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The Determinants of External Debt Service in Africa*

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ABSTRACT

The paper investigated how changes in commodity prices, exchange and interest rates, and terms of trade affect external debt service. The paper employed capital recovery theory and regression analysis in evaluating a model for Sub-Saharan Africa as a whole, and Nigeria, Ghana, Cote d'Ivoire and Egypt. The results of the study confirmed empirically the widely held view that increase in commodity prices enhances the ability of the countries in the region to service their external debts. Also, the unfavourable terms of trade of Sub-Saharan Africa proved to have worsened their ability to service their external debt. For the Sub- Saharan African countries in general, the terms of the loans (interest rate, term to maturity, grace period) seemed to increase the external debt service. Additionally, the external debt service of countries with significant exchange rate movements probably worsened, while the negative effect of interest rate changes were more noticeable in countries with stable exchange rates. The findings of the paper suggest the need to intensify efforts aimed at improving commodity prices

1. INTRODUCTION

One of the unresolved problems of macroeconomics from the last decade is the developing countries' external debt burden. Efforts have been expended by the international community in order to define, measure, proffer causes and solutions to the problem. During the period, the creditors perfected theoretical models for prescribing policy guidelines that would maximise the repayment of their loans. The debtor countries, crumbling under the weight of the debt burden, reacted with caution fearing that outright repudiation would cut-off new loans. The dilemma is that the debtor countries are quietly still negotiating and taking new loans which would eventually mature into future debts while suffering from the burden of existing debt. The new capital inflow, as theorised, is needed to replenish ageing infrastructure, provide new investment that will encourage economic growth and finally lead to the lessening of the debt burden.

* The author, a Pricinpal Economist in the Reseach Department, benefitted from comments made by members of the Department. However, all views are those of the author and do not reflect those of the Central Bank of Nigeria.

However, this relief has not materialised. Some indicators of the debt burden, namely, external debt service to exports of goods and services ratio and external debt to exports of goods and services ratio have been deteriorating. For instance, the Sub-Saharan African countries[1] total external debt to exports ratio worsened from 97.2 in 1980 to 222.3, 322.9 and 339.5 per cent in 1983, 1986 and 1991, respectively. The corresponding values for external debt service to exports for the same period were 10.9, 15.8, 28.2 and 19.8 per cent. Similarly, Nigeria's debt burden ratios have been going up. The external debt - export ratio rose from 31.9 per cent in 1980 to 169.6, 397.5 and 257.1 in 1983, 1988 and 1991. In those years, the external debt service - exports ratio increased from 9.1 per cent to 23.6, 29.3 and 25.8 per cent.[2]

The major reasons advanced for the deteriorating debt burden are the continuing fall in commodity prices which is the main source of foreign exchange for repayment and unfavourable terms of trade between Sub-Saharan Africa and the rest of the world. Other factors affecting the debt burden include exchange and interest rate fluctuations. Domestic macro-economic policy and political instability have also played major roles in retarding the debtor nations' ability to grow out of the debt burden by creating uncertainty which compounds the problem of business planning and production.

The main purpose of this paper is to investigate the empirical relationship between external debt service of African countries on the one hand and commodity prices, terms of trade, exchange rates and loan terms (interest rate, term to maturity and grace period). External debt service is the portion of current revenue used in settling past expenditures and, therefore, is not available to the domestic economy for consumption and/or investment in the current period. The implication is that external debt service is likely to have a negative effect on present and future economic growth and development. The paper continues in Part 11 with the review of the external factors affecting external debt and service burden. The model for the analysis is developed, estimated and discussed in Part Ill. Finally, Part IV of the paper contains the summary and conclusion.

II. REVIEW OF THE LITERATURE ON THE AFRICAN EXTERNAL DEBT BURDEN

The World Bank, probably because of its statute, has contributed substantially to the measurement and discussions on developing countries' debt and debt servicing problem. Avramovic and Gulhati (1960), as members of staff of the Bank, had stressed the effects of the fall in commodity import demand by industrial countries, and the subsequent downward movements in prices of primary products which was not marched by falling import prices of developing countries as the

[1] Sub-Saharan Africa is defined as Africa excluding Algeria, Angola, Egypt, Morocco, Namibia, South Africa and Tunisia (World Bank Debt Table)

[2] A note of caution should be sounded here for the perceived fall in the ratio. While the total debt service remained high, the increase in exports seemed to mask the worsening trend.

major cause of the debt servicing problem. This deteriorating terms of trade, they concluded, reduced real income and other macroeconomic variables which could have reduced the external debt. They also observed that commodity exporting countries' chances for earning foreign exchange were limited because the demand for commodity prices are inelastic in the world market. Besides, export promotion policies were hampered by unfavourable industrial countries' trade policies (protectionism). Therefore, they proposed the liberalisation of industrial countries trade policies.

In a symposium organised in 1989 by the World Bank, Cuddington (1989), citing studies by Balassa, Sachs, Almansi,[3] acknowledged the detrimental impact of external shocks on external debt payments but stressed that the countries' policy response and their economic structure were very important to the overall effect. For instance, countries with large tradeable sector, he suggested, would adjust better than countries with large service sector, while countries with over-valued exchange rates would suffer from capital flight and reduction in exports.

At the same forum, Reisen (1989) discussed the effects of real devaluation of the exchange rate and cross-currency movement on the foreign debt. He noted that real devaluation during the 1982-8 period doubled the public debt ratio in Brazil and Mexico, while the 85 per cent rise in public debt ratio in Indonesia was explained by debt-weighted real annual devaluation. Also, he explained that devaluation impacts negatively on external debt service because of its negative effect on local currency cover. Reisen also highlighted the inherent problems in the currency composition of external debt and the cost imposed by currency swings. He reasoned that information and transactions costs as well as institutional constraint inhibited developing countries from hedging their currencies against the fluctuations of major currencies. He suggested that debtor countries could minimise their exchange risk exposure by denominating their external debt portfolio in currencies reflecting their foreign exchange cash flows. He applied the methodology to Indonesia and calculated a savings of about $10.0 billion during the 1985-88 period as against a $6 billion loss if the World Bank suggested debt management policies had been followed.

Earlier, Claessens (1988) applied portfolio theory to establish the optimal currency composition of external debts that would minimise the negative effects of both exchange and interest rate fluctuations and exposure to commodity price movements.[4] He summarised the factors that affected optimal external debt composition in his model to include:-

(i) consumption expenditures;
(ii) the production structure of the economy;
(iii) the relationship and variation between domestic goods prices and exchange rates;
(iv) the relationship and variation between the exchange rates themselves;

3 See Cuddington (1989) for reference.
4 Exchange rate movement comprises too components domestic to foreign currency and cross currency swings.

(v) the expected costs of borrowing in each of the foreign currency, their relationship and variation;
(vi) the correlation and co-variance of the exchange rates and expected receipts and payments in foreign currencies; and
(vii) the level of risk the country can take.

When the country's objective is only to hedge against commodity price and exchange rate movements, he concluded that the covariances between commodity prices and exchange rates, the covariances among exchange rates, and the co-variances between exchange rates and expected net foreign currency payments are the most important factors affecting optimal external debt composition.

The Claessens model was applied by Kroner and Claessens (1989) to the Indonesian and Turkish debt data. Their result showed that borrowing a large fraction of Indonesia's external liabilities in US dollars provided a good hedge against fluctuations in terms of trade and export receipts. They related this to the fact that Indonesia's currency is tied to the dollar and the pricing of its major export (oil) is in US dollar. On the other hand, Turkey needed to borrow more Japanese Yen, pound sterling and French Franc, while investing more in Swiss Franc, German mark and the US dollar because of the diversified nature of Turkey's trade and the tying of its exchange rate to no particular currency.

The African Centre for Monetary Studies (1984) organised a two-week seminar on the external debt problems of African countries in 1983 in which eighteen papers were presented. The paper presented by the Central Bank of Egypt (CBE) discussed the impact of external factors on debt and debt management in African countries and identified fall in commodity prices; substitution of natural products with synthetics; inaccessibility of industrial countries' markets for manufactured and semi-processed goods; deterioration of the terms of trade in favour of developed countries and the rise in interest rates in international financial markets as factors affecting external debt and service. The CBE then suggested the strengthening of international commodity agreements to stabilise and shore-up commodity prices; forming primary commodity products' unions; improving the tariff preferences system under the framework of the General Agreement on Tariff and Trade (GATT); easing protectionist measures instituted by industrial countries and increasing net foreign exchange flows to developing countries. CBE further argued that debt rescheduling and external sector policies such as foreign exchange budgeting, exchange rate programming and export promotion are effective ways to curb the debt burden.

Greene (1989) reviewed the Sub-Saharan debt problem and identified declining commodity prices, rising interest rates, falling real net capital inflows and domestic policies as contributory factors to the increasing debt burden. He proposed a more active role for international organisations in reducing the debt burden. Among the measures he advocated were outright debt forgiveness, downgrading debts to more concessionary terms, establishment of an international facility to buy back outstanding debt, and donor-assisted debt service payment.

A recent study by Anyanwu (1994) showed that the region's debts are mainly bilateral and multilateral long-term debts, while the average maturity structure of the debts rose over his review period (1980-1991). The study also highlighted the upward trend in total debt service and interest payments. These phenomena were corroborated by Ojo (1994) who, in addition, identified commodity price shocks, interest and exchange rate fluctuations, reverse resource flows to developed countries and domestic economic policies as factors contributing to the worsening external debt situation in the sub-region.

Several strategies have been applied to reduce the indebtedness of developing countries. Humphreys and Underwood (1989) enumerated debt rescheduling, cancellation of concessional debts, increased concessional debt relief as measures that have already been applied to relieving the debt burden of low-income countries of Sub-Saharan Africa. Market-based debt reduction schemes such as debt buy-back, the Brady Initiative, debt-equity swaps, exit bonds, debt exchanges and collateralization have been proposed and analysed in Detragiache (1991), Claessens and Diwan (1990), Sachs (1989), and Kletzer (1990). Detragiache, Claessens and Diwan, and Sachs, for instance, pointed out the importance of reduced interest rates and availability of new money as an effective means of debt relief. On the other hand, Wakerman - Linn (1989) and Kletzer believe that information asymmetry and unenforceability of terms of agreement may render certain debt reduction strategies inefficient. However, Claessens and van Wijnbergen (1993) proved that the Brady Plan was efficient in the case of Mexico.

Another instrument applied to debt reduction that was discussed in the literature is debt-for-nature swaps. Hansen (1988) and later Occhiolini (1990), notated that debt-for-nature swaps could be inefficient as a debt reduction strategy because of the problem created by the difference in spending priorities of debtor and creditor countries. Diwan (1988) discussed the importance of linking trade and development to debt strategies and postulated that debtor nations could pursue import-substitution and export oriented policies as a way out of the rising interest rates and external debt as well as declining terms of trade.

III. THE MODEL

The review of the literature highlighted some of the factors affecting the African external debt service and the strategies adopted so far to reduce the burden. However, no effort was made to test the empirical relationship between those factors and the external debt service. The closing of this gap is the subject of this section.

1. The Theoretical Basis

The model is based on capital recovery theory[5] which states that the annual payment, A, that will repay a loan, P, in a given period, N, at interest rate, I, is given by

[5] See for instance Gittinger (1984a)

$$A = \frac{P\, i\, (1+i)^n}{(1+i)^n - 1} \qquad (1)$$

From Equation 1, A represents the external debt service (interest and principal payments), TDS, while P represents the initial debt stock D. Taking into account of exchange rate effects (conversion of debt from domestic to currency of denomination and cross currency swings), e, the external debt service in one currency in terms of the other becomes

$$TDS = \frac{eD\, r\, (1+r)^m}{(1+r)^m - 1} \qquad (2)$$

where r = interest rate on loan

e = exchange rate

m = maturity term

The interest component of the total debt service, I, is given by

$$I = e\, D\, (1+r)^m \qquad (3)$$

Assume further that the external debt service was not repaid resulting in the recapitalisation of the debt service and/or interest. Normally, interest capitalisation involves adding the interest during a given period to the principal of the debt so that the new debt becomes the sum of the principal and the capitalised interest (Gittinger, 1984b).

Mathematically, the new stock of debt D' at the end of a grace period, g, is given by

$$D' = [D + D\, (1+r)^g] \qquad (4)$$

The new debt service after interest capitalisation is easily derived from Equation 4 as

$$TDS = \frac{e\, D\, [1 + (1+r)^g][r\, (1+r)^m]}{(1+r)^m - 1} \qquad (5)$$

From Equation 5, it could be seen that the initial debt stock, exchange rate in which the debt is denominated, interest rate on the debt, grace period and maturity terms of the debt all affect the magnitude of the external debt service. In addition, factors that influence the ability of the country to service its debt also affect the

external debt service by increasing or decreasing the stock of debt D. The major factors include commodity price changes and terms of trade between the countries and the rest of the world. Equation 5 implies that increase in exchange rate, interest charges, term to maturity and grace period will likely increase the external debt service, while increase in commodity prices and favourable terms of trade will reduce the debt stock by improving the ability of the country to service the debt. The factors identified in the model are summarised in a linear form in Equation 6.

$$\text{Log } (Di) = a_o + a_1 \log(P_i) + a_2 \log (e_i) + a_3 \log (r_i) + a_4 \log$$

$$(m_i) + a_5 \log (g_i) + a_6 \log (t_i) \quad + u \qquad (6)$$

where

i = 1 .... 5 for Sub-Saharan Africa, Nigeria, Ghana, Cote d'Ivoire and Egypt.

aj, j = o..... 6 are coefficients to be estimated.

u = a random error

It is expected that all the coefficients will be positive. To evaluate the model, Sub-Saharan Africa and four countries (Nigeria, Ghana, Cote d'Ivoire and Egypt) were used. The countries were chosen to show the effect of geographical spread and the peculiar characteristics of each country. For instance, Nigeria depends mainly on petroleum exports and revenue to service its debt and therefore is affected more by changes in petroleum prices. It has witnessed exchange rate changes in the past years and ties its currency to the dollar which is also the currency in which its external debt is mainly denominated. Ghana depends on cocoa as the major foreign exchange earner and has also experienced exchange rate devaluations. Cote d'Ivoire also relies on cocoa, while its currency has been relatively stable as it has been tied to the French Franc. Egypt (North Africa) exports cotton and has one of the largest stock of external debts in Africa (Ojo, 1994).

2. Data Sources and Definitions

A. Sources

a. World Bank Debt Tables (various issues)

1. External Debt Service in US Dollars

2. Interest Rates (per cent)

3. Maturity in years

4. Grace period in years

b. International Financial Statistics Year Book (1993)

1. Commodity Prices and Index

2. Exchange Rates

3. Terms of Trade

B. Definitions

Total external debt service includes principal and interest payments on long-term debt and interest payments on short-term debt, including IMF credits. Interest rates, maturity and grace period are average terms of new commitments for all creditors. Commodity price index for developing countries was used as the nearest proxy to that of Sub-Saharan Africa. Average crude oil prices in the world market (US dollar per barrel), cocoa prices (Ghana - London) in US cents/pound, and cotton export price were the commodity prices used for Nigeria, Ghana, Cote D'Ivoire and Egypt, respectively. The exchange rate measures were the respective domestic exchange rate to the US dollar. The terms of trade is defined by the IFS as the ratio of export and import unit value indices. For this study, the series for Africa was used.

Equation 6 was estimated using ordinary least squares for the period (1970 - 1991). The results are presented in Table 1 with some summary statistics.

3. Analysis of Estimation Results

Generally, the regression results performed well. The estimates and summary statistics for Sub-Saharan Africa were as expected except the terms of trade that was negative. The adjusted R squared statistics ranged from 0.8879 to 0.6203 showing that the variations in the factors used in the model explained most of the movements in external debt service. The specific influence of each of the factors are as follows:

(i) Commodity Prices

All measures of commodity price were significant in influencing external debt service. The results show that increase in commodity prices enhances the ability of the country to pay its external debt as had been suggested in the literature. This confirms the general view that the worsening external debt service problem is related to falling commodity prices.

TABLE 1

Parameter Estimates of the Factors Affecting External Debt Service

Coefficient	Sub-Sahara	Nigeria	Ghana	Cote d'Ivoire	Egypt
a_0 (c)*	-9.250	7.6402	7.2799	-14.7398	-1.7618
a_1(P)	2.9448	1.3124	0.2530	1.6093	1.660
	(7.052)	(4.327)	(1.448)	(3.7204	(3.488)
a_2(e)	-	0.6669	0.4089	-0.0146	-0.7738
		(3.1807)	(10.8162)	-0.0136	(-1.4989)
a_3(r)	1.7081	-1.6325	-0.4515	2.3300	1.7968
	(1.891)	(-1.014)	(-1.471)	(2.257)	(2.9245)
a_4(m)	3.247	1.9871	-1.3938	1.5953	0.1742
	(2.491)	(1.5787)	(-1.614)	(0.854)	(0.2571)
a_5(g)	1.6419	-4.483	0.254	3.1582	-0.1347
	(1.930)	(-2.6849)	(0.2114)	(1.3915)	(-0.3402)
a_6(t)	-2.6096				
	(-1.895)	-	-	-	-
R^2	0.8879	0.7274	0.8625	0.6203	0.7469
D-W	1.823	0.908	1.143	1.252	1.485

t - Statistics in brackets.
* - Variables and the constant term (See Equation 6).

(ii) Exchange Rate Changes

Effect of exchange rate changes on external debt service were very pronounced in Nigeria and Ghana, countries which had devalued their currencies severally and significantly. Thus, the exchange rate changes must have aggravated the debt service problems of the two countries. On the other hand, the relatively stable exchange rates of Cote d'Ivoire and Egypt could have been beneficial to their external debt services.

(iii) Interest Rate Charges

Upward movements on loan interest rates tended to increase the debt service burden of Sub-Saharan Africa as a group. The same trend was exhibited by Cote D'Ivoire and Egypt. In contrast, the results imply that increase in interest rates had minimal effect on debt service in Nigeria and Ghana. The results show an anticylical effect between exchange and interest rates for the two sets of countries.

(iv) Maturity Terms and Grace Period

The results of the study indicate that increasing the maturity structure of the debts increases the external debt service of the Sub-Saharan African countries as a group. However, the relationship was not significant at the 5 per cent level when the countries were disaggregated. Similarly, a rise in grace period increased the external debt service payments of the Sub-Saharan countries as a whole. However, the grace period seemed to ameliorate Nigeria's external debt service and virtually had no effect in the rest of the countries.

(v) Terms of Trade

The result of the regression analysis implied that the unfavourable terms of trade of the Sub-Saharan African countries had negative impact on their ability to pay their external debt as expected. However, lack of data limited the ability of the study to investigate the trend at the country level.

4. Implications of the Results

Generally, the results are in agreement with the literature except in the few cases where country peculiarities proved otherwise. As such, the results support the on going efforts aimed at stabilising commodity prices. The international community should intensify efforts to remove trade barriers that would not only improve the terms of trade and ability of debtor countries to pay their debts but would also improve their economic growth and development.

Further empirical work is needed to really know whether concessionary terms (longer maturity term and grace period) really lessens the debt burden or actually compounds it. While the theory and empirical result supported the compounding hypothesis at the aggregate level (Sub-Saharan Africa), the results at the country level were mixed. There was a clear pattern that emerged which showed that those countries that devalued very often and in large proportions (Nigeria and Ghana) suffered more from the external debt burden and were marginally affected by interest rate charge changes. In contrast, interest rate charges were effective in increasing the external debt payments of Cote d'ivoire and Egypt. Both countries had relative exchange rate stability.[6]

III SUMMARY AND CONCLUSION

The paper set out to investigate the major determinants of external debt service in Africa. The main factors identified in the literature that affected their ability to service the debts were falling commodity prices, deteriorating terms of trade, exchange rate and interest rate fluctuations. Others were unconcessional maturity terms and grace periods. Many debt reduction strategies had been advocated and implemented among which were debt cancellation, debt-for-equity swaps, the Brady Plan, debt buy-back and concessional debt relief. The effectiveness of these measures may have been limited as the debt burden still worsened.

[6] The Cote d'Ivoire's currency, the CFA, was tied to the French Franc until 12th January, 1994 when it was devalued.

In order to find the empirical relationship between those factors and the ability of the African countries to pay their external debt, capital recovery and regression theories were applied in the analysis. The results confirmed the widely held views about the importance of commodity price stability in lessening the burden of external debt service. Excessive exchange rate fluctuation was also identified to be detrimental to external debt payments.

In conclusion, the paper supports the recommendations made by the Central Bank of Egypt in 1983 on the need to strengthen international commodity agreements so as to stabilise and raise commodity prices; remove tariff protection; evolve effective exchange rate policy; and booster exports of goods and services Finally, the terms given to debtor countries should not increase their debt burden.

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