External Debt Accumulation in Sub-Saharan African Countries:

How Fast Is Safe?

By

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Abstract

This paper empirically examines the rate of debt accumulation that limits the probability of debt distress. The estimations are based on a panel of 45 sub-Saharan African (SSA) countries over the period 1972–2012 using the dynamic probit estimation techniques. The results from the estimations suggest that countries with poor governance rating can sustain a lower rate of debt accumulation while those with a good governance rating are able to sustain a higher rate of debt accumulation for a given probability of debt distress. A low-income country with a poor governance rating would not be able to accumulate any debt while for a middle-income country with poor governance rating is able to tolerate annual debt accumulation of up to 5 percent of exports. Low-income and middle-income countries with a medium governance rating can sustain up to 1.5 percent and 12 percent annual debt accumulation respectively. With good governance rating the rate of debt accumulation should not exceed 12 percent and 30 percent of exports for low-income and middle-income respectively. Given its current status, sub-Saharan African countries' rate of debt accumulation is regarded as being unsustainable. This study has extended the debate on external debt sustainability and provides a benchmark for determining the financial commitments that should be offered to these countries.

1. INTRODUCTION AND BACKGROUND

Many low-income countries (LICs) require substantial external financing to reach their development objectives, and stepped-up investment in infrastructure is critical to achieve sustained growth and development. External debt financing can help in this regard by channeling resources to projects where the rate of return of the debt-financed investment is at least sufficient to service the debt incurred. However, debt can also expose countries to serious difficulties. If countries engage in excessive borrowing or suffer shocks to their economies, they may become unable to repay their debts and may have to make disruptive financial and economic adjustments (Fosu 2010).

Debt problems can be particularly difficult for LICs. They rely on debt to finance development, but their macroeconomic and financial features may undermine their repayment capacity. These features include narrower production bases and export structures, shallower financial markets, aid volatility, and weaker policy implementation capacity (Barkbu, Beddies & Le Manchec 2008). A large number of LICs accumulated excessive debt starting from the 1970s with a peak in the early 1990s, setting back their efforts to achieve solid growth and alleviate poverty for years. However, rising public debt accumulation has growth-reducing effects on both developed and developing economies (Reinhart, Reinhart and Rogoff 2012).

There is a large body of literature that has looked into the question of debt sustainability and its effects on growth and development. Most recent studies (Panizza and Presbitero 2012; Kumar and Woo 2010; Reinhart and Rogoff 2010; Pattillo, Poirson and Ricci 2011; Tcherreni, Sekhampu and Ndovi 2013; Mohamed 2013) on public debt and economic growth continue to support the evidence of a negative causal relationship between debt and growth –

rising public debt leads to lower growth–. Empirical literature has also explored the determinants of debt crises or distress. Most of the studies of the determinants of debt crises (Frank & Cline 1971; Grinols 1976; Feder & Just 1977; Mayo & Barrett 1977; Feder, Just & Ross 1981; Cline 1983) have focused on macroeconomic and financial variables and, more recently, on the level of debt (Kraay & Nehru 2006). But the pace at which developing countries should accumulate debt, while at the same time limiting the probability of debt distress, has not been explored in the literature.

Debt crises, its sustainability, and the ability of debtor countries to repay have also been investigated in the recent literature. Aylward and Thorne (1998) investigate countries' repayment performance to the IMF by distinguishing between those countries that make repayment on time and those that are overdue. Reinhart, Rogoff and Savastano (2003) are emphasizing more the role that history plays in explaining debt distress. Focusing on emerging market economies, their study uses the institutional investor rating as a measure of the debt distress probability because external borrowing has been the major source of finance in these economies over many decades. Analysing the relationship between debt crisis and external liquidity, Detragiache and Spilimbergo (2001) find that default on external debt is more pronounced in countries that are less liquid. Lausev, Stojanovic and Todorovic (2011) estimated debt rescheduling probabilities in 15 Eastern European countries using a panel logit model. Their findings suggest that low debt rescheduling probabilities and decreasing cost of debt can be achieved if policy efforts can be geared towards reducing government expenditure, attracting foreign direct investment, increasing export revenue and keeping a good repayment record. Similar studies by Odedokun (1993 & 1995) focusing on SSA countries also supports this argument. The effects of macroeconomic fundamentals on

sovereign debt (credit spreads) and on the probability of default in emerging market countries was investigated in Hilscher and Nosbusch (2010). Focusing on the terms of trade as a major macroeconomic fundamental, their result suggests that spreads tend to be higher for countries that have recently experienced adverse terms of trade shocks and that indeed was found to be an important predictor of default. Using a larger panel dataset covering 60 emerging and developed countries (including some SSA countries), Jedidi (2013) developed an early warning system (EWS) using panel logit model and various macroeconomic and financial variables. His findings show that total gross government debt, total gross external debt, foreign exchange reserves and imports represent the most consistent early warning indicator of sovereign debt crisis.

Closely related to this study is the work of Kraay and Nehru (2006), who empirically examine the determinants of debt distress in developing and low-income countries using a dynamic panel probit model. An important feature of their work is the inclusion of a policy variable that measures the quality of policies and institutions (CPIA). The Country Policy and Institutional Assessment (CPIA) is found to be a key determinant of debt distress; that is, for a given debt distress probability, countries with better policies and institutions can sustain higher levels of external debt burdens than countries with worse policies and institutions without increasing the risk of debt distress. Their work also focuses more on LICs, which distinguishes their work from previous studies that focus more on middle-income countries (MICs). The probit regression results from Kraay and Nehru (2006) confirm the importance of debt burden, policy and institutions, and shocks as the main drivers of debt distress in these countries. Based on a country's CPIA, a threshold for the debt burden that limits the

probability of a country running into debt distress was determined from their probit regressions.

Expanding on this analysis, this study's contribution to the debate on debt sustainability is an empirical analysis of the probability of debt distress based on the rate of external debt accumulation, using the methodology developed by Kraay and Nehru (2006). The objective of this study is to estimate thresholds for the rate of external debt accumulation that limit the probability of sub-Saharan African (SSA) countries running into debt problems. The thresholds estimated from this study are distinct from that of the IMF-World Bank debt sustainability framework (DSF) estimated for member countries. Whilst the DSF and Kraay and Nehru thresholds are estimated based on debt levels (present value of debt to exports ratio) which serve as a guide for countries to check their pace of accumulating debt given their quality of policy and institutions, this study has taken a further step to estimate the actual rate of debt accumulation (defined as the percentage change in present value of debt to exports ratios from one year to the next) that will limit these countries from running into debt distress. Another distinction from Kraay and Nehru (2006) is the use of worldwide governance indicators as a measure of policy and institutions, given that the CPIA was publicly unavailable before 2005.

The results suggest that countries with high rate of debt accumulation and low governance are more likely to experience debt distress. In addition, previous debt distress will significantly raise the probability of distress in the current period. Similarly, the unobserved time-invariant country characteristics have played a significant role in the likelihood of debt distress. Therefore, given the estimated distress probabilities, no sub-Saharan African LICs would be able to accumulate any external debt with a poor governance rating. With this

rating, only middle-income sub-Saharan African countries could tolerate debt accumulation not exceeding 5 percent of exports. Only at medium governance will LICs begin to accumulate external debt from one year to another. Since debts have a maturity date, along with additional interest payment, therefore, present value (PV) of external debt is adopted for calculating debt levels and the rate of debt accumulation instead of actual debt stock. This ensures comparability over time and across countries.

The rest of the study is organised as follows: Section II presents some stylized facts on the evolution of external debt. Section III presents the empirical analysis, which contains the theoretical framework and methodology, the description and analysis of the data used in the study and the results of the various estimations. It also provides thresholds of debt accumulation, given a country's governance performance. Section IV provides some concluding remarks.

2. SOME STYLIZED FACTS ON DEBT DEVELOPMENTS

The stylized facts presented in this section focus on the evolution of external debt stock and PV of external debt, using data from 45 sub-Saharan African (SSA) countries. External debt as defined by the World Bank databank is the sum of public and publicly guaranteed debt, private nonguaranteed debt, use of the IMF credit and other short-term debt. The PV of external debt is defined as the discounted future value of external debt. In other words, PV of external debt is defined as the ratio of external debt stock to its discount rate.[i]

Over the years, both developed and developing countries have to deal with debt crises.[ii] The composition of external debt in the region has not experienced any significant changes since 1970. Much of the external debt in these countries remain public and publicly guaranteed debt which has only declined from an average of about 80 percent in the 1970s to about 68

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percent in the 2000s (Figure 1). During the same period, private nonguaranteed debt rose

from 3 percent to about 11 percent while the use of the IMF credit and short-term debt

remained fairly stable (20 percent) since the 1980s after rising from about 17 percent in the

1970s.

Figure 1: Composition of Total External Debt in SSA Countries, 1970 to 2012
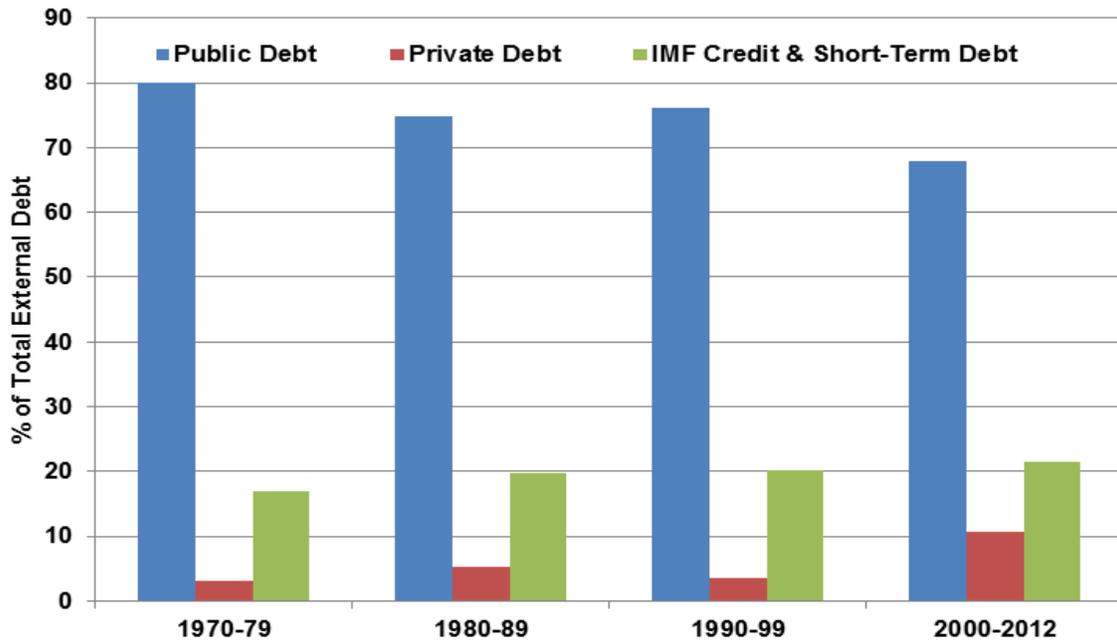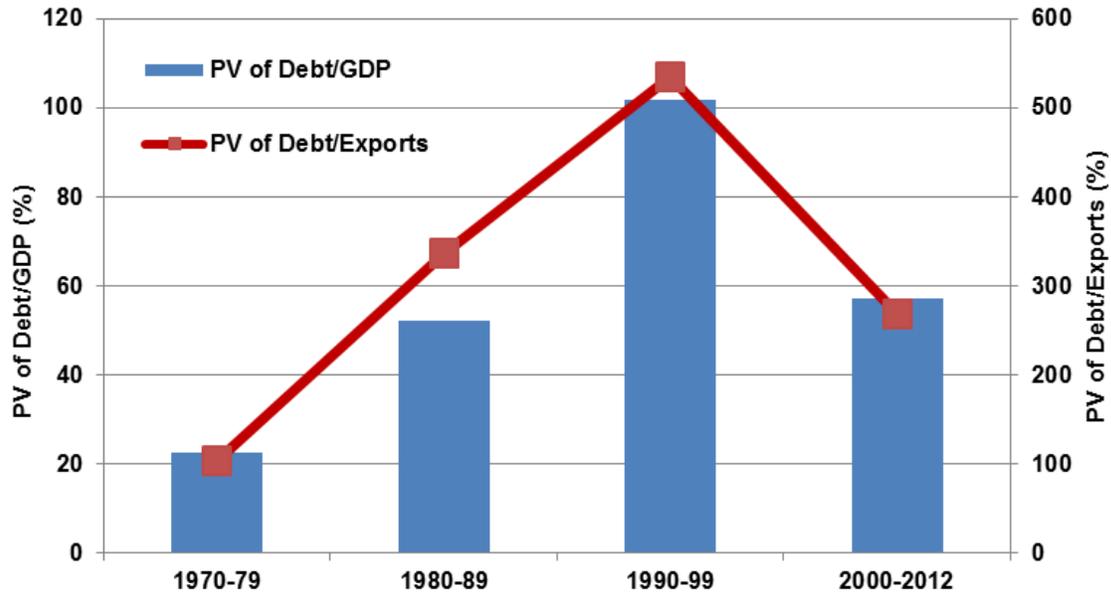

Source: World Bank (World Databank)

Since 1970, debt burdens defined as a ratio of gross domestic product (GDP) or exports have

increased rapidly (Figure 2). During 1970 to 1979, an average present value (PV) of external

debt as a ratio of GDP was about 22 percent. The ratio rose to about 52 percent (more than

double) in the 1980s, largely due to external shocks and rapid borrowing to finance

development. This trend continued into the 1990s with a rise to about 100 percent. Debt

ratios eventually fell to 57 percent of GDP during 2000 to 2012 as a result of debt relief. The

debt-to-exports ratio displayed a similar trend, starting at about 103 percent in the 1970s and

rising to about 335percent and 535percent in the 1980s and 1990s respectively. Debt relief helped to reduce the debt-to-exports ratio to about 267 percent between 2000 and 2012.
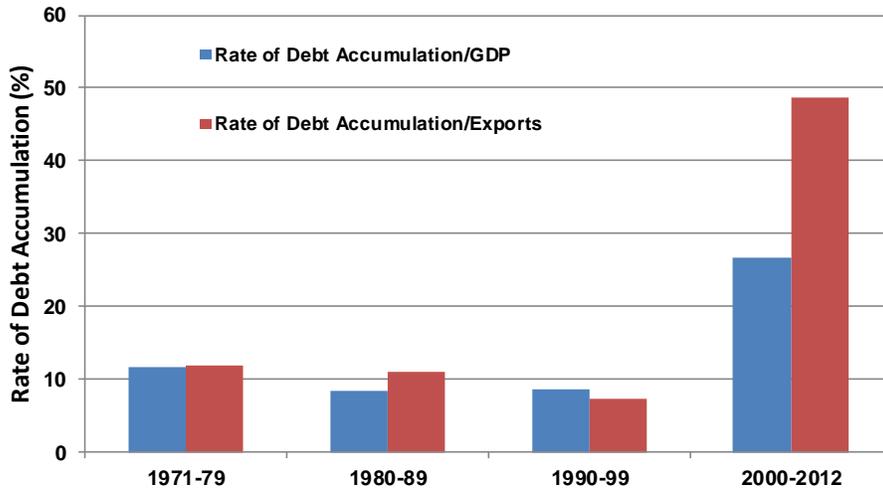
Figure 2: Ratio of External Debt to GDP and Exports in SSA Countries, 1970 to 2012
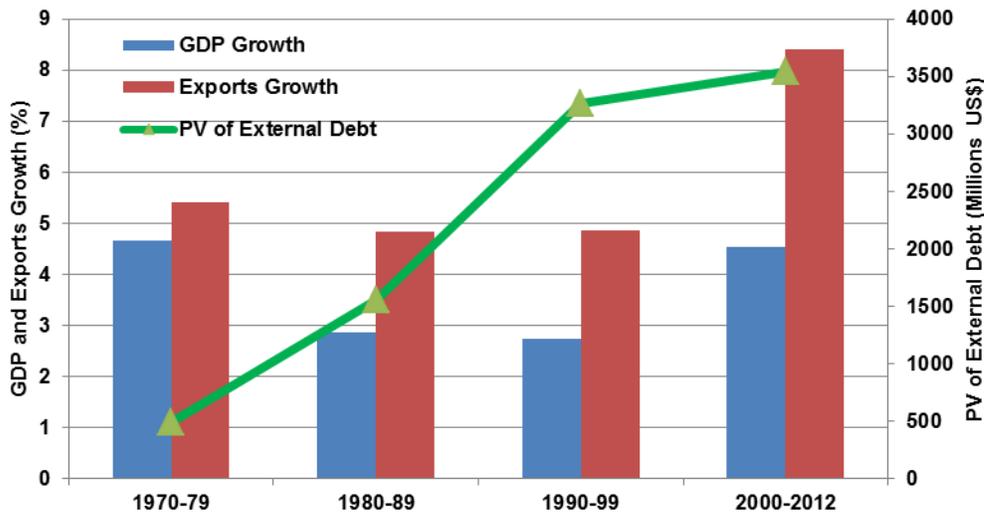

Source: World Bank (World Databank)

An important question is: *At what pace have these countries accumulated debt, especially post debt relief*?[iii] While positive throughout the period, SSA countries recorded a ten-year post debt relief debt accumulation (1990–1999) of about 9 percent and 7.4 percent of GDP and exports respectively (Figure 3). In the period covering 2000 to 2012, debt accumulation increased substantially in the region to about 27 percent of GDP and 49 percent of exports despite the rising growths in GDP and exports during this period. However, there is need for quidance on a sustainable rate of debt accumulation that will limit the probability that these countries run into debt problems again. Section 3 deals with this issue in greater detail.

Figure 3: Rate of Debt Accumulation in SSA Countries, 1971 to 2012

Source: World Bank (World Databank)

Figure 4: Average Present Value of External Debt, Growth Rate of GDP and Exports 1970-2012

Source: World Bank (World Databank)

Debt ratios obviously did not only change because of variations in the rate of debt accumulation. As such, rising debt ratios between 1970 and 1999 and their fall between 2000 and 2012 may not be a true reflection of these countries' debt accumulation. The ratios may

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rise because of either a large increase in the nominal stock of debt or a significant fall in GDP and export growth and vice-versa.

Despite the rising total external debt stock recorded during 2000 to 2012, debt ratios have declined during this period (Figure 2 and 4). During this period, GDP and export growth have been strong in most SSA countries under consideration and many of these countries have recorded growth rates of more than 4 percent and 8 percent of GDP and exports respectively (Figure 4). This represents the highest growth rates compared to the previous decades with growth in exports almost twice the previous decades. Moreover, the increase in the total stock of external debt between 2000 and 2012 has been slower compared to the previous decades. This is largely the result of significant debt relief received under the Heavily Indebted Poor Countries Initiative (HIPCI) and Multilateral Debt Relief Initiative (MDRI). In a nutshell, debt is still rising, but at a decreasing rate.

3. EMPIRICAL ANALYSIS

3.1. Theoretical Framework and Methodology

Following Kraay and Nehru (2006), a dynamic panel probit specification as stated below is adopted to model the probability of debt distress:

$$P(y_{it} = 1) = \Psi(\beta' X_{it} + \rho \cdot y_{i,t-} + \mu_c), \tag{1}$$

where y_{it} is the binary variable taking the value of one for debt distress episodes and zero for non-distress episodes; X_{it} is a vector of the determinants of distress; Ψ is the normal distribution function; β is a vector of parameters to be estimated; $y_{i,t-}$ denotes the value of the distress indicator in the episode immediately prior to the one occurring at time t in a

particular country; ρ is a parameter capturing the persistence of distress; μ_c is an unobserved country characteristics that influence the probability of debt distress and the subscript (*it*) refers to countries and time periods respectively. In addition to the vector of the determinants of distress, the above specification will also detect the level to which unobserved country characteristics, and country's history of distress influence the probability of current distress. A panel data technique uses an unbalanced sample of the dependent and independent variables in the estimations.

As mentioned earlier, the objective of this study is to estimate the rate of debt accumulation that will limit the probability of debt distress. About three distinct probit estimations were carried out to determine the probability of a country entering into debt distress. The first specification estimates the probability of distress, given the PV of external debt accumulation, level of governance and growth in GDP (measure of both internal and external shocks). To control for the differences in these countries debt levels (ratios), the second specification included the PV of debt ratios in the estimation. But current debt levels may not play a significant role in this specification since the rate of debt accumulation depends mainly on the previous year debt levels. Given this, the PV of debt ratios was lagged by one year in the second specification. The third specification serves as a robustness check to confirm if the definition of distress used and the policy variable adopted will produce similar results as in Kraay and Nehru (2006). Therefore, the probability of distress is explained by the PV of external debt ratio, level of governance and growth in GDP.

In general, the three specifications carried out in this study controlled for unobserved country-specific characteristics and country's history of debt distress. The unobserved country-specific is captured by using the initial observation on the dependent variable for

each country, as well as time averages of all the independent variables (Wooldridge 2005). For country history of debt distress, the lagged value of the dependent (binary) variable is used in capturing the possibility that a country that have experienced debt distress in the past is more likely to do so in future. These control variables also capture any structural changes that might have occurred in the debt accumulation over these years.

The overall debt burden of a country is expressed as a share of exports and is expected to be a major determinant of debt distress; that is, an increase in a country's debt burden should raise the probability of debt distress. Likewise, a higher rate of debt accumulation year on year is expected to increase the probability of running into debt problems. The GDP growth, which serves as a measure of shocks these countries face, is expected to produce a negative sign with respect to the probability of debt distress. Countries with good policy and institutions (governance) are less prone to debt problems and would be able to sustain a higher rate of debt accumulation and debt burden. Finally, the unobserved country-specific characteristics and country's history of debt distress could have an ambiguous sign with respect to the probability of debt distress. The direction of causality will be dictated by the structure of these economies. A positive or negative value for these variables and their level of statistical significance reveals the extent to which they really matter in explaining the probability of debt distress.

3.2.   Data Description and Analysis

The data used in this study have been obtained from the World Bank, World Databank, IMF; International Financial Statistics, and Worldwide Governance Indicators database. It covers the period between 1972 and 2012 among all 45 Sub-Saharan African countries, excluding Equatorial Guinea, Namibia and South Sudan. All data are measured in United States dollars,

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except for growth rates which are calculated using GDP data in each country's respective local currency. In line with the existing literature, debt variables are all in relation to exports of goods and services and the rate of debt accumulation is defined as the percentage change in debt to exports ratios from one year to the next.

The major limitation to this study is the nature of the data used. Data availability and weaknesses remain a major setback in carrying out empirical research in most developing (i.e. sub-Saharan Africa) countries. There is lack of adequate long time data series on present value of debt and measures of policy and institutions. However, in order to capture the entire SSA region, the following provides detailed explanation on how some variables used in the study were generated:

3.2.1. *Deriving present value of external debt*

The PV of external debt is only available for 2012. Since it is important to measure debt in its PV term, this study derived the PV of external debt from the publicly available actual external debt and interest payments series.

Using the following formula, the PV of external debt is derived as:

$$PV = \frac{CF}{(1+i)^n} \qquad (2)$$

CF is the cash flow of external debt over the period a country has been accumulating debt, i is the annual interest rate charged on external debt and n is the number of years in which debt has been accumulating with $n = 0$ being the year in which external debt was first issued. The ratio of annual interest payments on external debt to total annual external debt stock was used as a proxy for annual interest rate charged on external debt. In order to check for the

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validity of the derived series, the 2012 series (across all countries) is plotted against similar series from the World Databank (see Figure A1 of the Appendix). However, the derived series fit perfectly with World Databank estimates.

3.2.2. *Measuring policy and institutions*

The methodology adopted in deriving index for policy and institutions for this study follows the line of thought in Akanbi (2012) when measuring governance. Given this, the worldwide governance indicators developed by Kaufmann et al (1999a) were utilised as a measure of policy and institutions.[iv] The indices cover a broad range of policy and institutional outcomes for large number of countries, and include the rule of law, corruption control, government effectiveness, regulatory quality, voice and accountability and political instability. In order to capture policy and institutions in a broader context, the average value of the six elements in the governance indicators is used as a measure of policy and institutions.

Since the governance indicators series are only available from 1996 onwards, with missing values for 1997, 1999 and 2001, the Freedom House Index (FHI) is used to augment for all unavailable values. Although, the FHI only captures three elements of governance (political right and civil liberty which could proxy political instability, rule of law and voice and accountability in the WGI), and these could be considered the major elements hindering good policy and institutions in SSA economies. But the measures of indicators used in the FHI lacks the short-term dynamic changes embedded in a country's governance structures. For instance, significant changes in a country's political right and civil liberty may take a longer period to manifest in real time data and thereby not able to capture the short-run volatility in governance structures. However, this volatility is present in governance indicator.

To derive a robust long-term series for the governance indicator, the FHI was transformed to correspond to the governance index measures. The governance scores ranges from -2.5 to +2.5, with -2.5 representing the worst governance and +2.5 representing the best governance, while the FHI ranges from 1 to 7, with 1 representing total freedom and 7 representing no freedom. In addition, the average value of the combined political right and civil liberty indices, from the FHI, is also used in the transformation process.

The transformed governance index is generated based on the reported average governance scores and FHI for the SSA countries. However, the unavailable values in the governance scores are replaced with the equivalent values corresponding to the average FHI. For instance, the average FHI for Angola between 1996 and 2011 deteriorated from 5 to 7 index points while governance scores deteriorated from -1 to -1.6 over the same period. This indicate that a two index points change in FHI will lead to a corresponding 0.6 index point change in governance scores. This trend is also featured in almost all of the SSA countries, revealing the persistence in governance structure over the years.

3.2.3. *Defining debt distress episodes*

As mentioned earlier, this study builds upon Kraay and Nehru (2006) and therefore, debt distress episodes are defined as

i)   periods in which the sum of interest and principal (public and publicly guaranteed) arrears are large relative to the stock of debt outstanding

ii) when a country receives debt relief in a form of debt stock rescheduling or debt stock reduction

iii) when a country makes use of a substantial amount of IMF credit

Due to the public unavailability of data used by Kraay and Nehru (2006), debt relief (rescheduling and reduction) from Paris Club of bilateral creditors is replaced with debt stock rescheduling and reduction available from the World Databank. The substantial balance of payments support from the IMF under its non-concessional Standby Arrangement or Extended Fund Facilities is proxy by the substantial use of IMF credit.

Beside this distinction, the definition of distress episode follows the same as in Kraay and Nehru (2006).[v] Thresholds for large values of arrears are set at a maximum of 5percent of total debt outstanding. For substantial use of IMF credit, only those for which drawings on the IMF are greater than 25 percent of external debt stock outstanding is considered. When all country-year observations are pooled, the average use of IMF credit as a ratio of external debt outstanding, among the SSA countries stand at roughly 5 percent. However, when this value is about five times higher than the average value, it could be regarded as a distress year. With regard to debt relief, the year of rescheduling and reduction and two subsequent years are identified as distress years.

Table 1: Debt Distress Episodes Among SSA Countries

Angola	1989–2012	Ghana	1972–1976 1984–1988 1998–2000 2004–2009	Sao Tome and Principe	1985–2012
Benin	1972–1978 1983–1999 2003–2012	Guinea	1972–2012	Senegal	1989–2000 2003–2009
Burkina Faso	1986–90	Guinea-Bissau	1981–2012	Seychelles	1988–2012
Burundi	1989–1991 1998–2012	Kenya	2006–2012	Sierra Leone	1982–2000 2003–2012
Cameroon	1990–1997 2003–2012	Lesotho	2006–2008	Somalia	1981–2012
Cape Verde	1988–2003	Liberia	1983–2012	South Africa	2007–2009
Central African Republic	1972–1983 1989–2012	Madagascar	1982–2012	Sudan	1980–2012

Chad	1972–2001	Malawi	2006–2009	Swaziland	2005–2012
	2005–2007				
Comoros	1987–2012	Mali	1972–1980	Tanzania	1972–2012
			1991–2003		
			2006–2012		
Congo, Dem. Rep.	1976–1979	Mauritania	1984–2012	Togo	1981–1984
	1982–2012				1993–2012
Congo, Rep.	1972–1978	Mauritius	1980–1986	Uganda	1976–2012
	1985–2012				
Cote d'Ivoire	1988–1999	Mozambique	1985–2012	Zambia	1982–1998
	2003–2008				2001–2012
Ethiopia	1991–2010	Niger	1990–2012	Zimbabwe	2000–2012
Gabon	1990–97	Nigeria	1988–2004		
	2003–2012				
Gambia	1984–1986	Rwanda	1994–2012		
	2007–2012				

Source: Author's calculations and analysis of data

In order to identify strict episodes of distress and non-distress as described by Kraay and Nehru (2006), all short distress episodes of less than three years and non-distress episodes of less than five consecutive years are eliminated. Given this, a total of 64 debt distress episodes and 49 non-distress episodes were identified over the period 1972 to 2011 (Table 1). Separating the low-income (LIC) and the middle-income (MIC) SSA countries, a total of 38 distress episodes and 27 non-distress episodes were identified for LICs, while a total of 26 distress episodes and 22 non-distress episodes were identified for MICs. [vi] The average length of years in distress and non-distress among all the SSA countries stand at 22 years and 16 years respectively. This is higher among the LICs with about 24 years average length of distress and 13 years average length of non-distress. Finally, for the MICs the average length recorded is 17 years of distress and 21 years of non-distress.

3.3.   Empirical Results

As discussed in the previous section, the structural model of equation (2) is estimated in line with the three specifications and among country groupings (LICs and MICs). The results from the core specifications confirm that rate of external debt accumulation, the overall debt burden, policies (proxied by governance indicators), and shocks (proxied by real GDP growth) are highly significant determinants of the probability of debt distress. The signs of all the coefficients are as expected except for unobserved country-specific characteristics and country's history of debt distress variables which shows mixed results. Table 2 presents the results of the dynamic probit estimations.

The results indicate that countries which accumulate debt rapidly and have a high debt burden, low governance, and low GDP growth rate are more likely to experience debt distress. This is true for all the three specifications presented in Table 2. In addition, the results also revealed that debt distress in the previous period (column 7: lagged dependent variable) significantly raised the probability of distress in the next period in all the three specifications and across regional groupings. This indicate that the region's history of debt plays an important role in predicting the probability of debt distress, even after controlling for other determinants of distress.

The unobserved time-invariant country characteristics also played a significant role, except for some few instances where they are found to be insignificant. In the case of the initial dependent variable (column 8), higher initial distress probability will significantly increase the probability of a country running into debt distress except for middle income SSA countries where this does not translate into higher distress probability. A similar pattern is also recorded for the time-average of real GDP growth. But when debt levels are controlled

for (specification 2), higher time-average of GDP growth will decrease the probability of distress. At the same time, in specification 2, higher time-average of governance will reduce distress probability even when debt levels are controlled for. Higher time-average of debt accumulation will initially lead to lower distress probability but when debt levels are controlled for (specification 2), it tends to lead to higher distress probability. However, this has been cushioned by the positive effect of time-average of debt levels. These results reveal the importance of controlling for debt levels when estimating the rate of debt accumulation that will limit the probability of debt distress and suggest more robust estimates in specification 2 than specification 1.

The last column in Table 2 provides the estimated probabilities of distress based on the mean of the pooled sample of all countries. It indicates that the likelihood that SSA countries will run into debt distress is very high, especially among the LICs with over 90percent probability across the three specifications. Specification 3, which serves as a robustness check according to Kraay and Nehru (2006), confirms a similarity in estimates, especially with the LICs in which 75percent of these countries are in SSA.

Table 2: Dynamic Probit Results on the Probability of Debt Distress

	Rate of debt accumulation to exports	Present value of debt to exports	Lagged present value of debt to exports	Governance indicators	Real GDP growth	Lagged dependent variable	Initial dependent variable	Average rate of debt accumulation to exports	Average present value of debt to exports	Average governance indicators	Average real GDP growth	Constant	Number of Observation	Estimated Probability
Specification (Estimation) 1														
All SSA	0.06 (0.01)***			-0.37 (0.03)***	-0.89 (0.16)***	2.45 (0.03)***	0.52 (0.06)***	-0.01 (0.01)**		0.15 (0.04)***	-4.17 (1.53)**	-0.67 (0.06)***	1366	0.77
LICs	0.11 (0.05)***			-0.67 (0.06)***	-0.20 (0.09)***	3.78 (0.05)***	0.60 (0.08)***	-0.01 (0.02)		0.37 (0.07)***	0.48 (1.70)	-1.59 (0.08)***	890	0.92
MICs	0.07 (0.01)***			-0.32 (0.04)***	-2.13 (0.29)***	2.19 (0.04)***	-0.46 (0.09)***	-0.18 (0.06)***		0.11 (0.05)**	-11.70 (2.33)***	-0.21 (0.09)***	553	0.56
Specification (Estimation) 2														
All SSA	0.08 (0.01)***	0.19 (0.007)***		-0.22 (0.03)***	-0.77 (0.19)***	2.83 (0.03)***	0.36 (0.05)***	0.11 (0.01)***	-0.02 (0.005)**	0.27 (0.04)***	-14.24 (1.27)***	-0.78 (0.05)***	1401	0.79
LICs	0.27 (0.05)***	0.17 (0.01)***		-0.32 (0.08)***	-0.25 (0.11)***	3.74 (0.06)***	0.55 (0.07)***	0.12 (0.02)***	-0.02 (0.01)**	0.22 (0.1)***	-13.51 (1.9)***	-1.32 (0.08)***	890	0.94
MICs	0.08 (0.015)***	0.25 (0.02)***		-0.25 (0.05)***	-1.26 (0.3)***	2.48 (0.04)***	-0.32 (0.06)***	0.1 (0.05)*	-0.002 (0.01)	0.23 (0.05)***	-18.63 (1.66)***	-0.52 (0.08)***	566	0.55
Specification (Estimation) 3														
All SSA		0.12 (0.007)***		-0.17 (0.04)***	-1.67 (0.26)***	4 (0.04)***	0.18 (0.05)***		-0.001 (0.005)	0.17 (0.05)***	-9.6 (1.49)***	-1.52 (0.06)***	1552	0.73
LICs	0.12 (0.01)***			-0.23 (0.08)***	-2.04 (0.34)***	4.45 (0.07)***	0.48 (0.09)***		0.003 (0.01)	0.20 (0.1)*	-14.17 (2.39)***	-1.55 (0.1)***	915	0.93
MICs	0.2 (0.02)***			-0.14 (0.06)***	-1.71 (0.42)***	3.74 (0.05)***	-0.28 (0.08)***		-0.01 (0.01)	0.06 (0.06)	-8.18 (2.16)***	-1.53 (0.09)***	637	0.5

Note: *** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level and standard errors in parenthesis.
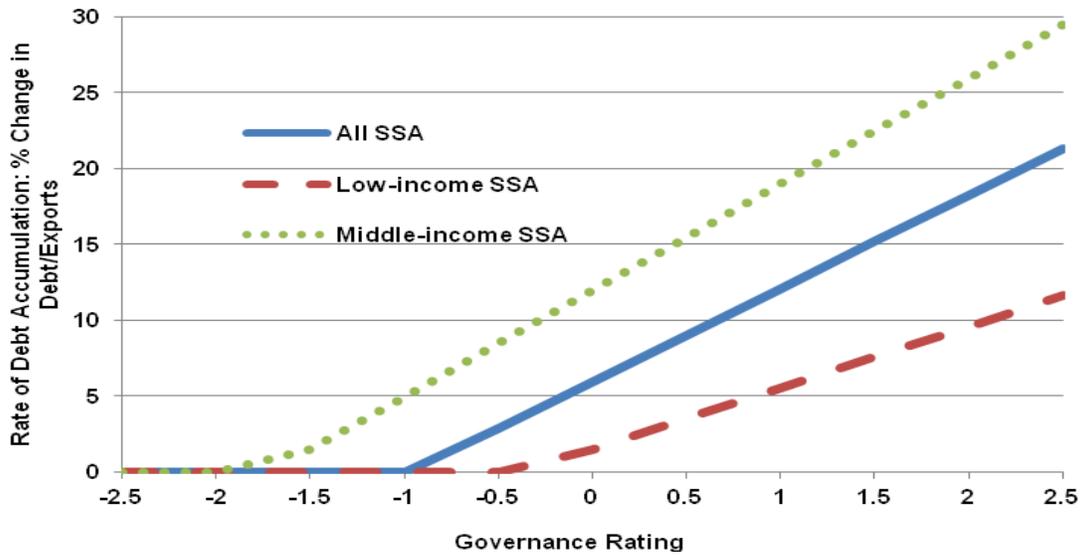
Source: Author's calculations and analysis of data

Identifying a "safe" level of debt accumulation

Debt relief has increased the borrowing space in many low-income countries. At the same time, new creditors have entered the playing field and domestic debt is gaining importance, all of which has led to an expansion in the volume and sources of funds available to these countries.[vii] These developments, while welcome, raise new risks. Previous studies, most notably Kraay and Nehru (2006), have identified thresholds for the level of external public debt ratios,[viii] but the question remains: *How much external debt should countries accumulate without jeopardizing debt sustainability?* The regressions above have clearly shown that debt accumulation matters for the probability of debt distress. At the same time, governance matters for the debt distress probability; therefore, thresholds for external debt accumulation or "borrowing ranges" are derived as a function of governance.

For the estimated debt distress probability (Table 2), countries with poor governance rating (truncating negative values at zero) can sustain a lower rate of debt accumulation while those with a good governance rating will be able to sustain a higher rate of debt accumulation (Figure 4 A&B). A rating below -1 is defined as poor performance; a rating between -1 and 0 reflects medium performance; and a rating above 0 corresponds to good performance.[ix]/[x] See Figure A2 of the Appendix for robustness check on debt ratios. This is similar to Kraay and Nehru (2006)'s estimates, especially among those in the LICs.
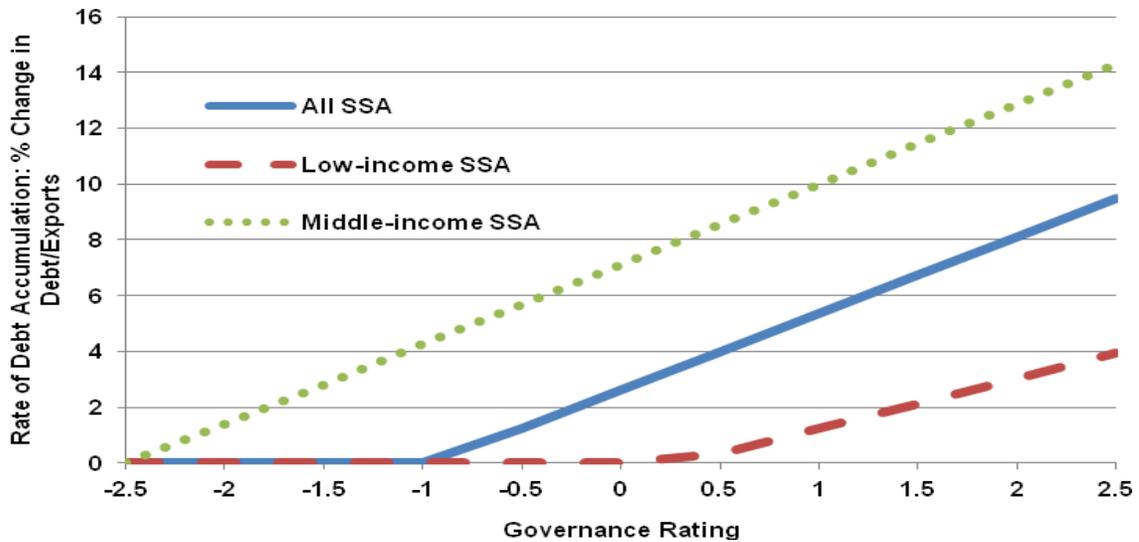
Figure 4. Governance Rating and Rate of Debt Accumulation

Panel A. Exclude debt burden

Source: Author's calculations and analysis of data

Panel B. Include debt burden

Source: Author's calculations and analysis of data

As shown in Figure 4 and Table 3 for the estimated distress probabilities, a country with a poor governance rating would not be able to accumulate any debt except for middle-income countries which could tolerate debt accumulation of about 0 to 5 percent of exports. Countries with a medium governance rating can sustain about 0-6, 0-1.5, and 5-12 percent debt accumulation for all SSA, LICs and MICs respectively. Finally, with a good governance rating –which very few SSA countries have achieved– the rate of debt accumulation should

be between 6 to 21 percent of exports for all SSA countries, while that of LICs and MICs should be between 1.5 to 11.6 and 12 to 29.5 percent of exports respectively.

Table 3: Debt Accumulation Thresholds

		Governance interval	Rate of external debt accumulation		
			All SSA	LICs-SSA	MICs-SSA
Poor governance	Exclude debt burden	-2.5 to -1	0	0	0 to 5
	Include debt burden		0	0	0 to 4.3
Medium governance	Exclude debt burden	-1 to 0	0 to 6	0 to 1.5	5 to12
	Include debt burden		0 to 2.6	0	4.3 to 7.1
Good governance	Exclude debt burden	0 to +2.5	6 to 21	1.5 to 11.6	12 to 29.5
	Include debt burden		2.6 to 9.5	0 to 4	7.1 to 14.3
All Countries	Exclude debt burden	Average (-2.5 to +2.5)	7.7	3.6	12.7
	Include debt burden		3.4	1	7.1

Source: Author's calculations and analysis of data

To limit the probability of running into debt problems, the rate of external debt accumulation in all SSA, LICs and MICs from one year to the next should not exceed 7.7, 3.6 and 12.7percent of exports respectively (average of pooled data), including the previous period debt burden in the model specification which resulted into a lower debt accumulation in these countries. This indicates that previous debt burden matter in determining the rate of debt accumulation that will limit the probability of debt distress. A country that recorded a substantial debt burden in the previous period will reduce its borrowing space in the current period. Therefore, estimates from specification that exclude debt burden should be the binding constraints for these countries.

In general, the data in all 45 SSA countries suggest that, except for Seychelles, no country has, on average, above +1 rating on their governance score. In fact, about 90percent of these countries fall below the medium governance rating (below 0), suggesting that external debt accumulation of 0-5percent of exports would seem to be a prudent benchmark.

4. CONCLUDING REMARKS

A large number of sub-Saharan African and low-income countries have experienced debt problems over the last few decades. This paper has shown that the probability of debt distress increases significantly with the rate of debt accumulation and controlling for debt burdens. It also critically depends on policies and institutions and shocks as found in previous studies. A key novelty in the study is the extension of the analysis on external debt sustainability by investigating the rate of debt accumulation which has become more prevalent in many low- and lower-middle-income countries. The findings are comparable with previous studies despite slight deviations in the data used and suggest the thresholds of debt accumulation that will limit the probability of debt distress, especially in sub-Saharan African countries. This study contributes to the framework of financing resource transfer to sub-Saharan Africa and low-income countries in a way of taking cautious steps to avoid running into debt distress. It also provides both private and official creditors as benchmark in examining the appropriate lending strategies suitable for these countries.

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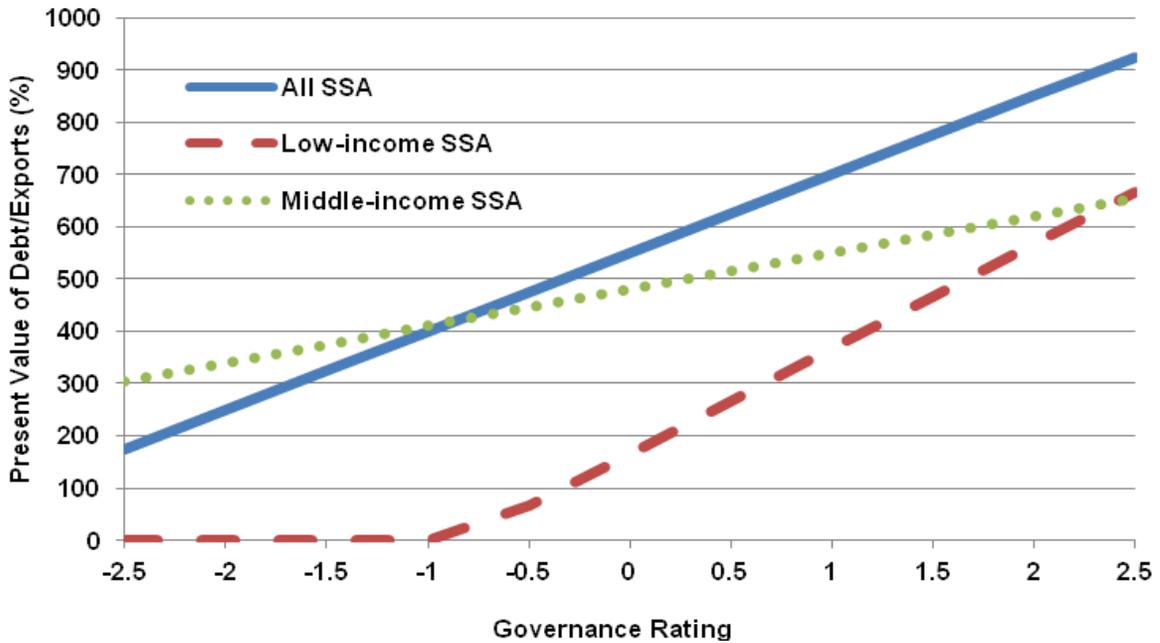
APPENDIX

Figure A1: Comparison of Present Value of External Debt from the Derived and World Databank Estimates
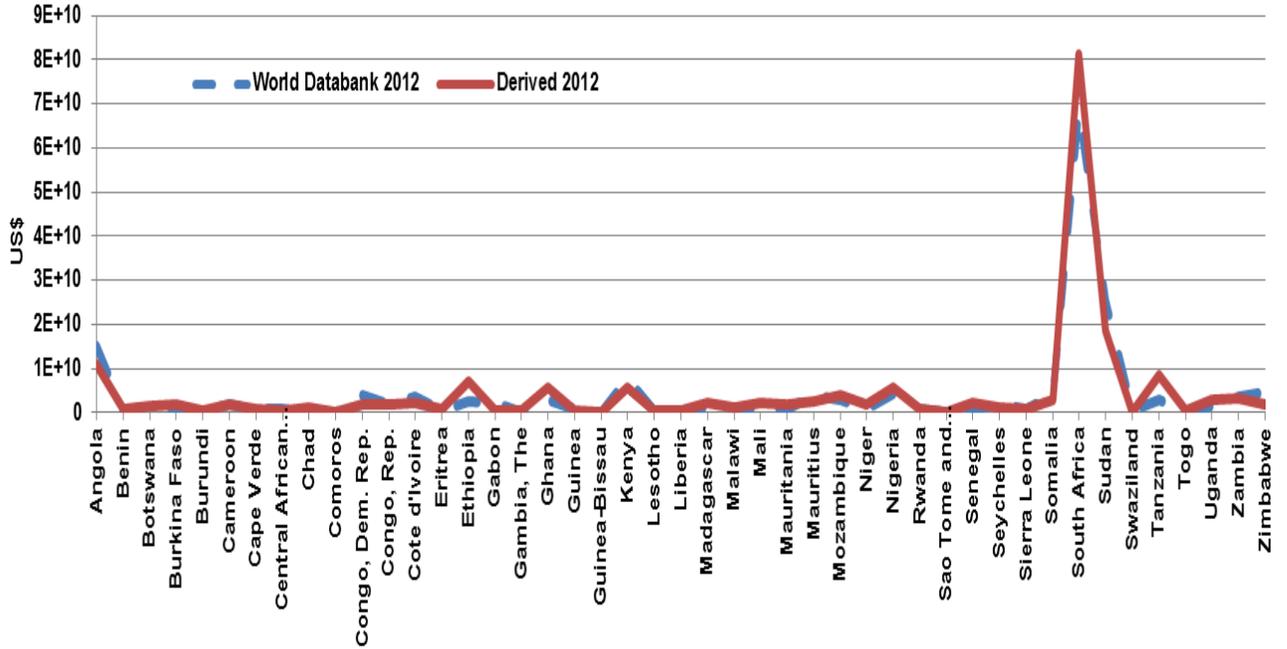
Source: World Bank, World Databank and Author's calculations

Figure A2: Governance Rating and Present Value Debt

Source: Author's calculations and analysis of data

Table A1: List of Countries

Low-income Sub-Saharan African Countries		
Benin	Gambia, The	Mozambique
Burkina Faso	Guinea	Niger
Burundi	Guinea-Bissau	Rwanda
Central African Republic	Kenya	Sierra Leone
Chad	Liberia	Somalia
Comoros	Madagascar	Tanzania
Congo, Dem. Rep.	Malawi	Togo
Eritrea	Mali	Uganda
Ethiopia	Mauritania	Zimbabwe
Middle-income Sub-Saharan African Countries		
Angola	Gabon	Senegal
Botswana	Ghana	Seychelles
Cameroon	Lesotho	South Africa
Cape Verde	Mauritius	Sudan
Congo, Rep.	Nigeria	Swaziland
Cote d'Ivoire	Sao Tome and Principe	Zambia

Endnotes

[i] See section 3.2.1 for detailed derivation of PV of external debt.

[ii] See detail in Aggarwal (2003) and more recently a critical review of the main issues surrounding debt sustainability in LICs in Mwaba (2005).

[iii] Rate of debt accumulation is defined as the percentage change in the present value of debt ratios.

[iv] Kraay and Nehru (2006) used the CPIA as a measure of policy and institutions but this is only publicly available since 2005.

[v] This distinction should affect the distress episodes identified when compared with Kraay and Nehru estimates.

[vi] The dataset identified 27 LICs and 18 MICs. However, as at the time of writing this paper about 75 percent of LICs remain in SSA countries. The list of countries used in the estimations can be found in Table A1 of the Appendix.

[vii] Albeit, the current global financial crisis could potentially reduce the resource envelope available to the LICs.

[viii] Also see IMF and IDA (2005).

[ix] This method is similar to Kraay and Nehru's (2006) definition of weak, medium, and strong performance using the CPIA.

[x] By averaging out all the explanatory variables (mean of the sample), the implied rate of debt accumulation is obtained by solving for debt accumulation:

$$\frac{P - (\beta_0 + \beta_1 Governance)}{\beta_2} = Debt$$, where *Debt* is either debt ratios or rate of debt accumulation; β_0

equals constant plus the product of the coefficients and average values of other explanatory variables; β_1 is the coefficient of governance; β_2 is the coefficient of debt (either debt ratios or rate of debt accumulation); *Governance* is the governance indicators rating and P is the estimated or desired probability of distress.