

SAVING BEHAVIOR AND EXTERNAL DEBT-SERVICE: EVIDENCE FROM SUB-SAHARAN AFRICA

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1. Introduction

The purpose of this article is to examine the relationship between saving behavior and sovereign external debt-service, which has been an economic burden on many Sub-Saharan African countries (World Bank 2001)¹. For more than two decades, as the debt of these countries increased, economic growth, investment and savings have declined (United Nations Conference on Trade and Development 2001; Collier and Gunning 1999). Efforts made to resolve these debt problems under the heavily indebted poor country (HIPC) Initiative have emphasized conditional debt relief and poverty alleviation, together with export-led, economic growth and enhanced national savings through improved fiscal and monetary policies (The World Bank 2001a).

While external debt and debt-service reductions seem necessary to spur economic growth, and noting that the major creditors and debtors have agreed to work with the debt reduction plan under the HIPC Initiative, Easterly (1999) has argued that providing debt relief, without a change in long-run saving behavior, may be ineffective in these countries. He further asserts that there will only be asset reductions, even as new borrowing is encouraged in response to debt relief.

Recognizing that the extent to which saving behavior should be changed has not been identified, and acknowledging that debt-service commitments require minimum saving rates in the economy, the main hypothesis of this paper is that external debt sustainability can only be achieved in the long run, if the saving rate is equal to or greater than the external debt-service to GDP ratio in these economies. If these conditions were not attained, then debt sustainability and economic growth would be jeopardized. Therefore, policymakers must not only be concerned with improving the rate of national savings, but they must also be focused on reducing the relative share of GDP that is allocated to debt-service commitments, even as exports and GDP expands.

The remaining sections of the paper are as follows. Section 2 provides an

¹ The thirty six African countries are: Angola, Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Republic of Congo, Côte d'Ivoire, Ethiopia, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda and Zambia.

analytical framework and background for an investigation of the debt-service to GDP ratio under the HIPIC program. An economic growth model is presented in Section 3, in which it will be demonstrated that the debt-service to GDP ratio is equal to the saving rate in the economy in the long run. Section 4 provides an outline of the data used in the study and describes the results from the empirical investigation. Conclusions are offered in Section 5.

2. Analytical Framework

External debt and annual debt-service payments for sub-Saharan Africa have been accepted as key factors retarding investment and economic growth. Support for this view is explained in part by the debt overhang hypothesis, which states that sovereign debt accumulation acts as a tax on future output that in turn depresses the incentive for private sector investments (Sachs 1989; Borensztein 1989)². Sub-Saharan African countries, which have significant debt and are long-term importers of capital, could therefore be at a disadvantage in gaining access to world financial markets, if they do not qualify under the Highly Indebted Poor Countries (HIPC) Initiative (The World Bank 2001).

Since external debt and debt-service payments can only be paid from exports, the HIPIC Initiative is structured on a set of economic indicators, with an export-led growth focus. Accordingly, an examination of the debt-service-to-GDP (DS/GDP) ratio indicates that it is influenced through indicators representing prior external claims on current and future exports and the degree of trade openness. Specifically, a prior external claim on exports is defined as the ratio of debt-service to exports (DS/X), with the debt-service being defined as the net present value of all due and payable debt at a specific point in time. The degree of trade openness is defined as the ratio of exports to GDP (X/GDP) and this signals the outward looking structure of the economy. Thus the product of these ratios establishes the debt-service-to-GDP (DS/GDP):

$$DS / GDP = DS / X \cdot X / GDP = d_t \quad (1)$$

² See Helpman (1989) for arguments against the debt overhang hypothesis. Also see Cline (1995) for a survey of the international debt crisis.

As the debt-service to exports ratio declines, the level of uncommitted foreign exchange increases, enhancing the creditworthiness and the debt-service capacity in the economy. Similarly as the ratio of exports to GDP increases, this implies that a larger share of the GDP is exported, allowing the economy to become more responsive to international competition. Consequently, improving the debt-service capacity of the economy depends on the outward looking structure of the economy, as represented by increasing trade openness and a decreasing ratio of debt-service to exports. This underlying structure of the economy sends a positive signal to investors who recognize that the foreign exchange, earning capacity of the economy is attractive, and this strengthens investment opportunities in the economy. If, however, these ratios were not responsive in the manner specified, then external debt sustainability would be jeopardized, as the share of GDP allocated to current debt-service could be significant.

The World Bank and IMF threshold levels for these indicators suggest that debt-service to exports should be within the range 20 to 25 percent, while exports to GDP should be at least 40 percent (Boote and Thugge 1997; International Development Association 2001). From equation 1 and using the IMF and World Bank threshold levels, it can be shown that the debt-service to GDP ratio is expected to range between 8 to 10 percent for eligible HIPC.

2.1 Debt-Service Projections and Implications

In the HIPC Initiative, debt sustainability is premised on the notion that some proportion of the outstanding debt will be written off and annual debt-service payments will be reduced, with the savings from debt-service payments being directed to poverty reduction. Additionally, it is expected that export led-growth will increase, leading overtime to the projected decline in the debt-service to GDP ratio as macroeconomic stability is attained.

During the period 1998 to 2005, the debt-service to export ratio for twenty-three sub-Saharan African countries under the HIPC is projected to decline from 16.3 percent in 1998 to 7.3 in 2005, a reduction of over fifty percent in seven years (World Bank Report 2001). Similarly, the export to GDP ratio is projected to increase from 20 percent in 1998 to 23 percent in 2005, an increase of over 15 percent in seven years. Given the debt-service, export and GDP relationships in equation 1, these results

imply that the debt-service to GDP ratio is projected to decline from 3.2 percent in 1998 to 1.6 percent in 2005, a decline of over 50 percent in seven years for twenty-three sub-Saharan African countries (Table 1).

Table 1: Africa Debt-Service Indicators for 23 HIPCs, 1998-2005

Economic Indicators	1998	2000	Percent	2002	2005
Debt-service/Exports (DS/X)	16.3	12.6		7.9	7.3
Exports/GDP (X/GDP)	20.0	22.0		23.0	23.0
Debt-service/ GDP = (DS/X) * (X/GDP)	3.2	2.8		1.8	1.6

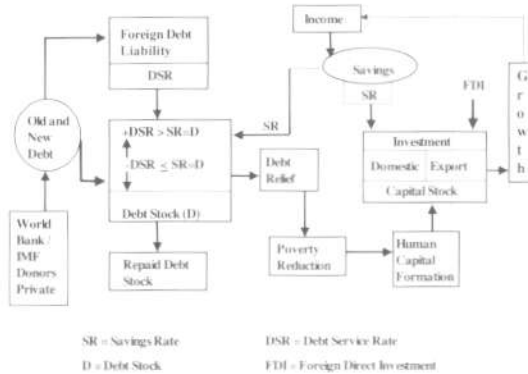
Source: World Bank Report (2001), Appendix, page 25, Table 4.

In order for these projections to be achieved, it is obvious that export-led growth in sub-Saharan Africa would have to be significant. But recent evidence does not support such optimism, suggesting thereby that these projections might be overstated. This outcome could be due to falling, commodity prices for primary exports from Africa (Deaton 1999; World Bank Development 2001b). It could also be due to the lack of export-demand, resulting from the general slow-down in the world economy and insufficient incremental investments in sub-Saharan Africa during the last decade (United Nations Conference on Trade and Development 2001)³. Besides, the underlying structural changes required to make these economies more export oriented will require a host of strategic political, economic and investment decisions. And it is for these reasons that the success of the HIPC Initiative to transform these economies and to make them more export oriented within seven years could be questioned.

Figure 1 below depicts the linkage between debt, savings, investment and economic growth, together with the current debt relief and poverty reduction program under the HIPC Initiative. With hardly any foreign direct investment (FDI) in many low-income countries (LICs) and insignificant new private investment, old and new debts are mainly sourced from the World Bank and IMF and developed countries. The figure shows that if the debt-service rate (DSR) in the long run is higher than the saving rate (SR), the debt stock will increase, once the debt relief program has been cancelled. Alternatively, the debt stock will decline, if the saving rate is equal to or larger than the

³ Saving and investment rates were higher during the period 1975-1979, as compared with the 1990s and 1980s (UNCTAD 2001, page 14, Table 5).

Figure 1: Debt, Savings, Investment and Growth



debt-service rate. Debt relief and increased government spending in the social sectors is intended for poverty reduction programs that are aimed at human capital formation over time, which in turn will improve labor productivity. Saving, which is derived from income, is used to pay down the debt and finance investment that could be complemented with foreign direct investment. Export-led economic growth could therefore flow from this process, given a set of appropriate policies.

3. Model

In order to model debt-service rate and saving behavior, the debt-service-to-GDP ratio (equation 1) is added on the demand side of the Solow (1956) growth model, with output per worker on the supply side defined as:

$$y_t = Ak_t^\alpha \quad 0 < \alpha < 1 \quad (2)$$

where y_t is output per worker ($Y/L = \text{GDP}/L$); k_t is capital per worker (K/L) and A is a constant representing the average product of capital per worker. The marginal product of capital per worker (MPK) is shown as:

$$MPK = \Delta y_t / \Delta k_t = \alpha y_t / k_t \quad (3)$$

The change in the capital stock (Δk_t) is equal to the difference between gross investment (I_t) and capital stock depreciation (δk_t):

$$\Delta k_t = I_t - \delta k_t \quad 0 < \delta < 1 \quad (4)$$

Output per worker is allocated on the demand side to consumption (C_t), investment (I_t) and debt-service (DS_t):

$$y_t = C_t + I_t + DS_t \quad (5)$$

with the functions for consumption (C) and debt-service capacity (DS) defined as:

$$C_t = (1 - s)y_t \quad 0 < s < 1 \quad (6)$$

$$DS_t = dy_t \quad 0 < d < 1 \quad (7)$$

where s is the saving rate and d is the debt-service rate out of current income (y_t), obtained from equation 1. Substituting equations 6 and 7 into equation 5 yields:

$$I_t = (s - d)y_t = (s - d)Ak_t^\alpha \quad (8)$$

From equation 8, it is recognized that investment per worker is not only a function of the capital stock but its magnitude is determined by the difference between the saving and debt-service rates in the economy. If the debt-service rate is larger than the saving rate, investment will be negative, suggesting that the debt-service rate is a marginal tax that reduces investment, since the debt-service is part of sovereign debt, repayable by government. Thus a zero percent debt-service rate would yield the established solution of savings being equal to investment. And a 100 percent debt-service rate implies that debt-service commitments will exhaust income. Jubilee 2000/USA (2002), a strong critic of the HIPC Initiative, has been calling for 100 percent debt cancellation ("Drop the Debt"), which according to this model implies a

zero debt-service rate. The World Bank and the IMF have rejected this approach, agreeing instead to a debt-service rate that is significantly less than one and below the debt-service rate prior to the HIPC Initiative⁴. Substituting equation 8 into equation 4 yields the change in the capital stock (Δk_t):

$$\Delta k_t = (s - d)y_t - \delta k_t \quad (9)$$

And dividing the change in the capital stock (equation 9) by the level of the capital stock (k_t), generates the growth rate in the capital stock:

$$\Delta k_t/k_t = \dot{K} = (s - d) y_t/k_t - \delta \quad (10)$$

When the change in the capital stock in equation 10 is zero ($\Delta k_t=0$), representing the steady state, this implies that the depreciation rate times the capital-output ratio (k/y) is equal to the difference between the saving rate and the debt-service rate:

$$\delta k_t/y_t = (s - d) \quad (11)$$

This result implies that if the depreciation rate, the saving and the debt service rates are known, then the capital output ratio can be derived from equation 11. Meanwhile, Mankiw (1997, p. 469) asserts that in the steady state "...the marginal product of capital net of depreciation, ($MPK - \delta$), equals the real rate of interest r ." This result suggests that the depreciation rate is equal to the difference between the marginal product of capital and the real interest rate ($\delta = MPK - r$); and upon substituting this result into equation 11 yields:

$$(MPK_t - r) k_t/y_t = (MPK_t \cdot k_t)/y_t - rk_t/y_t = I_t/y_t = (s - d) \quad (12)$$

The term $(MPK \cdot K)/Y$ represents the capital share of output, while the term $(rk)/Y$ represents the cost share of capital. The difference between these two shares

⁴ The World Bank HIPC website has a response to this question in a note written by C. Delchat, entitled, "100 Percent Debt Cancellation? A Response from the IMF and the World Bank."

represent the investment output ratio (derived from equation 8) and is equal to the difference between saving and debt-service rates. An important result from equation 12 is that if the capital share of output is greater than the cost share of capital, then there is a positive difference between the saving rate and the debt-service rate and this fosters a positive level of investment. Alternatively, if the capital share of output is less than the cost share of capital, then there is a negative difference between saving rate and the debt-service rate and this yields a negative level of investment. And finally, when the capital share of output is equal to the cost share of capital, or when the marginal product of capital is equal to the interest rate, then equation 12 shows that investment is zero and the saving rate is equal to the debt service rate ($s=d$). Assuming that the saving and debt-service rates are equal, this implies the intuitive result from equation 7 that the level of debt-service capacity is equal to aggregate savings in the economy in the long run:

$$DS_t = dy = sy_t = S_t \quad (13)$$

where S_t is the level of aggregate savings. Since both private and public savings determine the level of aggregate national savings, then changes in income and consumption will affect debt-service capacity. Also when the foreign debt-service commitments become a liability for the government, this will reduce public and national savings as the debt-service capacity of the economy decline, confirming the debt overhang hypothesis. Incentives to change saving behavior will therefore be important in these economies.

4. Data and Econometric Results

The empirical analysis uses cross-country data for 36 Sub-Saharan African countries, obtained from the Human Development Report 2000. Table 2 contains the means, maximum and minimum for the variables used in the model, and is based on a comparison between medium human development (MHD) and low human development (LHD) countries. The data show that twenty-four LHD countries tend on average to have lower saving, lower income per capita, and lower exports as a share of GDP than the twelve MHD countries. There are wide variations in the ratios representing trade openness, income, debt-service to exports and the average saving

rate which is sometimes negative in a few countries, such as Sao Tome and Principe (16 percent), Guinea Bissau (8.9 percent), Comoros (5.4 percent), Burundi (2.5 percent), Rwanda (1.8 percent) and Sierra Leone (1.3 percent). Low and negative saving rates will certainly affect debt-service capacity and retard investment and growth. Negative savings imply a declining capital stock as observed from equation 11.

Table 2: Economic Indicators in LHD and MHD

Indicators	Mean		Total	Max.	Min.
	LHD	MHD			
Number of observations	24	12	36		
Debt-service to exports (%)	18.5	17.1	16.0	40	3.3
Exports/GDP (%)	24.0	39.0	34.0	70	5.4
Debt-service/GDP = d (%)	4.4	6.7	4.9	18	0.9
Saving rate (%)	6.8	14.8	9.5	43	-16
Income per capita (US\$/day)	2.5	9.5	4.8	29	1.3

The model for estimation is based on equation 13, which is specified without an intercept term. Because the saving rate is different across countries, dummy variables are introduced to capture the changes in the marginal saving rates. In addition, a dummy variable is introduced to identify MHD countries, with the model specified as:

$$\text{LnDS} = (\beta_2 \text{ASR} + \beta_3 \text{Ihd} + \beta_4) \text{LnY} + e \quad (14)$$

where debt-service (LnDS) and income (LnY) are in natural logarithms. Dummy variables are recorded for middle human development (MHD) and average saving rates (ASR) of no more than 25 percent. Four equations are used to capture the different saving rates in the model, which is estimated by OLS and the results are recorded in Table 3.

The empirical results show that the estimated coefficients are statistically significant and have the correct signs. Statistically significant, positive coefficients for the income variable in all equations confirm that debt-service is proportional to income, where that proportion is determined by the saving rate, the estimated coefficient. The coefficient estimated for the product term for middle human development times income is positive and statistically significant, signaling that middle human development countries have higher saving rates than those observed in countries with low human development. Countries with saving rates that are no larger

than 25 percent have lower debt-service rates than other countries since the estimated coefficient for the average saving rate times income is negative and statistically significant.

Table 3: Regression Results

Variable	LnDS	t-ratios	LnDS	t-ratios	LnDS	t-ratios	LnDS	t-ratios
Income/capita (LnY)	0.55	27.6**	0.50	21.7**	0.62	23.8**	0.57	16.4**
MHD*LnY	...	...	0.10	2.9**	...	...	0.06	1.8*
ASR*LnY	...	...	...	...	-0.12	-3.5**	-0.09	-2.4**
Total observations	36	...	36	...	36	...	36	...
Adjusted R square	0.46	...	0.56	...	0.59	...	0.62	...

Notes: A single asterisk indicates statistical significance at the 5 percent level, double asterisk indicates statistical significance at the 1 percent level or better.

5. Conclusions

Over the last two decades, evidence suggests that while saving, investment and economic growth have been low, debt-service commitments have been high in sub-Saharan Africa, leading to a severe debt overhang, debt rescheduling and debt relief under the HIPC Initiative (The World Bank 2001). Establishing a framework for ensuring that sub-Saharan Africa can repay its external debt is a complex process requiring appropriate macroeconomic policies that encourage export-led growth and higher national saving rates. The notion that a debtor's debt-service rate cannot be larger than the saving rate is confirmed in this paper, where it is demonstrated that sovereign debt-service capacity is equal to the saving rate in the long run. The main implication of this result is that improving the national saving rate above the debt-service rate will ensure debt sustainability, reduce the debt-service impact on the economy, and enhance the investment environment in sub-Saharan Africa.

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Abstract

This paper examines the relationship between saving behavior and external debt-service, which is an economic burden in sub-Saharan Africa. The paper claims that the speed with which the debt-service to GDP ratio is expected to decline might be overstated and this could retard the success of the HIPC Initiative. The paper also shows that the saving rate must be equal to or greater than the long-run debt-service rate, if debt sustainability is to be achieved. Policymakers must therefore improve the national savings rate and reduce the share of GDP allocated to debt-service by fostering export-led GDP growth.

Key words: Saving rates; sub-Saharan Africa; HIPC Initiative; Debt-service to GDP ratio.

HABITUDE D'ÉPARGNE ET SERVICE DE LA DETTE EXTÉRIEURE: LE CAS DE L'AFRIQUE SUB-SAHARIENNE

Résumé

La présente étude vise à examiner le rapport existant entre l'habitude d'épargne et le service de la dette extérieure qui représente un fardeau économique pour la région de l'Afrique sub-saharienne. D'après cette étude, le rythme de la baisse prévue au niveau du ratio du service de la dette sur le produit intérieur brut (PIB) pourrait être surévalué, entraînant ainsi un certain délai dans la bonne marche du programme conçu à l'intention des pays pauvres largement endettés. L'étude montre aussi que, si on doit parvenir à une soutenabilité de la dette, le taux d'épargne doit être égal ou supérieur à celui du service de la dette à longue échéance et réduire la portion du PIB alloué au service de la dette en encourageant l'exportation bénéfique à l'augmentation du PIB.