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External Debt and Economic Growth in Ghana

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Abstract

This study analyses the effect of growth rate of external debt on the growth rate of GDP and finds out whether Ghana suffers from a debt overhang problem. The results from a Johansen multivariate cointegration method employed on our data showed that (i) there exists a stable long run relationship among GDP, labour force, investment, exports and external debt; and (ii) the long run effect of external debt on GDP has been positive and that Ghana is not suffering from any debt overhang problem. This means that importation of capital or reliance on external resources will help promote economic growth in Ghana. It is therefore recommended that every effort should be made by authorities to make Ghana much more attractive to external resources. The results of the study also indicate that military coups (political instability) have not been significant in explaining the growth rate of GDP in Ghana.

Background

In most economic development literature, the decades of the 1950s and 1960s are often described as "golden years" for developing countries because the rates of growth of these economies were not just high, but were mostly internally generated. In these decades, the less developed countries (LDCs) increased their investment with little reliance on external resources. In the 1970s, however, the inability of LDCs to generate sufficient domestic savings for capital formation to foster economic growth compelled them to rely on importation of capital. Hence, growth in the 1970s was "external debt-led" as these countries maintained persistent current account deficits, and borrowed heavily on the international capital market to finance the payment gap. Borrowing from abroad was highly favoured as a way of promoting economic growth. In the process, little attention was paid to the liabilities side of the current account deficit which increased the external indebtedness of these countries, until when Mexico, despite being an oil exporter, declared in August 1982, that it could not service her debts. Since then, the issue of external debt and its servicing has assumed critical importance and introduced a "debt crisis" debate.

Despite the tremendous improvement made in the debt situation of most middle-income debtor countries since the onset of the debts crises in 1982, a group of low income countries classified as Heavily Indebted Poor Countries (HIPCs) has continued to experience serious relatively high stocks of external debt. Out of the 41 countries classified as HIPCs, 33 (or 80%) including Ghana are in sub-Saharan Africa (SSA). The majority of these countries also fall under the existing classification of countries with low income and low human development.

In the last two decades, many LDCs have faced acute external debt servicing problems. There are varied reasons for this. Some debt problems have resulted mainly from the inefficient use and control of borrowed funds by debtor countries. But in most debtor countries, returns on investment had not even covered debt servicing cost, while in others, an inadequate policy framework for debt management has led to accumulation of external debt that has proved too excessive for the countries debt servicing capacity. In effect, many debtors have faced a much higher-than-anticipated growth in debt servicing repayments relative to the growth in the exports of goods and services (Essien and Onwiodwokit, 1998).

As at 31st December, 2004, Ghana's total external debts, including obligations to the IMF, was estimated at US $6,426.8 million. Long and medium term debt stock at the end of 2004 stood at US $6,086.0 million. In addition, debt stock owed to Paris Club creditors was estimated at US $ 275.7 million. However, multilateral and commercial debt stock stood at US $5,325.6 million and US $347.4 million respectively (Bank of Ghana Annual Report 2004).

The external debt problem which has had a profound influence on the economy in the recent past can be traced to the early 1980s which was the aftermath of the occurrence of the oil price increases of the 1970s. Furthermore, the nation's inability to meet all its debt repayments constitutes one of the serious obstacles to the inflow of external resources into the economy. The accumulation of debt service arrears which is compounded with penalty interest has not permitted reduction in the debt stock, despite the fact that the government has been servicing its external

debt with US $272.11 million since 1995. In 2003 alone, debt service was estimated at US $126.14 million while the total external debt service arrears up to December 31, 2002 was estimated at US $6,381.33 million. Thus, the cumulative total debt service requirement totaled US $7,908.43 million by the end of 2003. The above statistics shows, on one hand, that there has been a considerable injection of foreign resources (capital) into the Ghanaian economy which should help promote accelerated growth of the economy. On the other hand, it reveals that there has been increased outflow of resources (in terms of debt servicing) leaving little to support domestic economic growth.

This study, therefore, sought to find out (i) what has been the impact of the external borrowing (debt) on the economic growth of Ghana since there is much controversy as to the relationship between external borrowing (debt) and economic growth; and (ii) whether Ghana suffers from a debt overhang problem. A study of this nature has the potential to influence debt and its management for sustainable growth of the economy.

Overview of Ghana's External Debt Profile

Even though the problems that led to Ghana's debt burden are not different from those that affected other developing countries, certain politico-economic points have been singled out. These comprise the following:

i. Soon after independence Ghana embarked on a rapid industrialisation programme that resulted in huge spending, internal political instability and frequent changes of government through military coups, affecting continuity of developmental projects.

ii. Political appointees were put into sensitive positions irrespective of their training skills and expertise and this led to mismanagement and a collapse of accountability. Scarce foreign exchange was spent on military software and ammunition instead of gearing it towards self liquidating projects and infrastructures that would induce investment, savings and employment. With this gross dissipation of internal and external financial resources since the attainment of independence in 1957, it is not surprising that Ghana, once a rich gold and cocoa producing country, should plummet into heavy external debt.Figure 1 shows trends and changes in Ghana's debt stock for period, 1970 – 2004. It can be gauged from the table that the external debt has been increasing continuously except in 2004 when it declined from $8,034.57 the previous year to US$6,426.77. Ghana's external debt reached a peak of US$ 8,034.57 million in 2003 before falling by 20.00% in 2004 to $6,426.77 million. This is due to the fact that in July 2004, Ghana reached the completion point of the Heavily Indebted Poor Country (HIPC) Initiative. With this development, a total amount of US$ 3.5 billion of debt was earmarked for cancellation by the creditors. The country was expected to save an estimated US$ 230 million annually in debt service. As a result of the debt cancellation, the stock of external debt declined from US$ 8,043.6 million at the end of 2003 to US$6,426.8 million at the end of 2004.

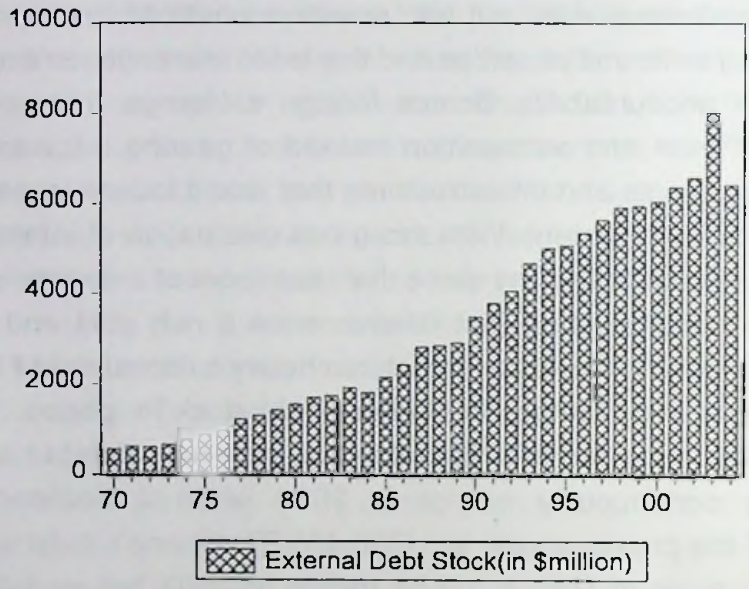


Figure 1: Ghana's External Debt Stock from 1970-2004 (in millions of dollars)

Source: The State of the Ghanaian Economy, various issues Bank of Ghana Annual Reports.

In spite of the continuous increase in total debt stock within the period of study, the total external debt as a percentage of GDP continued to fall; from a high of 157.3% in 2000 to 72.2% in 2004. This downward trend of external debt/GDP ratio is attributable to the debt relief enjoyed by Ghana as a result of Ghana reaching the completion point of the HIPC initiative.

Sources of External Debt

Ghana has contracted a number of debts from external sources. Some of them are discussed below:

Table 1: Distribution of Ghana's Short and Long Term External Debt By Major Sources (in US Million Dollars)

	1970	1971	1978	1979	1980	1983	1985
(A) short – term debt							
a) Arrears of current payment	na	na	123.6	292.3	221.3	358.2	124.4
b) Other arrears	na	na	163.8	136.0	137.1	54.4	29.3
c) Loans and overdrafts	na	na	40.6	50.5	63.8	12.3	29.0
Total (A)	64.4	46.8	321.0	478.8	422.2	424.9	182.7
(B) Long – term debt	na	na	294.1	312.3	342.1	398.70	354.1
a) Bilateral	na	na	187.1	230.9	0	446.80	555.7
b) Multilateral					320.3 0		
Total (B)	479.2*	509.4*	481.2	543.2	662.3	845.50	909.8

*includes medium term debt

1987	1990	1997	2000	2003	2004
59.8	0.00	0.00	0.00	0.00	0.00
0.00	53.83	0.00	0.00	0.00	0.00
0.00	0.00	287.00	275.00	474.77	330.30
90.1	53.83	287.00	275.00	474.77	330.00
444.0	466.60	1314.23	1592.06	2106.10	412.98
1,143.1	1,711.98	3,280.68	3812.28	4722.90	4858.71
1,587.1	2,178.58	4594.91	5,404.34	6,829.00	5,271.69

Source: Bank of Ghana Annual Reports

The Table 1 shows the sources by which Ghana's external debt is contracted in some selected years. Short term debts have been rising and falling since 1970. This trend has continued as a result of conditions that normally come with official loans. Some writers have called obtaining loans from the World Bank and its affiliates "the selling of sovereignty". This development of borrowing from abroad at stiffer rates and shorter maturities to finance unviable economic projects is one of the reasons attributed to the worsening debt situation of most less developed countries, including Ghana.

The short term external debt which was $241.0 million in 1986 decreased by $150.9million (62.6%) to $90.1million in 1987. The fall was attributed to the full payment of short-term loans and overdrafts as well as reduction in arrears of current payments. During the year 1987, Bank of Ghana paid $91.2million of its short-term loans and overdrafts and reduced its arrears on current payments from $122.2million to $59.8million. The summary shows that a dramatic decline in the short term debt was witnessed in 1990 where it was estimated at US$ 53.83 million.

Long term loans accounted for the largest proportion of the total debt. Multilateral long-term loans form the largest proportionate share of the total external debts. The current structure of Ghana's debt is considered to be favourable for development efforts as over 82% of the debt is long term. The relative proportions of short-, medium-, and long-term debt in 2000 were 5%, 6% and 89% respectively. By 2005, this had changed to 8%, 10% and 82% (ISSER, 2005).

Theoretical Framework

The theoretical literature on the relationship between the stock of external debt and growth has largely focused on the adverse effects of "debt overhang." Krugman (1988) defines debt overhang as a situation in which the expected repayment on external debt falls short of the contractual value of debt. If a country's debt level is expected to exceed the country's repayment ability with

some probability in the future, expected debt service is likely to be an increasing function of the country's output level. Thus, some of the returns from investing in the domestic economy are effectively "taxed away" by existing foreign creditors, and investment by domestic and foreign investors—and thus economic growth—is discouraged. Under such circumstances, the debtor country shares only partially in any increase in output and exports because a fraction of that increase will be used to service the external debt. The theory implies that debt reduction will lead to increased investment and repayment capacity and, as a result, the portion of the debt outstanding becomes more likely to be repaid. When this effect is strong, the debtor is said to be on the "wrong" side of the debt Laffer curve. In this case, the debt Laffer curve refers to the relationship between the amount of debt repayment and size of debt. However, the idea of debt Laffer curve also implies that there is a limit at which debt accumulation stimulates growth (Elbadawi, et al., 1996). In reference to an aid Laffer curve, Lensink and White (2001) argue that there is a threshold at which more aid is detrimental to growth.

A number of macro-economic models have been constructed for the analysis of foreign debt and economic growth (see, for example, Eaton and Gersovitz, 1981; Reidel, 1983; Selowsky and Van Der Tak, 1986). All these models retain the fundamental structure of the debt – cum – growth hypothesis with little modifications. The Eaton and Gersovitz (1981) model for instance attributes the crisis to both external shock and inappropriate domestic policies. The debt stock is postulated to take cognisance of GDP, expected variability of export, population size and the rate of income growth. In other words, the model postulates that external borrowing is undertaken because of export revenue shortages, population growth and slow rate of income growth, that is, low savings ratio. The fundamental criticism of this model is the gloss-over of the simultaneity between economic growth and debt stock. It is true that growth of the economy influences the debt stock because debt accumulation implies that more resources would have to be used to service debt.

The modified Reidel model, on the other hand, examines how balance of payment influences the incurrence of external loans. The model analyses the demand and supply of new loans (external) rather than the debt stock. The flow of debt is related to various ratios including the reserve to imports ratio, debt service to exports ratio, government budget deficit and investment to national income ratio. It emphasises that deficit spending will raise domestic import thereby reducing the foreign exchange available for external debt servicing.Selowsky and Van Der Tak (1986) on their part take a more modern view of the debt problem. Their model recognises the fact that highly indebted countries have been servicing their debt largely by austerity measures such as import and investment squeeze to generate trade surpluses necessary to finance the debt, but at a higher cost in terms of foreign consumption and output. It provides a simple framework that identifies the critical variable influencing debt as the rate of domestic savings, population growth (need for more public facilities), the efficiency of investment, the real interest rate on foreign debt and the initial savings rate required for a successful outcome of a growth – oriented debt policy. They concluded that a higher rate of growth of GDP taking into account the debt repayment flows can bring about recovery of credit worthiness to highly indebted countries.

Empirical Literature Review

The empirical literature has found mixed support for the "debt overhang" hypothesis. Relatively few studies have econometrically assessed the direct effects of the debt stock on investment. In most studies, reduced-form equations for growth are employed, under which the stock of debt is presumed to affect growth both directly (by reducing the incentives to undertake structural reforms) and indirectly (via its effects on investment). In middle-income countries, Warner (1992) claims that the debt crisis does not depress investment, but this has been countered by several researchers including Greene and Villanueva (1991),

Elbadawi et al. (1997), Fosu (1999) and Chowdhury (2001) who have found some credence in the debt overhang hypothesis. In a study of 54 developing countries (including 14 HIPCs), Hansen (2001) observed that the inclusion of three additional explanatory variables (the budget balance, inflation, and openness) leads to rejection of any statistically significant negative effect of external debt on growth. Savvides (1992) had earlier found that the ratio of debt to GNP has no statistically significant effect on growth. Djikstra and Hermes (2001) reviewed a number of studies on the "debt overhang" hypothesis and concluded that the empirical evidence is inconclusive.

Generally, therefore, a few studies give a clear idea of the level of the debt-to-GDP ratio at which debt overhang effects come into play. Elbadawi et al. (1996) confirmed a debt overhang effect on growth using cross-section regression for 99 developing countries spanning Sub-Saharan Africa (SSA), Latin America, Asia and Middle East. They identified three direct channels in which indebtedness in SSA works against growth: current debt inflows as a ratio of GDP (which should stimulate growth), past debt accumulation (capturing debt overhang) and debt service ratio. They found that debt accumulation deters growth while debt stock spurs growth. Other studies worth mentioning are those that simply use simulation analysis to demonstrate the impact of debt burden indicators on economic growth under different scenarios (see Ajayi, 1991; Osei, 1995; Mbire and Atingi, 1997). Studies that have shown favourable effects of external debt are rare and include those by the World Bank (1988) for the period 1980-86 and Chowdhurry (1994) for Bangladesh, Indonesia and South Korea.

Chowdhury (2001) further contributes to the existing literature on the debt-growth nexus by analysing the relationship in two separate country groups— HIPC and non-HIPC— using extreme bounds analysis for sensitivity tests and the mixed, fixed, and random coefficient approach that allows for heterogeneity in the causal relationship between debt and growth. The extreme bounds analysis shows that the relationship between a debt measure and

economic growth is robust to changes in the conditioning set of information included in the regression equations. The mixed, fixed and random coefficient approach, on the other hand, shows a statistically significant negative causal impact running from each of the four debt measures to economic growth in both country groups.

Maghyereh and Omet (2002) examined the impact of external debt on the performance of the Jordanian economy and determined the optimal level of debt using new a econometric technique. The findings of the study indicate that the optimal level of external indebtedness is about 53 percent of GDP. In other words, when the level exceeds this level, its impact on the performance of the Jordanian economy becomes negative. In a similar vein, Schclarek (2004) empirically explores the relationship between debt and growth for a number of developing and industrial economies. For developing countries, the study finds that lower total external debt levels are associated with higher growth rates and that this negative relationship is driven by the incidence of public external debt and not by private external debt. The study does not find any support for an inverted U-shape relationship between external debt and growth. For industrial countries, the study does not find any significant relationship between gross government debt and economic growth.

Iyoha (1999) uses a simulation approach to investigate the impact of external debt on economic growth in sub-Saharan African countries usingsmall macroeconomic model estimated for 1970-1994. The study found the significance of debt overhang variables in the investment equation, suggesting that mounting external debt depresses investment through both a "disincentive" effect and a "crowding out" effect. Policy simulation was undertaken to investigate the impact of alternative debt stock scenarios (debt reduction packages of 5%, 10%, 20% and 50%), effective in 1986, on investment and economic growth in the subsequent years. It was found that debt stock reduction would have significantly increased investment and growth performance. A 20%

debt stock reduction would, on average, have increased investment by 18% and increased GDP growth by 1% during the 1987-1994 period.

Using econometric analysis and Sri Lankan data for the period 1952 to 2002, Wijeweera et al. (2005) investigate whether Sri Lanka faces a debt overhang problem. Long-run estimations rely on cointegration methodology whereas short-run analysis employs an error correction method. The results indicate that Sri Lanka does not have a debt overhang problem, probably because total external indebtedness is not too high.

Clements et al. (2003) examines the channels through which external debt affects growth in low-income countries. Our results suggest that the substantial reduction in the stock of external debt projected for highly indebted poor countries (HIPCs) would directly increase per capita income growth by about 1 percentage point per annum. Reductions in external debt service could also provide an indirect boost to growth through their effects on public investment. If half of all debt-service relief were channeled for such purposes without increasing the budget deficit, then growth could accelerate in some HIPCs by an additional 0.5 percentage point per annum.

Given resource constraints faced by most less developed countries, including Ghana, and the contrasting conclusion on the role of foreign capital in the process of growth, there is the need to probe the issue further as it affects the country.

Model Specification

The theoretical framework underpinning this study is the Solow's (1956) neoclassical growth model. The model is built upon an aggregate, constant-returns-to- scale production function that combines labour and capital, but with diminishing marginal returns in the production of commodities. The model also assumes exogenous labour supply and savings as a fixed fraction of output. Given $Y = A \cdot F(K, L)$ and $cY = A \cdot F(cK, cL)$ due to constant returns to scale, let $c = 1/L$, then

$(1/L)Y = A \cdot F((1/L)K, (1/L)L)$

$Y/L = A \cdot F(K/L, L/L)$

$y = A \cdot f(k, 1)$

$y = A \cdot f(k)$

where y = output per unit of labour (Y/L), k = capital labour ratio (K/L), A = index of technology.

Following Feder (1983) and other researchers, the common variables that enter the growth model are growth rates of labour, exports and investment-GDP ratio (i.e. capital). The regression model used in this study is an extension (modification) of the Solow-type neo-classical growth model of the following specific forms:

$\ln Y = \alpha_0 + \alpha_1 \ln L + \alpha_2 \ln(I/Y) + \alpha_3 \ln EX + \alpha_4 \ln ED$

where lnY is the natural log of GDP;

lnL is the natural log of labour force;

ln(I/Y) is the total investment-output ratio;

lnEX is the natural log of exports;

lnED is the natural log of external debt;

The equation above is our long-run equation which is a neo-classical growth model expanded to include exports and external debt. The export coefficient in the model relates to output elasticity of exports and the variable reflects the degree of "openness" of the country. According to Edwards (1998) exports positively affect economic growth through increases in total factor productivity after including human capital and institutional factors. It is already clear from the above that the effect of external debt on economic growth is mixed with some studies finding evidence in support of the debt overhang hypothesis (ie. negative effect) while others show a positive effect. The theoretical predictions for the model, therefore, are that $\alpha_1>0$, $\alpha_2>0$, $\alpha_3>0$, $\alpha_4>/<0$.

Econometric Procedure

Our first strategy is to test for the stationarity of the series since time-series data have been used. Macroeconomists have become aware that many macroeconomic time series are not stationary in their levels and that many time series are most adequately represented by first differences (Dickey, Jansen and Thornton, 1991)[4]. In this study, the augmented Dickey-Fuller tests have been used. The Johansen multivariate cointegration test has been utilized to test for the existence of a long run equilibrium relationship among the variables. The short run dynamics have been examined by means of an error-correction model which has been specified as:

$$\Delta y_t = \alpha + \delta\omega_{t-1} + \gamma_1\Delta y_{t-1} + \gamma_2\Delta y_{t-2} + \ldots + \gamma_{p-1}\Delta y_{t-p+1} + \beta_t x_t + \varepsilon_t$$

where vector y_t = [Y, L, I/Y, EX, ED], exogenous vector x_t includes the dummy variable, DV, employed to capture the effect of military coups (political instability), taking the value of one (1) for the period of military rule or zero (0) otherwise. It is argued that political instability affects economic growth through several channels. Ghana's experience of military coups can affect economic growth directly by disrupting production and indirectly through decreased investment in physical and human capital. Moreover, poor economic performance can have a destabilising effect on the nation; thus political instability has a negative effect on economic growth because it prevents the adoption of growth-enhancing economic reforms (see also Edwards and Tabellini, 1991). ω_t is the error correction term. Under the long run equilibrium, error correction term (ω_t) equals zero. However, if the system deviates from its long run equilibrium, the error term differs from zero and the vector yt partially adjusts to return to its equilibrium. Thus the parameter δ indicates the speed of adjustment. Also, α is the constant term while ε_t is white-noise disturbance term. Lag length is selected by AIC (Akaike

[4] That is, formal statistical tests often can not reject the null hypothesis of a unit root. The presence of unit roots can give rise to the possibility of a spurious relationship among the levels of the economic variables. Also, parameter estimate from a regression of one such variable on others are inconsistent unless the variables are cointegrated (Dickey, Jansen and Thornton, 1991 58-78)

information criterion). The error correction series generated were used to estimate an over-parameterised vector error correction model that was later simplified into a more interpretable and more parsimonious model. A generalized impulse responsefunction is estimated to investigate the response of the growth rate of output to a shock from the growth rate of external debt.

Sources of Data

Annual data covering the period 1970 to 2005 were used for the analysis. The data were obtained mainly from the IMF's International Financial Statistics (on-line version). World Tables (various issues), The State of the Ghanaian Economy (various issues), Bank of Ghana Annual Reports and UNCTAD Annual Reports.

Empirical Results

Unit Root Test

The time series plot shown in Appendices 1 and 2 provide some idea about whether the trend is stationary or not. It is clear all the logs of the variables in levels show trend over time and none seems to be stationary. However, the first differences of the variables show no trend. Thus. a quick examination of the series plot seems to suggest some amount of stationarity in first difference. Notwithstanding this, a more formal test was carried out to establish whether the variables are integrated of order one, I(1) or otherwise for the variables in levels. The Augmented Dickey-Fuller tests suggest that the series are all integrated of order one, I(1). Since the t-values of the lagged level of the variables are less than their critical values, we fail to reject the hypothesis that the series are I(1) (see Appendix 3). In other words, the series are non-stationary in levels.

Cointegration Test

The Johansen Cointegration test rejected the hypothesis of no cointegrating equation in favour of at most one cointegrating equation at 5% significance level (See Appendix 4). In other words, there is only one significant cointegrating vector that spans the variables in the system, where lnY, lnL, ln(I/Y), lnEX and lnED form a stationary linear combination. The estimated long run economic growth function is given as:

lnY = -32.5737 + 3.7863*lnL + 0.1952*ln(I/Y) + 0.1377*lnEX + 0.3889*lnED

The error correction term is derived as:

ECM = lnY + 32.5737 – 3.7863*lnL – 0.1952*ln(I/Y) – 0.1377*lnEX – 0.3889*lnED

An examination of the long run output equation reveals that labour force, total investment-output ratio (capital) and exports have positive effect on output as expected. External debt also, has a positive effect meaning that 100% increase in borrowing (debt) will result in approximately 39% increase in output in the long run. The result is consistent with the results of the studies by World Bank (1988); and Chowdhurry (1994) for Bangladesh, Indonesia and South Korea. The result also suggests that Ghana, like Sri Lanka in the study by Wijeweera et al. (2005), is not suffering from debt overhang problem probably because total external indebtedness is not that too high, or probably Ghana has not reached that threshold at which more debt will be detrimental to growth.

Vector Error Correction Model

An over-parameterised model, which incorporated all the differenced variables and the error correction term (lagged once), was reduced to a more parsimonious model. Variable deletion was used to come up to the final dynamic equation presented in the table below.

Table 3: Results of Parsimonious VEC model for GDP Growth

Variable	Coefficient	Std. Error	t-value	t-prob
Constant	-19.3489	4.813	-4.02	0.0011
DlnY_2	0.3778	0.1710	2.21	0.0431
DlnY_3	0.5411	0.1557	3.48	0.0034
DlnY_4	0.5049	0.1938	2.61	0.0199
DlnL_1	10.2564	3.771	2.72	0.0158
Dln(I/Y)	-0.5230	0.1067	-4.90	0.0002
Dln(I/Y)_1	-0.2691	0.0986	-2.73	0.0155
Dln(I/Y)_4	0.4090	0.0835	4.90	0.0002
DlnEX_1	-0.2646	0.0927	-2.85	0.0121
DlnEX_2	-0.1624	0.0932	-1.74	0.1019
DlnEX_3	-0.1837	0.0669	-2.75	0.0150
DlnEX_4	-0.1311	0.0592	-2.21	0.0427
DlnED	0.4203	0.0675	6.22	0.0000
DlnED_1	0.2565	0.0782	3.28	0.0051
DlnED_2	0.1991	0.0842	2.36	0.0320
ECM_1	-0.5797	0.1434	-4.04	0.0011

Diagnostic Test Result

AR 1-2 test:	F(2,13)	= 0.95181 [0.4114]
ARCH 1-1 test:	F(1,13)	= 1.8370 [0.1984]
Normality test:	Chi^2(2)	= 0.71892 [0.6981]
RESET test:	F(1,14)	= 4.2438 [0.0585]

With regard to the statistical attributes of the parsimonious equation for the GDP growth, the various diagnostic tests applied were insignificant. A wide range of alternative specification tests was considered to give the parsimonious equation some reasonable level of validity and credibility. With the AR test for auto-correlated residuals, the results confirm the absence of serial or residual correlation. The Jacque-Bera normality test for the distribution of the residual indicates that the residual terms are white noise. There is no evidence from the RESET test that the equation is mis-specified.

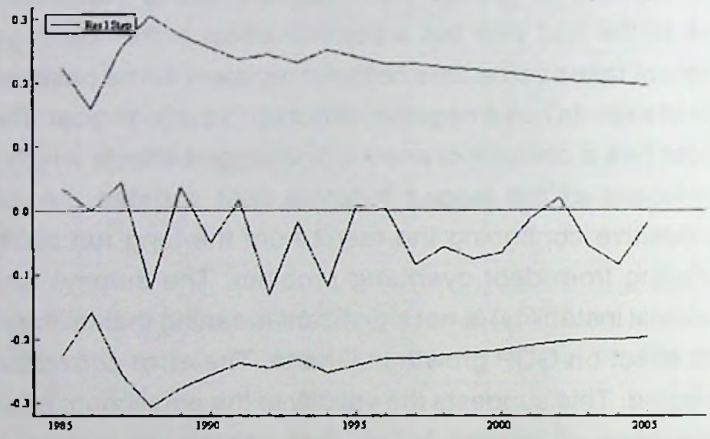
The results of the VEC model for the GDP growth show that the rate of growth of GDP in the second, third and forth years have feedback effects which

are positive. The growth rate of labour force has a positive effect on GDP growth in the first year. The rate of growth of investment has a contemporaneous negative effect up to the first year but a positive effect in the fourth year. This shows that investment takes some time before it registers some positive returns. The rate of growth of exports has a negative effect up to the forth year. The growth rate of external debt has a contemporaneous and lagged effects which are both positive. The coefficient of the lagged external debt variable (i.e. past debt accumulation) is positive confirming the result from the long run analysis that Ghana is not suffering from debt overhang problem. The dummy variable for military coups (political instability) is not significant meaning that military rule has had no significant effect on GDP growth in Ghana. The error correction term is significant as expected. This suggests the validity of the equilibrium relationship; indicating the existence of market forces that operate to restore long run equilibrium after a short run shock. The coefficient indicates a speed of adjustment of about 58% from actual growth in the previous year to equilibrium rate of economic growth. This shows all errors/deviations are not corrected within one year.

Stability Test

As can be seen from Figure 2, there is no evidence of parameter instability since the one-step residual plot (centred) stays within the critical bands. This means that the long run coefficients (proxied by ECM_1 as their linear combination) and short run coefficients (coefficients estimates of the first differenced variables) are very much stable.

Figure 2: Stability Test Results



Granger Causality Tests

In order to examine the predictability of growth rate of external debt on the growth rate of GDP, Granger causality approach is applied. The results of the Granger causality tests are illustrated in Table 4. The null hypothesis in each case can be rejected. The results clearly suggest that causation relation is from both sides, that is, there is bidirectional relation between growth rate of GDP and the growth rate of external debt. In other words, the data on external debt may be informative, to certain extent, in predicting Ghana's economic growth and vice versa.

Table 4: Granger Causality Tests Results

Null Hypothesis	Obs	F-Statistics	Probability
lnED does not Granger Cause lnY	34	3.35298	0.04898
lnY does not Granger Cause lnED		9.40118	0.00071

The Generalized Impulse Response Function

Having established that a long-term relationship exists between the growth rate of GDP and external debt, we proceed to examine the dynamic responses in more detail by generating the generalized impulse response function showing the response of the growth rate of GDP to one-standard deviation innovation in the growth rate of external debt and trace out the possible effects. A graphical representation of the generalized impulse response function presented in Appendix 6 above shows that within the first ten years, the effect of the growth rate of external debt on the growth rate of GDP has been positive. This confirms the earlier results from the cointegration test and also, from the VEC model. As can be seen from the fifth figure, in response to the external shock, economic growth rate increases between the first and third year, and there is a sharp downward movement ending in the fourth year. This is followed by upward and downward movements until output finally recovers from the initial shock to the external debt by the tenth year. A one standard error shock to the external debt leads to an increase in economic growth by approximately 0.09% within three years before it adjusts back to its potential level by the tenth year. The accumulated response of the growth rate of GDP to the growth rate of external debt shown in the seventh figure of Appendix 6 depicts an increasing response up to the ninth year before reaching its potential level. This shows that the long run effect of the growth rate of external debt on growth rate of GDP is favourable. It also means that importation of capital or reliance on external resources is beneficial to the economy of Ghana, in terms of promoting economic growth.

Impulse responses of the external debt to its own shock are found in the sixth figure. In response to own shock, the external debt decreases over time and there is a temporary increase between second and third years; after that the external debt reverts back to its potential level.

Concluding Remarks

Using the Johansen multivariate cointegration method and vector error correction (VEC) model, this study examined the effect of growth rate of external debt on the growth rate of GDP and found out whether Ghana suffers from debt overhang problem. The main conclusions of the study are: (i) there exists a stable long run relationship among the growth rates of GDP, labour force, investment, exports and external debt; and (ii) the long run effect of growth rate of external debt on GDP growth rate has been positive and that Ghana is not suffering from debt overhang problem. This means that importation of capital or reliance on external resources will help promote economic growth in Ghana. It is therefore recommended that every effort should be made by authorities to make Ghana very attractive to external resources.

The results of the study also indicate that military coups (political instability) have not been significant in explaining the growth rate of GDP in Ghana.

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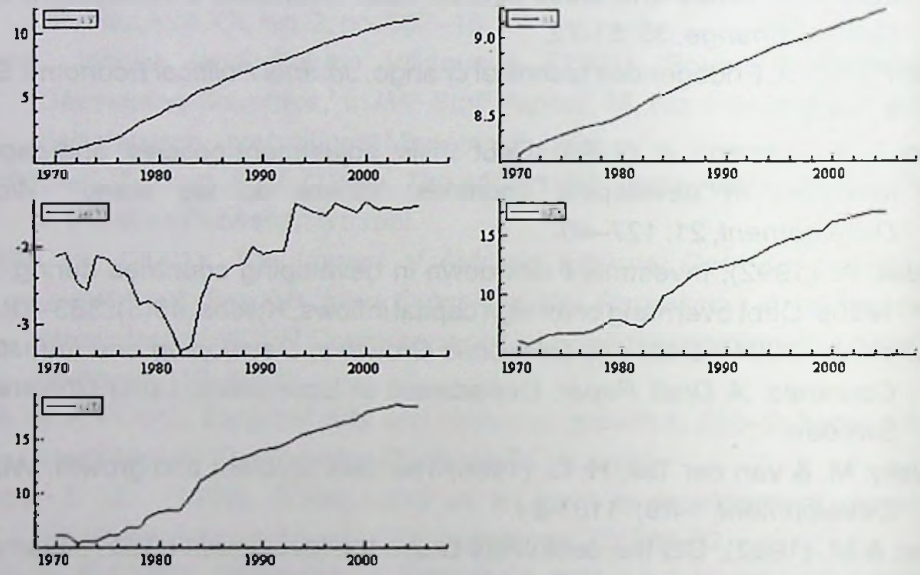
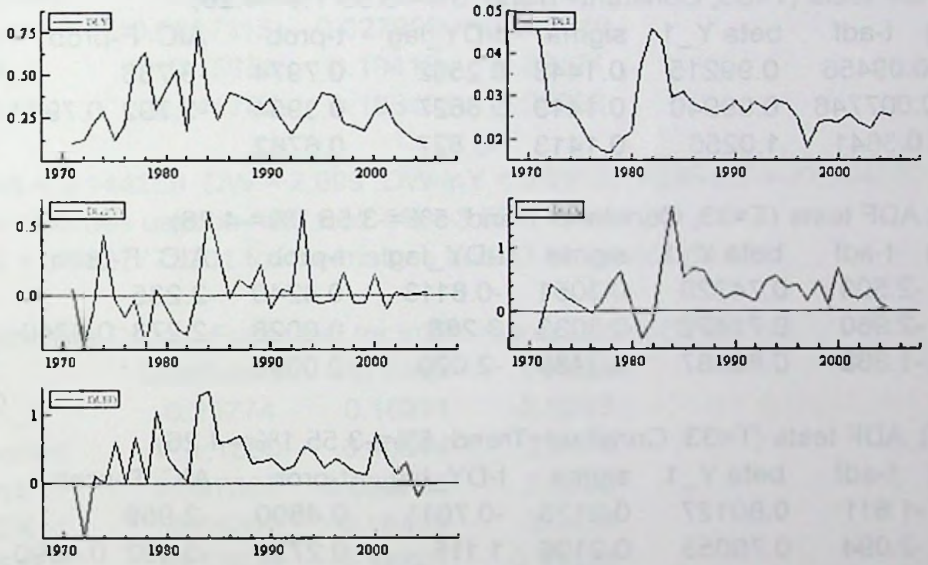
Appendix 1
Data Plot of Variables in Levels



Appendix 2
Data Plot of Variables in First Differences



Appendix 3
Results of Unit Root Test

lnY: ADF tests (T=33, Constant+Trend; 5%=-3.55 1%=-4.26)

D-lag	t-adf	beta Y_1	sigma	t-DY_lag	t-prob	AIC	F-prob
2	-0.09456	0.99215	0.1443	0.2592	0.7974	-3.733	
1	-0.007746	0.99940	0.1419	0.8627	0.3954	-3.792	0.7974
0	0.3641	1.0256	0.1413	-3.827	0.6782		

lnEX: ADF tests (T=33, Constant+Trend; 5%=-3.55 1%=-4.26)

D-lag	t-adf	beta Y_1	sigma	t-DY_lag	t-prob	AIC	F-prob
2	-2.509	0.74226	0.3051	-0.8113	0.4240	-2.235	
1	-2.960	0.71472	0.3033	3.268	0.0028	-2.273	0.4240
0	-1.868	0.80087	0.3489	-2.020	0.0090		

ln(I/Y): ADF tests (T=33, Constant+Trend; 5%=-3.55 1%=-4.26)

D-lag	t-adf	beta Y_1	sigma	t-DY_lag	t-prob	AIC	F-prob
2	-1.811	0.80127	0.2125	-0.7011	0.4890	-2.959	
1	-2.094	0.78055	0.2106	1.115	0.2739	-3.002	0.4890
0	-1.902	0.80398	0.2115	-3.021	0.4354		

lnL: ADF tests (T=33, Constant+Trend; 5%=-3.55 1%=-4.26)

D-lag	t-adf	beta Y_1	sigma	t-DY_lag	t-prob	AIC	F-prob
2	-2.448	0.86049	0.004003	-0.2801	0.7814	-10.90	
1	-3.090	0.85217	0.003939	6.939	0.0000	-10.96	0.7814
0	-0.8438	0.93743	0.006316	-10.04	0.0000		

lnED: ADF tests (T=33, Constant+Trend; 5%=-3.55 1%=-4.26)

D-lag	t-adf	beta Y_1	sigma	t-DY_lag	t-prob	AIC	F-prob
2	-1.010	0.90114	0.3500	1.252	0.2208	-1.961	
1	-0.7333	0.92949	0.3534	1.261	0.2174	-1.967	0.2208
0	-0.3804	0.96465	0.3569	-1.974	0.2208		

Augmented Dickey-Fuller test for lnY; regression of DlnY on:

	Coefficient	Std.Error	t-value
lnY_1	-0.0078502	0.083020	-0.094558
Constant	0.34705	0.11629	2.9844
Trend	-0.0027115	0.027998	-0.096846
DlnY_1	0.15956	0.19418	0.82171
DlnY_2	0.048785	0.18819	0.25923

sigma = 0.144269 DW = 2.099 DW-lnY = 0.01167 ADF-lnY = -0.09456
Critical values used in ADF test: 5%=-3.551, 1%=-4.26
RSS = 0.5827772301 for 5 variables and 33 observations

Augmented Dickey-Fuller test for lnEX; regression of DlnEX on:

	Coefficient	Std.Error	t-value
lnEX_1	-0.25774	0.10271	-2.5093
Constant	1.1860	0.40644	2.9179
Trend	0.097607	0.038727	2.5203
DlnEX_1	0.55202	0.16489	3.3478
DlnEX_2	-0.13636	0.16807	-0.81133

sigma = 0.305131 DW = 1.981 DW-lnEX = 0.01715 ADF-lnEX = -2.509
Critical values used in ADF test: 5%=-3.551, 1%=-4.26
RSS = 2.606935833 for 5 variables and 33 observations
Augmented Dickey-Fuller test for ln(I/Y); regression of Dln(I/Y) on:

	Coefficient	Std.Error	t-value
ln(I/Y)_1	-0.19873	0.10977	-1.8105
Constant	-0.59853	0.34003	-1.7602
Trend	0.010272	0.0061694	1.6650
Dln(I/Y)_1	0.19306	0.17015	1.1347
Dln(I/Y)_2	-0.12175	0.17367	-0.70107

sigma = 0.212493 DW = 1.977 DW-ln(I/Y) = 0.1429 ADF-ln(I/Y) = -1.811
Critical values used in ADF test: 5%=-3.551, 1%=-4.26
RSS = 1.264293252 for 5 variables and 33 observations

Augmented Dickey-Fuller test for lnL; regression of DlnL on:

	Coefficient	Std.Error	t-value
lnL_1	-0.13951	0.056979	-2.4484
Constant	1.1487	0.46491	2.4708
Trend	0.0038280	0.0015841	2.4166
DlnL_1	0.83435	0.15137	5.5120
DlnL_2	-0.044183	0.15773	-0.28011

sigma = 0.00400288 DW = 1.795 DW-lnL = 0.0105 ADF-lnL = -2.448
Critical values used in ADF test: 5%=-3.551, 1%=-4.26
RSS = 0.0004486455807 for 5 variables and 33 observations

Augmented Dickey-Fuller test for lnED; regression of DlnED on:
Coefficient Std.Error t-value

Sample: 1970 2005
Test assumption: Linear deterministic trend in the data
Series: lnY lnL ln(I/Y) lnEx lnED
Lags interval: 1 to 1

Eigenvalue	Likelihood Ratio	5 percent Critical value	1 percent Critical value	Hypothesized No. of CE(s)
0.729287	85.16144	68.52	76.07	None**
0.433818	40.73373	47.21	54.46	At most 1
0.261288	21.39320	29.68	35.65	At most 2
0.186680	11.09641	15.41	20.04	At most 3
0.112844	4.070980	3.76	6.65	At most 4

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level
Unnormalized Cointegrating Coefficients:

lnY	lnL	ln(I/Y)	lnEX	lnED
-0.682837	2.585398	0.133274	0.093995	0.265573
0.995729	-12.59681	-0.092747	0.927107	-0.732605
-1.312129	6.036452	-1.211422	0.116262	0.633311
-0.475237	0.252237	-0.422332	0.281127	-0.166647
-0.722551	8.391309	-0.201109	-0.008077	0.080319

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

lnY	lnL	ln(I/Y)	lnEX	lnED
C				
1.000000	-3.786258	-0.195176	-0.137653	-0.388926
32.57368				

lnED_1	-0.098862	0.097887	-1.0100
Constant	0.75446	0.34272	2.2014
Trend	0.034733	0.043521	0.79806
DlnED_1	0.17461	0.16084	1.0856
DlnED_2	0.20598	0.16446	1.2525

sigma = 0.350031 DW = 2.022 DW-lnED = 0.01503 ADF-lnED = -1.01
Critical values used in ADF test: 5%=-3.551, 1%=-4.26
RSS = 3.430617221 for 5 variables and 33 observations

Appendix 4

Results of Johansen Cointegration Test

Appendix 5

Overparameterised VEC Model

Modelling DlnY by OLS

	Coefficient	Std.Error	t-value	t-prob
DlnY_1	0.346109	0.4276	0.809	0.4636
DlnY_2	0.769806	0.5796	1.33	0.2549
DlnY_3	0.745904	0.4367	1.71	0.1628
DlnY_4	0.715267	0.5253	1.36	0.2450
Constant	-1.32836	0.8039	-1.65	0.1738
DlnL	17.0217	14.33	1.19	0.3006
DlnL_1	14.7004	18.08	0.813	0.4618
DlnL_2	-7.44871	14.32	-0.520	0.6303
DlnL_3	2.86328	12.26	0.234	0.8268

DlnL_4	3.24435	10.09	0.322	0.7639
Dln(I/Y)	-0.467044	0.1617	-2.89	0.0447
Dln(I/Y)_1	-0.599902	0.3154	-1.90	0.1299
Dln(I/Y)_2	-0.367281	0.3192	-1.15	0.3139
Dln(I/Y)_3	-0.173399	0.2554	-0.679	0.5345
Dln(I/Y)_4	0.299386	0.1716	1.74	0.1560
DlnEX	0.191647	0.3399	0.564	0.6030
DlnEX_1	-0.320039	0.1995	-1.60	0.1839
DlnEX_2	-0.230988	0.1555	-1.49	0.2116
DlnEX_3	-0.305991	0.1993	-1.54	0.1995
DlnEX_4	-0.225701	0.1529	-1.48	0.2139
DlnED	0.424954	0.2460	1.73	0.1591
DlnED_1	0.228730	0.2219	1.03	0.3609
DlnED_2	0.259769	0.2118	1.23	0.2872
DlnED_3	0.120468	0.2452	0.491	0.6489
DlnED_4	0.0754014	0.1895	0.398	0.7110
ECM_1	-1.43548	0.7434	-1.93	0.1257
dMilitary	0.00118962	0.08322	0.0143	0.9893
sigma	0.0870294	RSS	0.0302	964368
R^2	0.956799	F(26,4) =	3.407	[0.120]
Log-likelihood	63.4389	DW		2.41
no. of observations	31	no. of parameters		27
mean(DlnY)	0.309297	var(DlnY)	0.0226221	

ARCH 1-1 test: F(1,2) = 0.72597 [0.4839]

Normality test: Chi^2(2) = 2.9281 [0.2313]

Hetero test: not enough observations

RESET test: F(1,3) = 9.9988 [0.0508]

Appendix 6
Impulse Response Functions