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# *The External Debt Burden and Economic Growth in the 1980s: Evidence from sub-Saharan Africa*

*Augustin Kwasi Fosu*

ABSTRACT

*The study estimates the effect of external debt on economic growth in sub-Saharan Africa (SSA) during the 1980s when debt became a burden, and a majority of SSA countries defaulted. By using 1980-1990 World Bank data across 35 SSA countries in an augmented production function framework, the study finds that net outstanding debt was deleterious to economic growth for given levels of production inputs, whereas SSA's growth would have been 50% higher without the external debt burden. Meanwhile, there is little evidence of a negative correlation between debt and investment levels. External debt may still be burdensome even if it exerts little influence on the level of investment.*

RÉSUMÉ

*Cette étude examine les répercussions de la dette externe sur la croissance économique des pays de l'Afrique subsaharienne (ASS) au courant des années 1980. L'analyse se fait en utilisant les données de la Banque mondiale pour la période 1980-1990 portant sur 35 pays de l'ASS et à l'aide d'un cadre de production améliorée. Les résultats montrent que cette dette extérieure impayée a affecté négativement la croissance économique malgré les niveaux considérables de production, alors que sans ce fardeau, ces pays auraient pu jouir d'un taux de croissance de plus de 50 %. Les résultats prouvent qu'une corrélation négative très faible existe entre les niveaux de la dette et de l'investissement. Autrement dit, la dette externe constitue un fardeau même si elle a peu d'effet sur le niveau de l'investissement.*

## INTRODUCTION

Similarly to other less developed countries (LDCs), the external debt burden in most sub-Saharan African (SSA) nations became critical in the mid-1980s.[1]

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1. Of 45 SSA nations, only 11 countries were not in arrears or did not engage in debt rescheduling. They are Botswana, Burundi, Djibouti, Ethiopia, Kenya, Lesotho, Mauritius, Rwanda, Seychelles, Swaziland, and Zimbabwe (Greene, 1989).

It is presumed that debt has been a constraint to growth and development in Africa. According to United Nations Secretary General Perez de Cuellar, the debt burden "has become one of the most important factors constraining recovery and development in the continent" (United Nations, 1988; see also World Bank, 1989). Surprisingly, however, little empirical light has been shed on the above hypothesis. Although several studies (Lancaster, 1991; Danso, 1990; Greene, 1989) have discussed the possible causes of the African external debt problem and its implications for development, an empirical estimate of its impact on economic development in many SSA countries in the 1980s has yet to be provided.

Most of the literature on the impact of external debt in LDCs is focused on Latin America.[2] Still, such studies generally concentrate more particularly on how external debt influences investment or saving levels rather than economic growth (e.g. Savvides, 1992; Hoffman and Reisen, 1991; Faini and DeMelo, 1990; Fry, 1989). While a drag on investment rates will reduce economic growth, external debt could also affect the productivity of production factors in economic growth. External debt may still affect output growth even if investment levels are unaffected.

This study uses an augmented production function to examine the impact of external debt on the economic growth of SSA countries over the 1980-1990 period when most of these nations experienced difficulties with their debts. The theoretical role of external debt in the growth process is discussed, followed by empirical analysis, and then by the results and conclusion.

## I. THEORETICAL ISSUES

There are two competing hypotheses that external debt may be deleterious to economic performance: the "debt overhang hypothesis" (DOH) and the "liquidity constraint hypothesis" (LCH). According to the DOH, high debt acts as a tax on future output and reduces the incentive for saving and investment (Krugman, 1988; Corden, 1988; Froot, 1989; Sachs, 1989). The debt burden being the outstanding debt, a negative relationship between the rate of investment and outstanding debt is implied.

The LCH states that the requirement to service debt reduces funds available for investment purposes (Hoffman and Reisen, 1991). Hence, a binding liquidity constraint on debt would produce a negative effect on investment.

Empirical studies of the above hypotheses that examine the extent to which the debt burden affects saving or investment levels provide mixed results. For

2. For an example of the large volume of research on Latin America, see, for example, Sachs (1989).

example, the IMF (1989) cites evidence in support of DOH: in the 1980s, countries with larger debt levels also experienced smaller rates of capital formation. Using a more comprehensive framework that takes into account other factors influencing investment, Hoffman and Reisen (1991) discover little evidence for the DOH on the basis of outstanding debt; however, they find liquidity availability to be an important determinant of the level of investment. In contrast, Faini and DeMelo (1990) and Fry (1989) uncover negative impacts of outstanding debt/exports and outstanding debt/GNP ratios on investment, respectively.

As presented in the existing literature, both the DOH and the LCH imply an "indirect" adverse impact of debt on economic growth through reductions in investment levels.

This study offers an alternative hypothesis. It argues that even if debt is found to be inconsequential in the investment or saving function, it can still influence output growth through its effect on productivity. Thus, in addition to determining the influence of external debt on investment levels, its direct impact on output growth must also be examined.

Debt overhang, for example, may raise the discount rate of potential investors, due to the future tax accompanying an outstanding debt burden. Hence, short-term investment projects would be favoured over longer-term ones that might otherwise be more productive in terms of higher net present discounted value. That is, the existence of a debt overhang would influence the nature of investment undertaken, skewing the basket of investment projects toward those yielding faster returns that are less productive.[3]

Moreover, where the liquidity constraint is binding, loans are offered to generate short-term export proceeds that are used to meet repayment obligations. For example, longer-term improvements in the infrastructure that generate better payoffs but do so further in the future could be postponed. Instead, relatively perfunctory maintenance is performed on infrastructure in order to allow sufficient funds for projects such as mineral extraction that would yield faster foreign exchange for the repayment of loans.

The above scenario is particularly relevant for SSA countries in the 1980s compared to the earlier periods when loans were extended on more concessionary terms. For a myriad of reasons – deterioration in terms of trade,

3. Alternatively, the existence of a debt burden may discourage private investment, with shortfalls possibly being filled by public investment. If so, the investment mix in a more debt-strapped economy would be tilted toward a generally less-productive public investment (see, for example, Khan and Reinhart, 1990). Unfortunately, the paucity of available data for SSA does not permit a delineation between private and public investment in any meaningful way. The important point, however, is whether debt is likely to exert an adverse impact on growth by influencing the investment mix through this private/public or short/long-term dichotomy.

pursuit of wrong policies, or simply mismanagement – the bulk of SSA nations suffered balance of payments deficits, particularly around the early 1980s. The deficits were usually financed through relatively short-term loans, typically through the IMF, which required them to pursue projects that would foster foreign exchange faster to meet their repayment obligations. Such financing constraints could preclude alternative efficient projects with payoffs farther off in the future. Thus, while a country with a larger debt burden might experience a smaller investment, as the traditional theory suggests, it is also conceivable that the country would be constrained to a less efficient mix of investment projects.

The foregoing discussion suggests that external debt may exert an adverse "direct" impact on economic growth even if it is not deleterious to the level of investment. We test this "direct effect of debt hypothesis" (DEDH).

## II. EMPIRICAL MODEL

Consider the usual cross-country "augmented production function":[4]

$$y_i = b_1 + b_2 l_i + b_3 k_i + b_4 x_i + e_i , \qquad i = 1, 2, \ldots, n \qquad (1)$$

where $y_i$, $l_i$, $k_i$, and $x_i$ are growth rates of production, labour, capital, and exports, respectively, in country $i$; $b_j$ ($j$=1,2,3,4) are parameters to be estimated; $e_i$ is the error term; and n is the number of countries in the sample. Both slopes $b_2$ and $b_3$ are expected to be positive according to neoclassical theory, whereas the anticipated positive sign of $b_4$ is based upon the generally avowed beneficial effects of exports (Fosu, 1990; Ram, 1985).

The above hypothesis suggests that the debt burden enters into equation 1 directly. That is,

$$y_i = b_1 + b_2 l_i + b_3 k_i + b_4 x_i + b_5 d_i + u_i , \qquad i = 1, 2, \ldots, n \qquad (2)$$

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4. The literature is replete with studies based on this production-function specification and its variants, where output is not only a function of the traditional inputs of labour and capital but also a function of exports, which are assumed to reflect international forces not captured in these neoclassical functional arguments. For a discussion of the various types of specifications, see, for example, Edwards (1993), and for an application of the present version to African countries, see, for instance, Fosu (1990).

Alternatively, the extended Feder-type version could have been used (Edwards, 1993). As Lussier (1993) has shown, however, the simpler Fosu specification appears to be sufficient relative to the Feder model, at least for low-income and African economies. In any case, the empirical results subsequently presented herein indicate that findings regarding the importance of debt in the growth equation appear invariant to the inclusion status of the export variable (see table 1).

where $d_i$ measures external debt for the $i$th country, $b_5$ the "direct" impact of debt, $u_i$ the new error term, and the remaining symbols are as previously defined in equation 1. The hypothesis that $b_5$ is negative is tested next.

## III. DATA, ESTIMATION AND RESULTS



Equation 2 was estimated cross-sectionally based on country averages from the 1980-1990 complete data set, available for 35 SSA countries. The choice of this sample period was governed primarily by two factors: first, the relevant data for SSA are more available in the 1980s than in previous years; second, and more importantly, the level of SSA external debt was substantially smaller before the 1980s (Greene, 1989). It was not until the 1980s that the external debt became obviously binding, with a large number of SSA nations defaulting or having their debts rescheduled (Greene, 1989). The sample of countries, ranked by the level of debt, is shown in the appendix.

Several debt burden measures were considered from debt data (World Bank, *World Debt Tables*, 1988-89 and 1993 issues). From both theoretical and empirical grounds, net debt, computed as total outstanding debt less total reserves (as a proportion of GNP), was considered the best measure of the debt burden. Theoretically, this measure, which incorporates both the debt overhang and the liquidity constraint, is probably the best indicator of debt severity because it demonstrates the inability of a nation to meet its future debt liabilities. Statistically, when other debt burden measures such as gross debt as a proportion of GNP or exports were used, they produced relatively unsatisfactory results. Although the coefficients of these other debt variables were all negative as expected, their statistical significance, as well as the goodness of fit of the respective models, was substantially weaker.[5]

In addition, actual debt service payments were considered inadequate indicators of the debt burden, since a large number of SSA countries were in arrears.[6] A larger debt service may actually reflect the higher ability of a country to meet its debt obligations rather than the existence of a higher debt burden. Thus, debt service would be a poor measure of debt burden, which is also supported by the statistical results. The actual debt service measures (expressed as proportions of both exports and GNP) were relatively unsatisfactory in the growth equation. Although negative, their coefficients were

5. Following other studies on the debt burden (in particular, Hoffman and Reisen, 1991), the level of the (net) debt, rather than its growth, is used here as the appropriate measure of the debt burden. A change in the level would obviously change the burden; however, it is assumed, as in previous studies, that it is the burden itself that affects growth.

6. All but 9 countries in the present sample were in arrears or had their debts rescheduled (see ftn. 1).

insignificant and the goodness of fit of the model deteriorated when they were used as measures of the external debt burden instead of net outstanding debt.

Data for $l$, $k$, and $x$ are derived from the *African Development Indicators* (World Bank, 1992). For each country, growths of output $y$, labour $l$, and exports $x$ are measured as the average annual percentage of GDP, labour force, and exports of goods and nonfactor services, respectively. As is now standard in the literature (Fosu, 1990; Ram, 1985), capital growth $k$ is proxied by the mean annual gross domestic investment as a percentage of GDP.[7]

Full and restricted versions of equation 2 were estimated using Ordinary Least Squares (OLS). The results are reported in table 1. For parsimony reasons, only the regression results of the "best" models, which involve net debt outstanding, are reported and discussed here.[8]

To assess the reliability of the OLS estimation, the White test for heteroscedasticity and the RESET specification test were conducted. The results of these tests indicate that heteroscedasticity is not a problem in any of the models reported[9] (table 1) and that the fully specified equations that include the debt variables are "correctly" specified.[10]

As a benchmark, the basic neoclassical model is presented as equation A in table 1. This model fits the data rather poorly, as indicated by the SEE and adjusted $R^2$. Equation B is the export-augmented production function, which exhibits an improvement over the basic model in terms of goodness of fit. The export coefficient is also positive, consistent with existing estimates for SSA (Fosu, 1990). Compared with previous estimates for earlier periods, however, the model's goodness of fit appears weak, suggesting a possible omitted variable in the case of the 1980s.

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7. For justification, refer to Fosu (1990, ftn. 11) and Ram (1985, ftn. 6).

Note that the use of the above measure for investment transforms the coefficient of the capital variable to the marginal product of capital, since then $dQ/Q = b(dK/Q)$, where $dQ/Q$ is the growth rate of GDP, $dK/Q$ is capital formation as a proportion of GDP, and $b$ is the coefficient. It follows that $b = dQ/dK$.

8. The other results are available from the author upon request.

9. Based on squared terms of the regressors in the squared residual test equation, the White test statistic $H = nR^2$ shows no evidence of heteroscedasticity at the 0.1 level in any of the models in table 1. For example, $H$ equals 12.46 and 13.68 for the test equations based on models C and D. Since $H$ is distributed chi-square with 9 degrees of freedom in either test equation, the null hypothesis of homoscedasticity cannot be rejected even at the 0.1 level (critical value equals 14.68). Meanwhile, all the other models in table 1 have even lower $H$ values.

10. Based on a 6th order specification, the critical value for the RESET F statistic is 2.71 at the 0.05 level, so that the null hypothesis of "correct" specification cannot be rejected, especially for the fully specified models C and D in table 1. Note from table 1 that the RESET F values are particularly low for these two models, so the "correct" specification hypothesis cannot be rejected for them even at a higher level of type 1 error.

Table 1. Debt and growth in sub-Saharan Africa, 1980-1990

| Equation | Constant | l | k | x | D1 | D2 | $AR^2$ | SEE | RESET |
|---|---|---|---|---|---|---|---|---|---|
| A | -0.854 (0.41) | 0.787 (1.11) | 0.084 (1.55) | – | – | – | 0.04 | 2.56 | 2.4 |
| B | -0.448 (0.24) | 0.812 (1.27) | 0.047 (0.92) | 0.217[a] (2.88) | – | – | 0.22 | 2.31 | 2.6 |
| C | 0.610 (0.34) | 0.836 (1.39) | 0.055 (1.14) | 0.168[b] (2.28) | -0.017[b] (2.26) | – | 0.31 | 2.17 | 1.9 |
| D | 0.474 (0.26) | 0.941 (1.55) | 0.047 (0.97) | 0.200[a] (2.79) | – | -0.021[b] (2.20) | 0.30 | 2.18 | 1.7 |
| E | 0.628 (0.32) | 0.826 (1.29) | 0.084 (1.70) | – | -0.022[a] (2.86) | – | 0.21 | 2.31 | 2.6 |
| F | 0.232 (0.11) | 0.937 (1.40) | 0.081 (1.57) | – | – | -0.024[b] (2.28) | 0.15 | 2.41 | 3.0 |

*Note:* The absolute value of the t-ratio is indicated in parenthesis. The dependent variable *y* is the annual mean percent growth rate of GDP over the 1980-1990 period; *l* is the average yearly percent growth of the labour force; *k* denotes the mean annual gross domestic investment as a percentage of GNP; *x* is the average yearly growth rate of exports of goods and nonfactor services; *D1* is the mean net debt, defined as total external debt less total reserves, as a percentage of GDP; *D2* is similarly defined as *D1* but over the 1980-1985 period. The variables *y*, *l*, *k*, and *x* are derived from World Bank, *African Development Indicators, 1992*; *D1* and *D2* are computed from data from World Bank, *World Debt Tables*, 1988-89 and 1993 issues. $AR^2$ and *SEE* are the adjusted coefficient of determination and the standard error of estimate, respectively. *RESET* is the Ramsey F test for model specification. The sample size comprises 35 countries.

a. Statistically significant at the 0.01 level (two-tailed).
b. Statistically significant at the 0.05 level (two-tailed).
c. Statistically significant at the 0.10 level (two-tailed).

Equation C incorporates the net debt variable *D1*, measured over 1980-1990, which exhibits a statistically negative coefficient, and the goodness of fit of the model improves substantially when it is included. This finding agrees with the above hypothesis of a negative direct effect of debt.

Despite the indication from the RESET test that model C is "correctly" specified, it may still be important to further ensure that the observed correlation between GDP growth and debt does not run counter to the direction of the hypothesis. It is conceivable, for example, that those economies performing relatively dismally in the early 1980s might have attracted additional loans during the latter part of the decade, as many SSA countries entered into structural adjustment programs in the mid-1980s. If so, then the negative correlation reported between net debt and GDP growth might be caused by the effect of GDP on debt. That is, we must circumvent the possible scenario that the observed negative association between growth and net debt might be due to poor performers receiving larger loans.

Accordingly, the growth model is re-estimated using *D2*, net debt covering only the first half of the decade from 1980 to 1985. Since this external debt

measure generally precedes the period of structural adjustment, it should mitigate the potential problem of the reverse correlation mentioned above. The results, based on *D2*, are shown as equation D in table 1.

It is reassuring that estimates based on *D2* are similar to those based on *D1*. Even if we take into account the potential problem of reverse causation, the coefficient of net debt remains negative and significant, while the goodness of fit of the model improves over that of the export-augmented equation B. In addition, there is very little difference in the goodness of fit or the measure of the debt effect between these two sets of results (equations C and D). Hence, the observed negative correlation between GDP growth and net debt does not appear to result from increased indebtedness due to poor performance. Instead, the evidence seems to support the hypothesis that net external debt had a deleterious direct impact on economic growth in the 1980s.

To further strengthen the above estimates of the debt coefficient, equations E and F of table 1 present additional results based on models that exclude the export variable. These results show that the estimates are similar to those in the export-augmented specifications, despite the rather substantial reduction in the goodness of fit of the model when the export variable is omitted. Thus, it appears that an adverse effect of debt on growth is independent of the inclusion of exports, lending further support to the robustness of the debt coefficient.

Table 2. Correlation: debt versus other regression variables

| | y | I | k | x |
|---|---|---|---|---|
| D1 | -0.44[a] | 0.01 | -0.02 | -0.30[c] |
| D2 | -0.35[b] | 0.10 | -0.04 | -0.12 |
| D1' | -0.26[c] | -0.01 | -0.09 | -0.60[a] |

*Note*: *D1'* is similarly defined as *D1* but is expressed as a proportion of exports rather than GNP. All other variables are defined in table 1.
a. Statistically significant at the 0.01 level.
b. Statistically significant at the 0.05 level.
c. Statistically significant at the 0.10 level.

Zero-order correlation coefficients are reported in table 2 to show the relative importance of the "direct" and "indirect" effects of external debt on growth. The results show that the debt variables *D1* and *D2* correlate most negatively with the GDP growth, *y*, but weakly with the investment variable, *k*.

It should be noted that *D1*, *D2* and *k* are expressed as proportions of GNP. This might introduce a spurious positive correlation between them, thus

Table 3. Summary statistics of regression variables

| | Mean | Standard Deviation |
|---|---|---|
| y | 2.55 | 2.60 |
| I | 2.31 | 0.62 |
| k | 18.71 | 8.09 |
| x | 1.21 | 5.38 |
| D1 | 70.59 | 50.45 |
| D2 | 55.45 | 38.68 |

*Note*: All variables are defined in table 1.

confounding any true negative correlation between net debt and investment. Therefore, it is conceivable that the finding of the weak negative correlation between net debt and investment is a statistical artifact. To circumvent this potential problem, additional correlation results are presented using another debt measure *D1'*, which is similarly defined as *D1* but with exports, rather than GNP, as the denominator. The results (table 2) indicate that the negative correlation of *D1'* with *k* is still quite weak. Thus, there is strong evidence that there was little correlation between debt and investment levels in the 1980s for SSA; therefore, the negative impact of external debt on GDP growth is likely direct, as the DEDH suggests, rather than occurring through a reduction in the investment rate.[11]

From the coefficients of the net debt variables in equations C and D of table 1 and the means presented in table 3, partial elasticities associated with *D1* and *D2* are computed at the means as 0.47 and 0.46, respectively. This means that on average, a 1% rise in net debt would reduce GDP growth by about 0.5%, *ceteris paribus*. In other words, SSA's growth would have averaged nearly 1.2%, or nearly 50% higher during the decade of the 1980s if the external debt burden, measured as net debt, had been absent.[12]

11. Obviously, the current conclusion is based on simple correlations, and a more comprehensive multiple-regression specification might reveal otherwise. Nevertheless, it is interesting that the negative zero-order correlation of debt appears much more apparent with GDP than with investment. Besides, the present result that external debt does not negatively influence investment levels in SSA is buttressed by the finding for the Philippines, for example, that debt with official creditors (both international and bilateral) did not adversely affect private investment (Borensztein, 1991). That SSA relies heavily on official creditors may, therefore, help to explain the finding here of a weak negative correlation between debt and investment in SSA.

12. That is, for *D1*, (-0.017)(70.59) = -1.2 and 1.2/2.55 = 0.47

## CONCLUSION

This study has examined the impact of external debt on economic growth in sub-Saharan Africa in the 1980s, when the debt burden became apparent. Using 1980-1990 data for 35 SSA countries in an augmented production-function framework, it has tested the "direct effect of debt hypothesis" (DEDH) that debt may adversely influence growth even if it has little or no impact on the level of investment. The results reveal a substantial impact of net external debt on GDP growth, which supports the DEDH. Meanwhile, additional evidence shows a rather weak negative effect of debt on investment levels.

The findings of the study imply that in assessing the impact of external debt in developing economies, researchers and policy makers need not concentrate their efforts on the rate of investment, as has traditionally been the case. The nature and productivity of the investment projects undertaken may actually be relatively important. Indeed, the substantial decline in productivity documented in previous studies might be due in part to this external debt burden.[13] This study suggests that reducing such burdens could contribute substantially to economic growth in SSA even if the rates of investment remained unaffected.

13. World Bank (1989), for instance, presents statistics showing a large deterioration in rates of return on investment in SSA, especially during the 1980s. In addition, World Bank (1991) reports a decline in the growth rate of total factor productivity for Africa during 1973-1987. While much of this could be explained by poor governance, it is still conceivable that the existence of an external debt burden may cause these economies to undertake relatively suboptimal investment projects due to constraints imposed by the debt burden, as argued above.

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## APPENDIX

Sub-Saharan African countries ranked by net debt

| Rank | Country | Rank | Country |
|---|---|---|---|
| 1 | Botswana | 19 | Benin |
| 2 | Rwanda | 20 | Sierra Leone |
| 3 | Lesotho | 21 | Senegal |
| 4 | Swaziland | 22 | Malawi |
| 5 | Burkina Faso | 23 | Togo |
| 6 | Chad | 24 | Zaire |
| 7 | Mauritius | 25 | Mali |
| 8 | Zimbabwe | 26 | Tanzania |
| 9 | Central African Republic | 27 | Madagascar |
| 10 | Burundi | 28 | Sudan |
| 11 | Ethiopia | 29 | Gambia |
| 12 | Cameroon | 30 | Liberia |
| 13 | Ghana | 31 | Côte d'Ivoire |
| 14 | Nigeria | 32 | Somalia |
| 15 | Gabon | 33 | Congo |
| 16 | Uganda | 34 | Zambia |
| 17 | Niger | 35 | Mauritiana |
| 18 | Kenya | | |

A larger rank number signifies a higher net debt (*D1*). For the definition of the debt variable and the data sources, see table 1.