THE IMPACT OF EXTERNAL DEBT ON ECONOMIC GROWTH: A COMPARATIVE STUDY OF NIGERIA AND SOUTH AFRICA

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Abstract

This paper investigates the impact of the huge external debt, with its servicing requirements, on economic growth of the Nigerian and South African economies. The external debts of Nigeria and South Africa are analyzed in a new context utilizing traditional, but innovative, models and econometric techniques. The Neoclassical growth model, which incorporates external sector, debt indicators, and some macroeconomic variables, is employed in this study to explore a linear, as well as non-linear, effect of debt on growth and investment. Both ordinary least squares (OLS) and generalized least squares (GLS) are employed in the analysis. Among other test results, the negative impact of debt (and its servicing requirements) on growth is confirmed in Nigeria and South Africa. However, South Africa performs better than Nigeria in the application of external loans to promote growth. In addition, external debt contributes positively to growth up to a point after which its contribution becomes negative in Nigeria (reflecting the presence of non-linearity effects).

Introduction

External debt is one of the sources of financing capital formation in any economy. Adepoju et al. (2007) note that developing countries in Africa are characterized by inadequate internal capital formation due to the vicious circle of low productivity, low income, and low savings. Therefore, this situation calls for technical, managerial, and financial support from Western countries to bridge the resource gap. On the other hand,

external debt acts as a major constraint to capital formation in developing nations. The burden and dynamics of external debt show that they do not contribute significantly to financing economic development in developing countries. In most cases, debt accumulates because of the servicing requirements and the principal itself. In view of the above, external debt becomes a self-perpetuating mechanism of poverty aggravation, work over-exploitation, and a constraint on development in developing economies (Nakatami & Herera, 2007).

Like most developing countries of the world, Nigeria relies substantially on external funds for financing its development projects – iron and steel mills, roads, electricity generation plants etc. Such external funding usually takes the form of external loans. In the early years of political independence (i.e. 1960 through 1975), the size of such loans was small, the rate of interest concessionary, the maturity was long-term, and the source was usually bilateral or multilateral in nature. For instance, Nigeria's external debt in 1960 was about $150 million; however, beginning in the year 1978, the situation changed. Nigeria, at the lure of the international financial centers, started to borrow huge sums from private sources at floating rates and with shorter-term maturities. The 1978 "jumbo loan" alone was estimated at some US $1 billion. By 1982, the value of Nigeria's external indebtedness was US $18.631 billion, which represented over 160% of Nigeria's gross domestic product (GDP) for that year. The situation precipitated a debt-crisis that progressively worsened over time. By 1986, Nigeria had to adopt a World Bank/International Monetary Fund (IMF) sponsored Structural Adjustment Program (SAP), with a view to revamping the economy and making the country better-able to service her debt.

Loan capital was readily available to South Africa during the 1970s, and both the public and the private sectors borrowed heavily, often in the form of trade credits. However,

in the early 1980s, foreign investments declined relative to the value of foreign loans needed to finance economic growth. Equity finance declined as a proportion of foreign debt from 60% in the 1970s, to less than 30% in 1984. South Africa's loan increased from 40% to 70% of foreign debt. Its total foreign indebtedness increased steadily as loans were acquired from the IMF, whenever the foreign bankers turn down its request for loan. In addition, indebtedness was stabilized through gold swap. The debt problem became endemic in 1984, as about two-thirds of its outstanding loans had a maturity of one year or less. The public sector was responsible for the 16% of South Africa's foreign debt; 44% of South Africa's foreign liabilities were incurred by the banking sector; the remaining 40% were private liabilities. When Chase Manhattan withdrew substantial credit lines from South Africa in 1985, a major foreign debt crisis became glaring.

The impact of credit freeze and refusal to roll credit over on South Africa led to a drop in the value of rand (South African currency) and temporary closure of the financial and foreign-exchange market. Liabilities not affected by the freeze include trade credits, credits guaranteed by the Paris Club, member governments, and loans from IMF and Central Banks. Also compounding South Africa's debt problem was the large proportion of debt that was denominated in hard non-dollar currencies, but appreciated in dollar terms as the dollar weakened. Since then, South Africa's external debt has been high and continued to follow a predictable upward trend, exerting substantial negative impact on productivity and growth.

The Deutsche Bank (2008) showed the South African economic profile was better when it observed that key economic indicators show that there is consistent negative trade and current account balances. Current account balances, as proportion of GDP, is increasing predictably and external debt is growing persistently. For instance, external debt as of 2003

was put at US $38.1 and went up to US $68 billion by 2007 (about a 78% increase). Short term debt for 2003 was US $9.2 billion and went up astronomically to US $24 billion in 2007. External debt, as percentage of GDP, was 22.9 in 2003, but moved up slightly to 23.2 in 2007. The significance of these is that the debt indicator may portray a manageable picture of South Africa's debt situation, but the reality is that the present external debt situation may be unsustainable in the long run, especially if measures are not put in place for its management.

According to Ayadi (1999) and Ayadi et al. (2003), external debt burden had dramatically limited developing countries' participation in the world economy and the attendant debt servicing obligations continue to manifest as an impediment to economic growth and development. Debt burden has led to a limited accumulation of capital (depletion of international reserves) and a limited application of flexible financing policies to consolidate small and medium-sized firms. This indirectly affects employment, literacy, and poverty. A cursory look at external debt profile and some debt indicators of Nigeria and South Africa reveal the inherent serious nature of a debt burden (Tables 1 and 2).

Table 1:   External Debt Stock for 1994 - 2007 (In Millions of US Dollars)

Year	Nigeria	South Africa
1994	33092.3	21671.0
1995	34092.5	25358.0
1996	31406.6	26050.0
1997	28454.8	25272.4
1998	30294.5	24752.8
1999	29127.6	23907.3
2000	31354.9	24860.7
2001	31041.6	24050.0
2002	30476.0	25099.1
2003	34700.2	27423.1
2004	37883.1	27112.4
2005	22178.3	31098.6
2006	7693.0	35548.8
2007	8590.0	38855.0

Source: Economist Intelligence Unit (2008) CountryData-Annual Time Series.

A comparative view of the external debt stock of Nigeria and South Africa indicates that the debt volume for Nigeria is significantly higher than that of South Africa. The debt stock followed an upward trend in Nigeria until 2004, after which it nose-dived, especially from 2006, when Nigeria took advantage of the debt relief to offset the substantial part of its debt. The debt stock volume for South Africa has been stabilized over the years, until 2005 when debt stock started to record an upward pattern. On a casual view, the South Africa external loan has been better managed than that of the Nigeria. For instance, South Africa has not defaulted in servicing its debt obligation; the compounding effect of not servicing debt is not taking a toll on its debt stock. In addition, South Africa has been able to offset some of its external debt obligations, especially before the year 2005. The above comparison, however, can be more meaningful if debt stock and its servicing requirements are compared with countries' resources (debt indicators).

Table 2: External Debt Indicators for Nigeria and South Africa (Percent)

YEAR	NIGERIA				SOUTH AFRICA			
	Total Debt to Exports	Total Debt to GDP	Debt Service to Exports	Debt Service to GDP	Total Debt to Exports	Total Debt to GDP	Debt Service to Exports	Debt Service to GDP
1994	317.31	58.84	17.95	3.33	69.74	15.96	9.34	2.14
1995	257.36	141.87	13.84	7.63	71.15	16.78	9.51	2.24
1996	175.34	90.09	14.01	7.20	71.03	18.13	11.55	2.95
1997	151.43	80.83	7.54	4.02	66.22	16.98	17.14	4.40
1998	235.88	91.30	10.37	4.01	68.09	18.44	12.07	3.27
1999	188.81	83.76	6.89	3.06	66.66	17.97	11.96	3.23
2000	114.63	74.52	6.75	4.39	62.39	18.73	9.69	2.91
2001	136.34	64.67	11.25	5.34	62.17	20.34	11.26	3.68
2002	151.13	65.24	7.39	3.19	63.99	22.59	12.20	4.31
2003	116.55	59.53	5.52	2.82	54.53	16.44	5.70	1.72
2004	91.70	52.58	4.20	2.40	43.94	12.53	3.95	1.13
2005	37.70	24.10	15.10	9.70	43.35	12.83	4.51	1.33
2006	11.60	6.60	10.4	5.80	43.07	13.81	6.60	2.12
2007	12.50	6.30	1.70	0.90	39.90	14.90	6.60	2.40

Source: Economist Intelligence Unit (2008) CountryData-Annual Time Series.

Table 2 contains popular, but traditional, external debt indicators which include the ratio of debt stock to exports. This ratio peaked at over 317% in 1994 for Nigeria when compared with its South African counterpart with about 70% for the same period. This indicator began to decline after 1994 for Nigeria and South Africa. Prior to 2003, Nigeria's external debt was greater than its export capacity. As for South Africa, the story is different, with a manageable debt indicator ratio better than that of Nigeria.

The ratio of debt stock to GDP is a traditional debt indicator that compares a country's debt stock with its productive capacities. By implication, the higher a country's debt stock is, compared with its output, the greater the debt burden or indebtedness of that country. This ratio showed that debt stock was above the productive capacities of Nigeria in the year 1995, whereas the South Africa indicator ranges between 12.53 and 22.59 from 1994 to 2007. Nigeria's ratio did not decline substantially until the debt relief was granted by the Paris club in 2006. The importance of this is that South Africa's management of its debt, as well as its productive capacities, is better than that of Nigeria.

The above point is well supported when one observes the debt service payment as a proportion of export, and as a proportion of GDP. South Africa had continued to honor its external obligations regularly while Nigeria accumulated service arrears. This ratio is identical for both South Africa and Nigeria, despite the huge disparity between debt stock to exports of the two countries, because South Africa had been honoring its service obligations as and when due. In Nigeria however, there is a wide disparity between service due and payments, which further exerts substantial pressure on its debt stock due to recapitalization of arrears.

There are limitations to the aforementioned anecdotal comparative analysis because they have not been able to ascertain existence of a debt trap facing either of the two countries. Debt stock as well as debt service indicators, mostly serve as warnings of potential danger of excessively large debt stock. Based on Van Der Merwe (1993) even though the ratio of government debt to GDP has increased relatively sharply in South Africa, there is still no "explosion" in the growth of debt. Whether or not the same argument holds water for Nigeria prior to 2005 is a different story. From Tables 1 and 2, it is extremely difficult to draw any definite conclusions alone from our international comparisons thus necessitating for additional comparative analysis on the possible impact of huge debt on growth. The thesis of this paper is to apply some econometric approaches to investigate the presence of linear or non-linear effect of debt on economic growth.

Literature Review

Increases in savings and investment in an economy lead to economic growth (Hunt, 2007). Sachs (2002) argues that growth will not take-off until capital stock has risen to a given threshold. As capital rises, and investment and output rise, in a virtuous circle, the saving level will also continue to rise. After a given level, the rise in both capital and savings will be sufficient to engender self-sustaining growth. The reason for opting for external finance, as a means of ensuring sustained development rather than utilizing only domestic resources, is provided by the 'dual gap' theory. The theory postulates that investment is a function of savings, and that in developing countries, the level of domestic savings is not sufficient to fund the needed investment to ensure economic development. Thus, it is logical to seek the use of complementary external goods and services. The acquisition of external

funds, however, depends on the relationship between domestic savings, foreign funds, investment, and economic growth. A guiding principle on when to borrow is a simple one. Borrow abroad so far as the funds acquired generates a rate of return that is higher than the cost of borrowing the foreign funds (Ajayi & Khan, 2000). In essence, by following this guiding principle, a borrowing country is increasing capacity and expanding output with the aid of foreign savings.

External debt does not automatically transform into debt burden when funds are optimally utilized. In an optimal condition, the marginal return on investment is greater than or equal to the cost of borrowing. According to Edelman (1983), the critical factors affecting debt service capacity are returns on investment, the cost of borrowing, and the rate of savings. The benefits of external borrowing have been emphasized in the literature to the neglect of the costs. Ubok-Udom (1978), enumerates the costs of external borrowing to include debt service burden which incorporates costs implied by the term structure of external loans, costs of resultant liquidity crisis, costs of the viciously cumulative debt, the manageability of the debt, costs of debt rescheduling, and costs of import substitution among others.

Colaco (1985) explains debt service vulnerability in developing countries using three contexts. First, the size of external loans has reached a level that is much larger than equity finance, resulting in an imbalance between debt and equity. Secondly, the proportion of debt at floating interest rates has risen dramatically, so borrowers are hit directly when interest rates rise. Thirdly, maturities have shortened considerably in large, part because of the declining share of official flows. All the above factors are relevant to Nigeria and South Africa. Mehran (1986) argues that adequate debt management is essential in an increasingly

complex financial environment. Mehran also identifies the critical components of debt management as policy co-ordination, regulatory environment, accounting, and statistical analysis. The aforementioned is true since the effectiveness of measures to reach a balanced level of debt supportive of development, depends on the debtor nation adopting fiscal adjustment and structural reform. Other features are transparency and anticorruption policies, creation and/or improvement of debt management structures, and decision making processes among others.

The next issue in debt acquisition and management is the determination of a sustainable level of debt. According to Ajayi and Khan (2000), sustainable foreign borrowing is measured by several ratios, such as debt to export, debt service to export, debt to GDP (or GNP), and external debt to Gross National Income among others. However, the determination of the sustainable level of these ratios is indeterminable and their usefulness is reduced to a warning of potential explosive growth in the stock of foreign debt. For instance, if the acquisition of additional foreign debt increases the debt servicing burden more than it increases the country's capacity to bear the burden, such an acquisition becomes undesirable and the situation must be reversed through export expansion. If export is not expanded, more borrowing will be necessitated for servicing debt and external debt will pile up above the country's capacity to bear.

According to Omotoye et al. (2006), Nigeria is the largest debtor nation in the Sub-Saharan Africa. They also observe, in a comparative study with Argentina (Latin America's most severely indebted nation), that Nigeria's external debt, as a percentage of gross national income, has been continuously higher than that of Argentina since 1985 and continued to follow an upward pattern, unlike that of Argentina. The problem is compounded, according

to Greene (1989), by inability of the economy to generate the requisite resources to meet repayment obligations, especially since the early 1980s. Fosu (2007) further shows the severity of the debt burden brought about by the pile-up debt (debt arrears as proportion of total debt stock) as high as 59%.

Cohen (1993) and Clements et al. (2003) corroborate the aforementioned impact of debt, as they observe that the negative effect of debt on growth works not only through its impact on the stock of debt, but also through the flow of service payments on debt, which are likely to 'crowd out' public investment. This is so because service payments and repayments on external debt soak up resources and reduce public investments. The damaging impact of debt servicing on growth is attributable to the reduction of government expenditure resulting from debt-induced liquidity constraints (Taylor, 1993). Liquidity constraint, implied by the debt-servicing requirements, may shift the budget away from the social sector or public investment. This is important for consideration because public expenditures are likely to be a major determinant of the economic activities in many functional sectors (Fosu, 2007).

Accumulated debt stock reduces economic performance through 'debt overhang' effect (tax disincentive and macroeconomic instability). Tax disincentive means that a large debt stock discourages investments because potential investors assume that there would be taxes on future income in order to make debt repayments. The macroeconomic instability relates to increases in fiscal deficit, uncertainty due to exceptional financing, exchange rate depreciation, possible monetary expansion, and anticipated inflation (Claessens et. al. 1996).

The relevance of 'debt overhang' hypothesis was stressed by Audu (2004). According to Audu, "the debt service burden has militated against Nigerian's rapid economic development and worsened the social problems. Service delivery by key institutions designed

to mitigate the living conditions of vulnerable groups were hampered by decaying infrastructure due to poor funding. By cutting down expenditure on social and economic infrastructure, the government appears to have also constrained private sector investment and growth through lost externalities. This has reduced total investment, since public investment is a significant proportion of the total investment in the country."

It is argued that external debt burden is among the factors that depressed private investment in the Philippines after 1982. By utilizing data from Nigeria, Iyoha (1997) reports results that confirm the 'crowding out' and the 'debt overhang' effects of debt servicing. He concludes that these two effects apparently explain, to a large extent, the low level of investment in the Nigerian economy. Another study by Ashinze and Onwioduokit (1996), examines the relationship between external debt and growth in Nigeria using a macro-economic model. The study reports a period of effective utilization of external finance, which resulted in a significant level of economic growth. It also reports periods when external funds were not judiciously utilized with a resultant effect of economic decline.

Edo (2002) analyzed the African external debt problem with reference to Nigeria and Morocco. He concluded that external debt has affected investment severely. Other findings include the fact that fiscal expenditure, balance of payments, and global interest rates are major factors explaining debt accumulation in the studied countries. He, therefore, suggests measures that could alleviate the above problems (privatization, sustained export promotion program, and restructuring and development of capital markets, among others).

Claessens et. al. (1996) also explained the cash flow impacts of debt as the "liquidity constraint" (a reduction in current debt services increases the current level of investments, for any given level of future indebtedness). Another effect identified is the reduction of moral

hazard effect. Moral hazard effect implies debt reduction to countries with a record of sound macro policies. According to Arnone et. al. (2005), "inflation tax reduces public investments and uncertainty (option of waiting and misallocation of investments) are likely to occur with a large debt stock. Additionally, large debt stocks lead to capital flights, higher tax rates and continuous over-borrowing, with a negative effect on growth."

The impact of huge foreign debt is recognized by Mutasa (2003). According to Mutasa, the heavy debt burden and continual reliance on countries of the north for hard currencies has been a major impediment to accelerated integration within and across regional groupings in Africa. There is a growing concern over the amount of borrowing indulged in, the servicing of such foreign debt, and the future strain on regional schemes and general sustainable development. Resources transferred abroad for debt servicing represents a reduction in what can be devoted to regional schemes and economic development. Not only is potential regional integration foregone but, also in many cases, previous development achievements are being eroded. Debt repayments in the form of arrears have grown rapidly giving rise to questions regarding the credit worthiness of many countries. On the other hand, conditionality, associated with debt repayments and trade, has stood in the way of northern creditors at the cost of intra-regional trade. Compounding this situation is the pattern of existing trade. Existing trade patterns reflect strong vertical linkages (developed-developing country) and weak horizontal linkages (between developing countries), which are symptomatic of an unequal global balance of economic power and debt problems.

In this paper, the approach represents a comparative exploration of the efficiency in which external funds had been utilized and whether countries (especially South Africa) could sustain its rapidly growing external debt profile with efficiency. This study specifically

analyzes how annual growth rate of output (as measured by GDP growth) is affected by debt stock and its service indicators. The effect of the external debt service burden on economic performance and investment (the 'crowding out' effect) in Nigeria and South Africa is analyzed. Moreover, the relationship between the debt Laffer curve and non-linearity in the effect of debt can be better appreciated when we re-examine the debt Laffer curve's postulates. The curve, too, is non-linear and it relates the debt stock to the ability to repay (expected value of repayment). The curve is inverted, U-shaped, indicating that as the debt stock grows, repayment ability after a cumulative debt stock value declines. In other words, efficient utilization of debt stock tends to decline beyond a level and further acquisition of debt leads to a decline in productivity. This issue is examined comparatively for Nigeria and South Africa. The choice of Nigeria and South Africa in this study is borne by the roles of these countries in Africa's development efforts and regional integration, which has great potentials for improving poverty level generally in the African continent.

Model and Estimation Method

The reason for opting for external finance, as a means of ensuring sustained development, as against domestic borrowing is answered by the 'dual gap' analysis. This theory postulates that investment is a function of savings and investment that requires domestic savings is not sufficient to ensure economic development, thereby necessitating complementary external goods and services. According to Root (1978), the gross domestic product identity is of the form:

$$GDP = C + S \tag{1}$$

Alternatively,

$$GDP = C + I + (X - M) \tag{2}$$

where,

C = Consumption

I = Investment

X = Exports

M = Imports

S = Saving

In this model, investment includes both private sector investment and government investment expenditure. That is,

$$I = I_p + I_g \tag{3}$$

where,

I_g = G (government expenditures)

I_p = private sector investment

Since GDP equals domestic consumption plus the domestic saving, it follows from equations (1) and (2) that the demand for domestic investment equals the sum of domestic savings and the import balance on current accounts, which is financed by net borrowing from abroad.

$$I = S + (M - X) \tag{4}$$

Where,

(M - X) = net foreign borrowing

To answer the question of why external debt tends to increase rapidly, we recall the two-gap model described by Chenery and Strout (1966). In their model, net external borrowing is known as basic transfer (BT). Mathematically, it is measured as the difference

between the net capital inflow (gross capital minus the amortization on past debt) and interest payments on remaining accumulated foreign debt.

$$BT = Dd - rD \qquad (4a)$$

Or

$$BT = (d - r)D \qquad (4b)$$

where,

D = total accumulated foreign debt

d = percentage rate of increase in total debt

r = average annual interest rate

Dd = net capital inflow or the rate of increase in total external debt

rD = total annual interest rate payments

Equation (4b) shows losses or gains in foreign exchange from international capital flows by a country in a given year. BT indicates gain if $d > r$ and loss otherwise. Generally, if borrowing is linked with productive use when rates of return exceeds r and BT is positive, increasing the external debt will not hamper the economy of the recipient country in the long run.

Given that the aforementioned theory relates to inter-temporal budget constraint in a period-to-period flow, the following equation becomes applicable:

$$(D_t - D_{t-1}) = Y_t - rD_t - C_t - I_t - G_t \qquad (4c)$$

Where,

$(D_t - Dt\text{-}1)$ = net change in debt from a period t to a period $t+1$

Y_t = GNP in period t (net remittance is included)

C_t = consumption in period t

I_t = domestic investment in time t

G_t = government expenditure in time t

In Equation (4c), the debt size in a given period can be reduced by an increase in a country's output and a reduction in consumption, domestic investment, and government expenditure. The failure of a country to do a period-to-period flow analysis and to reach the level where the sum of output, consumption, domestic investment, and government expenditure is less than the basic transfer, will lead to a debt crisis as shown below:

$$C_t + I_t + G_t - Y_t < dD_t - rD_t \tag{4d}$$

(Note that $dD_t - rD_t = BT_t$)

The regression models in this study take the Solow-type neoclassical growth model of the following specific forms. Output growth is determined by domestic savings, debt burden, capital, and other macroeconomic variables, such as exchange rate.

Equation (5) analyzes the impact of debt indicators on output growth ('debt overhang' effect). Equations (6) and (7) capture the overhang effect and 'crowding out', respectively, while also accounting for the non-linearity impact of debt (Krugman & Proot, 1989). The following three models are adopted in this paper:

Model 1

The first model explores a linear relationship between output and debt burden indicators. The model is based on the following equation:

$$Y_g = \Omega_0 + \Omega_1 \frac{\Delta EXPO}{EXPO} + \Omega_2 \frac{RGFI}{RGDP} + \Omega_3 DSERGD + \Omega_4 DEBGDP + \Omega_5 GCAP + \mu_t \tag{5}$$

Where,

Y_g = annual growth rate of the RGDP [measured as the following variable]

(RGDP$_t$-RGDP$_{t-1}$)/RGDP$_t$. RGFI/RGDP = total investment-output ratio

$\frac{\Delta EXPO}{EXPO}$ = annual growth rate of exports

DSERGD = ratio of debt service to RGDP

GCAP = growth in fixed capital

DEBGDP = size of external debt stock relative to RGDP

μ_{it} = random error terms (assumed to have a zero mean)

$\delta_1 I$ = variance-covariance matrix

Equation (5) represents the neoclassical growth model extended to exports and non-export sectors. The common variables that enter the growth model are: growth rates of labor (which is excluded because of data problem), exports and investment-GDP ratios (capital). Gounder (2001) utilizes the Solow-type neoclassical growth model to analyze the impact of Official Development Assistance (ODA) on growth. In Gouder's model, which is incorporated into Solow's model, the explanatory variables are; the official development assistance to GDP ratio, (AID to GDP ratio) multilateral aid to GDP ratio, ratio of grant aid to GDP, ratio of loan to GDP, and ratio of technical cooperation to GDP in separate equations. It is relevant to include as explanatory variables in this analysis, the ratio of debt stock to GDP and debt service to GDP, as shown in Equation (5) above.

Model 2 and Model 3

The second model is based on variants of Elbadawi, Ndulu and Ndungu's (1999) model of external debt sustainability. This model has two versions, namely: (i) rate of growth, external debt relationship (the debt Laffer curve, which investigates the 'debt overhang'), and financial constraint hypothesis; and (ii) private investment and external debt

relationship (which investigates both demand side and the credit constraint). The Elbadawi et al's model investigates the impact of large external debt stock with its servicing requirements and the resultant fiscal deficit on private investment (measured as private investment to GDP). It is, however, true that external debt acts as constraint, not only to private investment alone but on investment generally and as such we based our analysis on total investment. The shortcoming of this model is that it considers only the public sector gap, and ignores the external sector. Our re-formulated Elbadawi, Ndulu and Ndungu models are shown below:

$$Y_g = \alpha_0 + \alpha_1 DEBGDP + \alpha_2 (DEBGDP)^2 + \alpha_3 DSEREXP + \alpha_4 TOT + \alpha_5 GCAP + \mu_{it}$$

(6)

And

$$\frac{RGFI}{RGDP} = \beta_0 + \beta_1 DEBGDP + \beta_2 (DEBGDP)^2 + \beta_3 DSEREXP + \beta_4 TOT + \beta_5 GCAP + \mu_{it}$$

(7)

Where,

Y_g = rate of output growth

$\Delta RGDP/RGDP$ = external shock (measured as terms of trade variability)

TOT = external shock (measured as terms of trade variability)

$GCAP$ = growth rate of investment stock

$DEBGDP$ = external debt to RGDP ratio

$RGFI/RGDP$ = ratio of investment to RGDP

$DSEREXP$ = debt service to exports

In carrying out the analysis in this paper, the dependent and independent variables chosen were based on their ability to portray the investigation in a meaningful and consistent manner. Variables were included, excluded, or proxied based on theoretical and/or empirical

justification. However, data availability and measurability acted as major constraints in terms of what variables to include. An econometric model is employed to quantify the economic effects of foreign debt and economic growth in Nigeria and South Africa. However, since foreign debt and the servicing requirements are not the only factors affecting output growth, there is a need to capture other variables in order to avoid a model mis-specification error. In order to capture the impact of domestic resource on growth, we utilized the total investment to GDP ratio, as opposed to the savings to GDP ratio employed as a proxy for investment (Mbaku, 1993; Islam, 1992). The use of total investment to GDP is in conformity with earlier studies (such as Gounder, 2001).

From (Gounder, 2001), the export coefficient in our model relates to the output elasticity of exports and this variable reflects the degree of "openness" of the economy and constitutes an "input" in the production function. Edwards (1998) observes that exports play a positive role in the growth process by increasing total factor productivity after including factor productivity and institutional factors. Aside from capital and export variables, effective labor force is included theoretically as a determinant of output since labor is an important variable input in a formalized input-output model. Our shortcomings in this study include our inability to obtain an accurate labor data (a good proxy), therefore it was excluded. Other variables used in our models include the ratio of debt stock to the country's output (measured as RGDP). This variable (new variable formed) is a traditional debt indicator that compares a country's debt stock with its productive capacities. By implication, the higher a country's debt stock is compared with its output, the greater the debt burden or indebtedness of that country.

Debt service ratio to GDP is another traditional indicator of indebtedness, which compares an economy's debt service expenditure to its level of productivity. Generally, the higher the ratio of debt service to a nation's productivity, the more serious the debt burden on the economy (Omotoye et al., 2006).

Empirical Analysis and Discussion

The data employed in this study are annual macroeconomic variables, including gross investment, exports, foreign debt stock, debt service variables, debt service indicators, real GDP (RGDP), and debt stock indicators. The sample period is from 1980 through 2007. All data were directly obtained from the Economist Intelligence Unit [EIU] (2008) Country Data-Annual time series. Data for debt service-to-export ratio (DSERVEXPO) for South Africa were not directly available. As such, direct computation by the authors was done having obtained the debt service data and export (fob) separately from the above source.

Model 1

$$Y_g = \Omega_0 + \Omega_1 \frac{\Delta EXPO}{EXPO} + \Omega_2 \frac{RGFI}{RGDP} + \Omega_3 DSERGD + \Omega_4 DEBGDP + \Omega_5 GCAP + \mu_t$$

Table 3: OLS Result of the Expanded Neoclassical Growth model for Nigeria and South Africa

	NIGERIA			SOUTH AFRICA		
	Dependent Variable is the Annual Growth Rate of GDP (Y_g)					
Variable	**coefficient**	**t-statistic**	**Prob.**	**coefficient**	**t-statistic**	**Prob.**
Constant	0.170228	2.12**	0.0462	12453.98	0.05	0.9624
ΔEXPO/EXPO	0.014260	0.62	0.5393	0.003155	3.20*	0.0048
RGFI/RGDP	-1.817452	-2.68*	0.0140	-2063.320	-2.99*	0.0075
DSERGDP	0.005012	1.40	0.1747	-0.397934	-0.16	0.8740
DEBGDP	-0.000373	-0.96	0.3464	2.280720	2.86*	0.0100
GCAP	0.017957	3.17*	0.0046	37.31600	3.93*	0.0009
AR(1)	-			0.9985		
R-Squared	0.4208			0.9959		
Adjusted R-Squared	0.3588			0.9946		
Durbin-Watson	1.1537			1.5600		
F-statistic (probability)	3.9094 (0.0116)			762.54 (0.0000)		

*: indicates significant at 1% level; **: indicates significant at 5% level; ***: indicates significant at 10% level

The results reported in Table 3 indicate that investment-output growth and gross investments significantly determine output growth rate in Nigeria. While investment-output growth is negatively related to economic growth in Nigeria, gross investment exhibits a positive relationship with economic growth. However, in South Africa, export growth, investment-output growth, stock of external debt, and gross investments, significantly influence output growth. With an r-squared of 0.42, one can conclude that all independent variables explained only 42 percent variability in the dependent variable in Nigeria. An r-squared of 0.998 for South Africa indicates that all independent variables accounted for over 99 percent variability in output growth. In other words, the model explains that output growth in South Africa is better than in Nigeria. The F-statistic validates the joint contributions of the independent variables in explaining output growth in both Nigeria and South Africa. The Durbin-Watson confirms the absence of serial autocorrelation in the Nigerian data series, but not in the South African series. Taking cue from Greene (1997) who stresses the problem posed by auto-correlated disturbances and suggests a way to deal with them. Accordingly, when auto-correlated disturbances are present, a generalized regression model is employed because the ordinary least squares method becomes inefficient. Judge et al. (1985) also agree on the loss of efficiency, but differ on the severity of the problem. In view of the above argument, a generalized least squares (GLS) is fitted to the expanded neoclassical growth model for South Africa.

The influence of export growth on GDP growth is confirmed by the results, even though the coefficient is relatively small and statistically insignificant in Nigeria. In South Africa, however, the relationship is not only positive, but fairly large in magnitude and is statistically significant. The implication is that Edward's (1998) observation, that exports

play a positive role in the growth process by increasing total factor productivity, has been confirmed in South Africa. Interestingly, the variable that captures the impact of domestic resources on growth (RGFI/RGDP), suggest that domestic resources significantly depressed growth in Nigeria and South Africa. As more domestic resources are committed to the economy, the less is their effectiveness in generating a higher level of growth. Investment stock, however, contributes significantly to the explanation of output growth in Nigeria and South Africa. As gross investments grow, rate of output growth is accelerated in conformity with the neoclassical. The positive (and significant) relationship between investments and growth validates the neoclassical growth theory (Solow, 1956; Hunt, 2007).

The result, which relates debt service ratio to growth, produces mixed results in Nigeria and South Africa. While debt service ratio aided output growth in Nigeria, it compresses output growth in South Africa. The reason for this is not far fetched. South Africa services her external debt conscientiously; debt service payments and debt service due are the same. In Nigeria however, debt service payment is just a tiny proportion of the service due over the years and that, of course, explains the steady build-up in Nigeria's debt stock over the years. In addition, the variable that relates the seriousness of debt burden (EXDEBT/GDP) on productivity growth (Y_g) indicates that the more serious the burden (based on the stock of the debt), the more likely it is to compress output growth in Nigeria (a partial validation of debt effects). Unlike Nigeria, South Africa utilizes the additional external finance better, as it has contributed positively and significantly to output growth. The extent to which it can sustain this beneficial impact of debt will be revealed in the next section of this paper.

Model 2

$$Y_g = \alpha_0 + \alpha_1 DEBGDP + \alpha_2 (DEBGDP)^2 + \alpha_3 DSEREXP + \alpha_4 TOT + \alpha_5 GCAP + \mu_{it}$$

Table 4: Results from the Non-Linear Elbadawi's Reformulated Model

Dependent Variable is the Annual Growth Rate of GDP (Y_g)						
	NIGERIA			**SOUTH AFRICA**		
Variable	**coefficient**	**t-statistic**	**Prob.**	**coefficient**	**t-statistic**	**Prob.**
Constant	139.6423	2.69*	0.0136	37299.51	0.02	0.9845
DEBGDP	2.171544	2.39**	0.0262	4.702742	1.50	0.1505
(DEBGDP)^2	-0.009798	-1.79***	0.0886	-0.076730	-1.42	0.1731
DSEREXP	-0.497183	-0.58	0.5686	-53.06424	-0.48	0.6354
TOT	0.338339	1.90***	0.0710	1.798019	2.04**	0.0560
GCAP	12.56681	5.45*	0.0000	17.53859	3.50*	0.0024
AR(1)	-			0.999415		
R-Squared	0.9219			0.9930		
Adjusted R-Squared	0.9033			0.9908		
Durbin-Watson	1.3296			1.7320		
F-statistic (probability)	49.5547 (0.0000)			451.03 (0.0000)		

*: indicates significant at 1% level; **: indicates significant at 5% level; ***: indicates significant at 10% level

Table 4 contains results of a non-linear test of the relationship between output growth and some independent variables. In the Nigerian data, the size of external debt, terms of trade variability and growth in fixed capital exert a significant impact on economic growth. As for the South African data, only the terms of trade variability and growth in fixed capital exert a significant impact on economic growth. The F-statistic confirms the existence of the relationship for both countries. With the Durbin-Watson result of approximately 1.33, the presence of serial correlation in both time series data is ruled out. The existence of autoregressive unit within a unit bracket in the GLS estimate of South Africa is a pointer to a stationary process.

The results also show a non-linear impact of debt stock on growth in Nigeria. External debt stock possibly contributed positively to growth in the early periods of loan acquisition. Subsequent to this, indiscriminate borrowings, coupled with non-servicing of debt, and its cumulative impact took effect on Nigeria when the debt stock significantly depressed output growth. In the case of South Africa, the non-linearity impact is not clearly apparent as it is in Nigeria. Even though the non-linearity impact in the utilization of South Africa's external funding is present, it is not a significant factor affecting economic growth. Debt service ratio also exerts a negative impact on productivity growth in conformity with the 'debt overhang' theorists for both countries. Favorable terms of trade, which measure the level of external shocks, are related positively to output growth in conformity with theory. This variable is significant at the 10 percent significance level in Nigeria and at the five percent level in South Africa. Lastly, investment growth exerts a positive and significant impact on output growth in Nigeria and South Africa.

Model 3

$$\tfrac{RGFI}{RGDP} = \beta_0 + \beta_1 DEBGDP + \beta_2 (DEBGDP)^2 + \beta_3 DSEREXP + \beta_4 TOT + \beta_5 GCAP + \mu_{it}$$

Table 5: Non-Linear Private Investment Model Results						
Dependent Variable is Investment/Output Ratio						
	NIGERIA			SOUTH AFRICA		
Variable	coefficient	t-statistic	Prob.	coefficient	t-statistic	Prob.
Constant	0.125320	9.18*	0.0000	0.134524	7.84*	0.0000
DEBGDP	-0.001071	-4.48*	0.0002	-5.76E-06	-0.01	0.9927
$(DEBGDP)^2$	5.61E-06	3.88*	0.0009	7.49E-06	0.63	0.5361
DSEREXP	-0.000495	-2.19**	0.0398	-0.007845	-0.40	0.6972
TOT	5.67E-05	1.21	0.2393	-8.14E-05	-0.50	0.6245
GCAP	0.006830	11.24*	0.0000	0.012913	20.44*	0.0000
AR(1)	-			0.400160		
R-Squared	0.9850			0.9884		
Adjusted R-Squared	0.9814			0.9848		
Durbin-Watson	1.3853			1.4476		
F-statistic (probability)	275.5286 (0.0000)			270.50 (0.0000)		

*: indicates significant at 1% level; **: indicates significant at 5% level; ***: indicates significant at 10% level

Table 5, shows the results of a non-linear investment and the cash-constraint model. This model captures the disincentive nature of debt and its servicing requirements on investment. A cursory look at the results shows that the non-linearity impact of debt stock is confirmed because the coefficient associated with $(DEBGDP)^2$ is statistically significant in Nigeria. External debt service ratio also has a significant impact on growth in Nigeria. This is a strong validation of the 'debt overhang' and 'crowding out' theory in Nigeria. Four out of five variables significantly affect investment in Nigeria, while only one variable has statistical significance in South Africa. In addition, the terms of trade variable is directly related to domestic resources, which indicates that the presence of trade surplus increases the size of investment in Nigeria. All the independent variables collectively capture about 99 percent variability in investment in Nigeria and South Africa. In addition, the F-statistic validates the joint contributions of all independent variables in explaining investment in both countries. Furthermore, the Durbin-Watson statistic indicates an absence of autocorrelation in the disturbance term.

The results show that the terms of trade are important in the determination of productivity. The reverse is the case in South Africa. Moreover, external debt as a proportion of GDP is inversely related to growth in investment at an initial point. At some point the relationship becomes reversed. The turning point is not ascertained in this study. The key point is that the growth in debt stock relative to productivity discourages further growth in investment in Nigeria and South Africa. This of course is the argument of the 'debt overhang' proponents. However, at some other interval in time, debt contributed significantly to growth in investment. This argument is logical because at an earlier period of debt acquisition, because of its manageable size (and meaningful borrowing), external debt

significantly contributes to investment growth. Beyond a time frame, more indiscriminate borrowing (and non-servicing of loans in Nigeria) become the order of the day and debt becomes a discouraging factor for investment in Nigeria and South Africa.

Finally, the growth in external debt servicing, as a proportion of exports, becomes a clog on the wheel of investment in Nigeria and South Africa. This, of course, is expected as the 'crowding out' theorists argue that external debt service crowds out investments. Generally, the results in this paper support both the 'debt overhang' theory and 'crowding out' theory in Nigeria and South Africa, but found the debt relief obtained by Nigeria as a justified palliative measure.

Conclusion

Many countries opt for external finance as a means of ensuring sustained development and against domestic borrowing. The 'dual gap' theory postulates that investment is a function of savings and that investment that requires domestic savings is not sufficient to ensure economic development, thereby necessitating complementary external goods and services. An important issue that needs investigation is whether or not external borrowing drives economic development in debtor states. The thesis of this paper is to apply some econometric approaches to investigate the presence of linear or non-linear effect of debt on economic growth in Nigeria and South Africa.

Debt service to GDP ratio showed a negative relationship in conformity with theory and expectation for South Africa. The debt stock, however, has a significantly strong positive relationship with output growth confirming the beneficial impact of debt in South Africa. As for Nigeria, debt service exerts a positive, but statistically insignificant, impact on output

growth. Capital growth exerts a positive and significant influence on output growth in Nigeria and South Africa. The impact of debt size on growth is non-linear in Nigeria, but not in South Africa. Debt stock contributes significantly to growth at the initial period of acquisition, up to a point when its further acquisition becomes non-sustainable and consequently retards growth.

In both countries, the terms of trade variability influences growth. When the terms of trade are favorable, growth is accelerated. By the same token, capital pile-up contributes positively to output growth in both countries. The contribution of capital growth to the explanation of domestic resource on growth was equally confirmed to be positive in Nigeria and South Africa. Debt service exerts a negative influence on the contributions of domestic resource on growth in Nigeria and South Africa. The non-linearity impact of debt on the contributions of domestic capital to growth is significant in Nigeria, but not so in South Africa.

The logical implication of the foregoing is that external debt has been better utilized in South Africa than in Nigeria. However, the current debt profile for Nigeria portrays a better picture than for South Africa. Therefore, Nigeria needs to consolidate on the gains of the debt relief recently granted her and the consequent reduction in its debt stock. One way to do this is through consistent debt management strategies, prudential borrowing, persistence servicing of debt, and possible liquidation of all outstanding external debt.

A major implication is that South Africa requires a better management of its external debt obligations. The government should place an embargo on further acquisition of external finance, except for top priority projects. The marginal return on investment is greater than or equal to the cost of borrowing for such priority projects. If the current rate of debt pile-up is

maintained, external debt will become South Africa's major problem, threatening its economic environment, thus increasing poverty.

Finally, Nigeria, South Africa, and all indebted countries of the world should seek external loans only for very high priority, well-appraised, and self-liquidating projects. Such projects should have direct impact on economic development. An economic culture of transparency, in the issue of debt management, should be cultivated. Governments should make fiscal adjustments through cuts in expenditures, as this could reduce the level of deficit financing, which exerts pressure on foreign exchange. They should avoid short term financing, especially when floating rates of interest are involved. A sound macroeconomic environment is an important ingredient of growth because it is a logical prerequisite to proper utilization of external funds.

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