volatility is an important determinant of export revenue for countries highly dependent on a few commodities. Nevertheless, shocks on quantities also tend to explain a good part of the variability. Indeed, Gilbert and Tabova (2004) showed that for 17 country-commodity pairs, quantity and price variability appear to be of comparable magnitude, with a tendency for quantity effects to exceed price effects. Quantities are likely to be affected by presumably exogenous factors, such as weather conditions, strikes and wars. If the obvious advantages of an index based on world prices lie in its immediate availability and the absence of possible manipulation by price-taker countries, the authors conclude

---

[7] Our main concern here is that the profile of repayments remains as neutral as possible from the borrower's viewpoint, regardless of the moment when it draws on its right to suspension.

on the weakness of the world commodity price proxy to account for a country's ability to pay in their attempt to evaluate the benefit of linking concessional debt repayments to the evolution of commodity prices. Relying on a terms-of-trade trigger would also raise issues, as it would limit the applicability of the scheme to countries with high commodity concentration in imports and exports, whose international prices are readily available. Moreover, focusing only on commodity prices has the major drawback of assuming that these countries' export structures are not going to change towards manufactured goods, for example, at least for the next 30 or 40 years (i.e. the loan maturity). It may even prevent these countries from diversifying their export basis away from commodities in the future in order to fully benefit from the scheme. In this respect, the choice of export revenues also seems more relevant because it does not prejudge a country's future export structure.

Nevertheless, two main difficulties emerge with the choice of a criterion based on export revenues: incentives and timeliness. We must include the policy and reporting incentives that the scheme is likely to generate for an indebted government. The borrowing country must not be able to misreport its trade statistics in order to benefit from payment suspensions. Therefore, we chose to use mirror trade statistics, i.e. other countries' imports from the borrowing country. It is very unlikely that a country will be able to convince all its trade partners to misreport their import flows in order to trigger the mechanism. Of course, a government could be directly responsible for a fall in the quantum of exports, which would be detected as such in mirror statistics, but as its total revenues are likely to hinge upon export taxes, it is very doubtful that a country could benefit from the voluntary disruption of its export flows (as mentioned above, the shock criterion is also set with reference to a moving average of the past years, and debt service is only a small fraction of total exports). There is a possibility that a government can increase its income from export taxes, even though the country's export quantities fall in order to reap the benefit of the scheme.

Nevertheless, the scheme is designed to mitigate this type of incentive, as there are only a limited amount of suspensions to draw upon. There is therefore no free lunch, i.e. no benefit from triggering the mechanism when there is no need to do so.

Once we have defined what constitutes an export shock, the automaticity of the suspension is an important feature of the counter-cyclical loan: if the criterion is met, the mechanism can be triggered by the country. Nevertheless, it should not be an obligation: the country may draw on its capital of floating grace periods and suspend its payments, but is not forced to do so. As a matter of fact, its ability to pay might not be considerably affected by a shock, especially if it has sizeable forex reserves.

Our next question was: had these export shocks not taken place in these countries, what would their probability of facing debt distress have been? We simply simulated how the counter-cyclical loan that we just defined would have performed for a sample of 24 HIPCs during the period 1975-2004. The thought experiment goes as follows: if counter-cyclical loans had been made to these countries in year 1975, would they have been able to dampen most of their export shocks? In particular, for each country we try to estimate whether a 1% or a 1.5% interest rate would have been more appropriate with respect to their vulnerability. Of course, the assumption that the loan starts in 1975 is not neutral with respect to these calculations because export earnings fluctuated widely during the 1980s (which correspond to the first years of amortization in our scheme) and many countries in our sample experienced consecutive export shocks during this period. If we had assumed that the loan had started in 1980, for most of the countries, all shocks would have been entirely dampened by such a scheme. All calculations assume that a 3.5% interest rate is paid on assets.

On average, countries in the restricted sample of 24 HIPCs experienced ten shocks during our period of interest. Table 6 below indicates the number of shocks a counter-cyclical loan would have dampened:

Table 6.   Simulation of a counter-cyclical loan for 24 countries, 1975-2004

Countries	Number of shocks (Total)	Number of shocks dampened by a loan with a 1% interest rate	Number of shocks dampened by a loan with a 1.5% interest rate
Burundi	18	5	6.5
Sierra Leone	17	7	9
Zambia	15	8	9
Uganda	14	8	10
Rwanda	13	5	7
Chad	12	5	7
Mauritania	12	9.5	12
Nicaragua	12	6	7
Niger	12	5	7
Togo	11	5	6
Cote d'Ivoire	10	5	7
Gambia, The	10	6	8
Malawi	10	5.5	7
Senegal	10	6	7
Burkina Faso	9	5.5	7.5
Guyana	9	6	7.5
Cameroon	8	6	8
Ghana	8	8	8
Guinea-Bissau	6	5.5	6
Madagascar	6	5	6
Benin	5	5	5
Bolivia	5	5	5
Congo, Rep.	5	5	5
Mali	3	3	3
AVERAGE	**10**	**5.8**	**7.1**

For all countries, a 1.5 % interest rate charged on the loan would have been more appropriate because it would have permitted more suspensions in the face of the frequency of shocks. Countries with very volatile export earnings would gain from the increased flexibility offered by a higher (but still low) interest rate.

Using the estimated probability of facing a debt distress episode from our regressions, we also find that debt distress risk is significantly lowered for most of the countries which experienced export shocks, as illustrated by the change of risk category for 17 countries out of 25 (see Cohen *et al*., 2008).

Appendix 1. External Debt Dynamics

The external debt dynamics formula follows the balance of payments accounting identity:

$$D_t = C_t - NFDI_t + (1+r_t) D_{t-1} + Z_t \qquad (1)$$

where D_t is external debt at end of period t (usually denominated in US dollars), C_t is the current account balance net of interest payments, NFDI is net foreign direct investment, r_{t-1} is the nominal interest rate in period t and Z_t accounts for non-debt-creating capital flows (such as debt relief, changes in arrears, changes in foreign exchange reserves) and the fraction of the financing gap that is financed through additional external loans.

Both sides of equation (1) can be divided by GDP$_t$ (expressed in current terms) and we obtain:

$$d_t = c_t - nfdi_t + \frac{(1+r_t) D_{t-1}}{GDP_t} + z_t \qquad (2)$$

where lower case variables denote original variables expressed as a proportion of GDP.

(2) can be written as:

$$d_t = c_t - nfdi_t + (1+r_t) \frac{D_{t-1}}{GDP_{t-1}} \times \frac{GDP_{t-1}}{GDP_t} + z_t \quad (3)$$

Then we can subtract d_{t-1} from both sides of (3) to get:

$$d_t - d_{t-1} = c_t - nfdi_t + d_{t-1} \left[(1+r_t) \frac{GDP_{t-1}}{GDP_t} - 1 \right] + z_t \quad (4)$$

If we call g_t the real growth rate of GDP and π_t the inflation rate, then we can write:

$GDP_t = (1+g_t)(1+\pi_t) GDP_{t-1}$ which leads us to derive[8]

$$\frac{GDP_{t-1}}{GDP_t} = \frac{1}{(1+g_t)(1+\pi_t)}$$

Inserting into (4), we obtain[9]:

$$d_t - d_{t-1} = c_t - nfdi_t + d_{t-1} \left(\frac{r_t - g_t - \pi_t - g_t\pi_t}{1+g_t+\pi_t} \right) + z_t$$

Therefore, the debt dynamics equation can be written as:

$$d_t - d_{t-1} = c_t - nfdi_t + d_{t-1} \left(\frac{r_t - g_t - \pi_t - g_t\pi_t}{1+g_t+\pi_t} \right) + z_t$$

or as it is used in the IMF and World Bank's Debt Sustainability Analyses:

$$d_t - d_{t-1} = c_t - nfdi_t + \frac{r_t d_{t-1}}{1+g_t+\pi_t} - \frac{g_t d_{t-1}}{1+g_t+\pi_t} - \frac{\pi(1+g_t)d_{t-1}}{1+g_t+\pi_t} + z_t$$

Change in nominal interest rate	Real GDP growth	Changes in price and exchange rates

---

Appendix 2.   Debt Cancellations for MDRI

Debt Cancellations for MDRI (in % of GDP 2005)

	ADB	IDA	IMF	IDB	Total Amount Cancelled
Sao Tome and Principe	55.8%	51.6%	2.8%		110.2%
Malawi	18.5%	86.9%	2.1%		107.5%
Guyana	0.0%	23.8%	8.4%	59.3%	91.5%
Sierra Leone	16.2%	41.9%	14.8%		72.9%
Madagascar	7.3%	34.8%	4.0%		46.1%
Mauritania	14.0%	29.3%	2.6%		46.0%
Nicaragua	0.0%	15.4%	4.2%	20.0%	39.7%
Uganda	5.9%	31.6%	1.5%		38.9%
Zambia	3.3%	25.5%	8.1%		37.0%
Mali	10.5%	23.6%	2.1%		36.1%
Ghana	4.5%	27.6%	3.6%		35.7%
Honduras	0.0%	14.2%	1.9%	16.9%	32.9%
Niger	5.7%	21.7%	3.3%		30.8%
Tanzania	5.0%	22.9%	2.8%		30.8%
Mozambique	8.2%	19.5%	2.4%		30.0%
Bolivia	0.0%	16.1%	2.5%	10.7%	29.3%
Senegal	5.0%	22.3%	1.8%		29.0%
Ethiopia	6.6%	20.7%	1.5%		28.8%
Rwanda	5.1%	16.0%	3.6%		24.6%
Benin	8.4%	15.9%	1.2%		25.6%
Burkina-Faso	6.6%	14.1%	1.8%		22.4%
Cameroon	1.4%	4.8%	1.5%		7.7%
Total	8.5%	26.4%	3.6%	26.7%	43.3%
Total African Countries	10.4%	28.4%	3.4%		42.2%

References

BROOKS, R., M. CORTES, F. FORNASARI, B. KETCHEKMEN and Y. METZGEN (1998), "External Debt Histories of Ten Low-income Developing Countries", *IMF Working Papers*

CATÃO, L. and B. SUTTON (2002), "Sovereign Defaults: The Role of Volatility", *IMF Working Papers*, WP/02/149

CATÃO, L. and S. KAPUR (2006), "Volatility and the Debt-Intolerance Paradox", *IMF Staff Papers*, Vol. 53, N° 2

COHEN, D. (2000), "The HIPC Initiative: True and False Promises", OECD Development Center Working Paper N° 166

COHEN D., P. JACQUET and H. REISEN (December 2005), "Loans or Grants", CEPR Discussion Paper No. 6024.

COHEN, D. and S. VILLEMOT (2007), "Self-Fulfilling Debt Crises in Theory and Practice", *Inter-American Development Bank*, Research Department Working Paper n° 565.

COHEN, D., H. DJOUFELKIT-COTTENET, P. JACQUET and C. VALADIER (2008), "Lending to the poorest countries? A new counter-cyclical debt instrument", *OECD Development Center Working Paper N°269*.

DETRAGIACHE and SPILIMBERGO (2001) "Crises and Liquidity: Evidence and Interpretation", *IMF Working Papers*.

DJOUFELKIT-COTTENET H. et M. RAFFINOT (2007), « Viabilité de la dette et perspectives de réendettement dans les pays africains dans un contexte post-PPTE », *Techniques Financières et Développement*, N° 87, pp. 56-67.

EATON, J. and M. GERSOVITZ (1981), "Debt with Potential Repudiation: Theoretical and Empirical Analysis", *Review of Economics and Statistics*, Vol.48, pp. 234-309.

EATON, J., M. GERSOVITZ and J. STIGLITZ (1986), "The pure theory of country risk", NBER Working Paper n° 1894.

FERRARINI, B. (2007), "The Shortcomings of the New Debt Sustainability Framework in Light of Macroeconomic Vulnerability", NCCR *Trade Working Papers*, WP N° 2007/13.

GILBERT, C. and P. VARANGIS (2004), "Commodity Prices", *World Bank*, mimeo.

GILBERT, C. and A. TABOVA (2004), "Commodity Prices and Debt Sustainability", *Group of Research and Analysis on Development*, Discussion Paper N° 4.

GILBERT, C. and A. TABOVA (2005), "Can We Link Concessional Debt Service to Commodity Prices?", *Group of Research and Analysis on Development*, Discussion Paper N° 8.

GLAESER, E., LA PORTA, R. LOPEZ-DE-SILANES, F. and A. SHLEIFER (2004), "Do Institutions Cause Growth?", NBER Working Paper N° W10568.

GUILLAUMONT, P. (2005), "Macro Vulnerability in Low-Income Countries and Aid Responses", Annual *Bank Conference on Development Economics*, World Bank.

HARBERGER, A. C. (1985) "Lessons for debtor-country managers and policymakers", *International Debt and Developing Countries* (ed. Smith, G. W, and J. T. Cuddington).

IMF (2002), *Assessing Sustainability*.

IMF/WORLD BANK (2004), *Debt Sustainability in Low-Income Countries: Further Considerations on an Operational Framework and Policy Implications*.

IMF (2006), *Applying the Debt Sustainability Framework for Low-Income Countries Post Debt Relief.*

KAUFMANN, D., A. KRAAY and M. MASTRUZZI (2006), Governance Matters V: *Governance Indicators for 1996-2005*, The World Bank.

KOREN M. and S. TENREYRO (2007), "Volatility and Development", *Quarterly Journal of Economics*, 122, 1, pp. 243-287.

KRAAY, A. and N. DEPETRIS CHAUVIN (2005), "What Has 100 Billion Dollars Worth of Debt Relief Done for Low-Income Countries?", The World Bank, *mimeo*.

KRAAY, A. and V. NEHRU (2006), "When is External Debt Sustainable?", *The World Bank Economic Review* 20 (3), pp. 341-365.

MANASSE, P., N. ROUBINI and A. SCHIMMELPFENNIG (2003), « Predicting Sovereign Debt Crises », *IMF Working Paper* 03/221.

MANSOORIAN, A. (1991), "Resource Discoveries and 'Excessive' External Borrowing", *The Economic Journal* 101, pp. 1497-1509.

PATILLO, C., H. POIRSON and L. RICCI (2002), "External Debt and Growth", *IMF Working Paper* 02/69.

REINHART, C. (2002) "Credit Ratings, Default, and Financial Crises: Evidence from Emerging Markets", *World Bank Economic Review* 2002, Vol. 16 No. 2, pp. 151-170.

REINHART, C., K. ROGOFF and M. SAVASTANO, (2003) "Debt Intolerance", *Brookings Papers on Economic activity*: 1, Brookings Institution, pp. 1-74.

ROUBINI, N. (2001), "Debt Sustainability: How to Assess Whether a Country is Insolvent", Stern School of Business, New York University, *mimeo*.

STANDARD AND POOR'S (2002), "*Sovereign Defaults: Moving Higher in 2003?*"

TOMZ, M. and M. WRIGHT (2007), "Do Countries Default in Bad Times?" Federal Reserve Bank of San Francisco Working Paper Series, WP 2007-17.

WYPLOSZ, C. (2007), "Debt Sustainability Assessment: The IMF Approach and Alternatives", HEI Working Paper N° 03/2007, Graduate Institute of International Studies.

Série Documents de travail / Working Papers Series

N° 42   *Potential Financial Frameworks for a Sustainable UNEO*

Helle Husum, COWI, Erik Brander, COWI, Suzanne A.K. Steensen, COWI, et Emmanuelle Lachaussée, AFD - June 2007

N° 43   La concession des aéroports de Madagascar : une privatisation en trompe-l'œil ?

Aymeric Blanc, département de la Recherche, AFD, et Olivier Gouirand, AFD - Août 2007.

N° 44   La concession du chemin de fer du Cameroun : les paradoxes d'une réussite impopulaire

Aymeric Blanc, département de la Recherche, AFD, et Olivier Gouirand, AFD - Août 2007.

N° 45   Analyse rétrospective de la crise alimentaire au Niger en 2005

Jean-Pierre Olivier de Sardan, LASDEL, avec la participation de M. Ali Bako, E. Guillermet, O. Hamani, Y. Issa, M. Koné et M. Moha - Septembre 2007.

N° 46   Une nouvelle base de données institutionnelles : « Profils Institutionnels 2006 »

A new institutional database: "*Institutional Profiles 2006*"

Nicolas Meisel, département de la Recherche, AFD et Jacques Ould Aoudia, DGTPE - Septembre 2007

N° 47   *Governance of Renewable Natural Resources: Concepts, Methods and Tools*

Sheila Wertz-Kanounnikoff, Institut du développement durable et des relations internationales (Iddri) et Dominique Rojat, AFD - September 2007.

N° 48   La crise de la filière coton : conséquences économiques et financières au Burkina Faso

François Xavier Bellocq et Arthur Silve, Département de la Recherche, AFD - Septembre 2007.

N° 49   *Youth and labour market in Africa (DIAL)*

Jean-Pierre Cling, Flore Gubert, Christophe J. Nordman, Anne-Sophie, DIAL - October 2007.

N° 50   *Culture and development: a review of literature. The continuing tension between modern standards and local contexts*

Hèla Yousfi, Researcher at "Gestion et société", CNRS, Paris - November 2007.

N° 51   Transferts et déséquilibres macroéconomiques des économies ultramarines

Philippe Jean-Pierre, université de la Réunion - Novembre 2007.

N° 52   Eloignement, insularité et compétitivité dans les petites économies d'outre-mer

Bernard Poirine, maitre de conférences d'économie à l'université de la Polynésie française - Novembre 2007.

N° 53   Pourquoi s'ouvrir ? Contraintes et perspectives pour les économies ultramarines

Jean-Michel Salmon, maitre de conférences, CEREGMIA-faculté de droit et d'économie de la Martinique, université des Antilles et de la Guyane et consultant indépendant à STRADEVCO - Novembre 2007.

N° 54   *Regional Trade Agreements and Developing Countries: The Case of the Independent Pacific Island States*

Robert Scollay - November 2007.

N° 55   *Corporate Social Responsibility in Turkey: Overview and Perspectives*

Naïg Cozannet, Agence Française de Développement, Helge Rieper, Frankfurt School of Management and FinanceYekbun Gurgoz, Agence Française de Développement - December 2007.

N° 56   allocation geographique de l'apd francaise : Comparaison entre la sélectivité de l'APD française totaleet celle de l'Agence Française de Développement

Jacky Amprou, AFD, Carl Bernadac, AFD, Pascaline Magnes, ministère des Affaires étrangères - Novembre 2007.

N° 57   L'aide au commerce dans les pays en développement : des articulations complexes pour une efficacité réelle

Marilyne Huchet-Bourdon, maître de conférences en économie, Agrocampus Rennes, Anna Lipchitz, économiste, département de la Recherche, AFD, Audrey Rousson, consultante, AFD - Janvier 2008.