American Journal of Economics 2012, 2(7): 195-205
DOI: 10.5923/j.economics.20120207.05

External Debt Relief and Economic Growth in Nigeria

M. C. Ekperiware[1,*], S. I. Oladeji[2]

[1]Technology, Innovation and Enterprise Studies (TIES) department, National Centre for Technology management (NACETEM) Ile-Ife, PMB 012, Nigeria
[2]Department of Economics, Obafemi Awolowo University (OAU), Ile-Ife, Osun State Nigeria

Abstract This study examined the structural break relationship between external debt and economic growth from 1980 to 2009 with a view to examine the effect of external debt relief on economic growth in Nigeria. The effect of huge external debt of less developed countries is believed to impede investment resources. This has resulted in debt restructuring of various kinds in Nigeria with some concessional loans, as well as the external debt relief in 2005. A decade after the debt relief critical sectors of the economy such as education, health, electricity, transport and exchange rate etc. suppose to show evidence or sources of such debt relief. Some studies found the effect of external debt relief to be doubtful especially on economic growth. Hence, a scientific study of the debt relief granted Nigeria by the Paris club in 2005 is here evaluated in respect of the effect on economic growth in the country. The study used quarterly time series of external debt, external debt service and real gross domestic product to determine the structural break effect of external debt on economic growth in the Nigeria as a result of the debt relief. The result of the chow test showed that the 2005 external debt relief caused a structural break in economic growth relationship with external debt in Nigeria. The study further showed that beside the reduction in aids, resources were freed for economic growth projects in health and education sectors. Conclusively, the external debt relief did make available resources for economic growth in Nigeria. Countries are therefore recommended toward discretional concessional borrowing and see external debt relief as a good option for poor unsustainable indebted countries as a way of making resources available for economic growth. The real sector should be the focal point where value is created rather than impeding it with mismanagement and servicing debt.

Keywords External Debt Relief, Structural Break, Dummy Structural Break, Aids , Economic Growth

1. Introduction

Nigeria like other developing countries had faced domestic financial constraint. This constraint has made external debt an essential complement to domestic resources for promoting sustainable economic growth among these developing countries. This is possible if the economic benefits from such projects are larger than the interest paid on the debt (1). However, excessive external debt more often than not impedes economic growth. The burden of debt on indebted countries has resulted in channelling of funds to debt servicing, instead of allocating resources to crucial developmental projects (2 and 3).

Huge debt of less developed countries has led to debt, constituting impeding factor to economic development of these countries. This has resulted to debt restructuring of various kinds. Debt restructuring is the renegotiation of existing debt to new terms that are accepted by both the creditor and debtor. Restructured debt can be in three ways: rescheduling of debt, debt relief and conversion of debt. Rescheduled debt is change in the terms of agreement and conditions surrounding the amount of debt owed. Debt relief or cancellation is the reduction in outstanding debt obligation. Nigeria has been involved in one form of debt restructuring or the other (4; 5 and 6).

Creditor nations introduced debt relief in 1996 and 1999 to Heavily Indebted Poor Countries (HIPC) as a way of removing the impeding effect of debt burden on economic growth, such as debt overhang. Debt overhang occurs when the stock of external debt in a country exceeds her repayment ability (7). Thus, external debt forgiveness will encourage investment, economic growth and probably improve foreign exchange rate in indebted countries (8 and 2). However, external debt relief contributing to economic growth is possible if such countries are able to engage in viable economic projects with their new external debt status without falling back to debt crisis (9). In essence, external debt relief is not automatic but, domestic government good governance and resource utilization are crucial in making such debt relief to boost economic growth (8 and 10).

Nigeria achieved the long sought external debt relief from the Paris Club in 2005 that agreed to cancel 60% (18 billion US dollar) of the US$30.85 billion owed to it. This debt relief eventually spared the country from the yearly US$2.3 billion (₦345 billion) debt service burden. And expectations

* Corresponding author:
mosekperi2002@yahoo.com (M. C. Ekperiware)
Published online at http://journal.sapub.org/economics
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are that the deduction of 30 billion US dollar (₦4.5 trillion) from Nigerian external debt profile is potent to induce economic growth. The expectations are that the resources required previously to pay and service such external debt should now be channelled to investment and other viable projects to boost economic growth. Despite the debt forgiveness received by Nigeria from Paris club, the evidence of accelerated economic growth looks sketchy (11). The performance in the education, health, exchange rate, external debt stock and servicing should show evidence or sources of the impacts of such debt relief, if not, where is all those resources previously used in servicing these debts gone into or what of the promise of reduction in poverty the government gave if the debt is relief. It is therefore, instructive to find out the direction and the extent of the effectiveness of the debt relief granted to Nigeria. This forms the motivation to examine the trend of macroeconomic variables to illustrate how these variables performed before, during and after the external debt relief and establish a structural break in the relationship of external debt, external debt service and economic growth in Nigeria.

This debate of external debt relief has established two schools of thought; the argument for and against external debt relief as a tool for economic growth. Some authors are of the view that debt relief significantly will improve economic growth (12; 13 and 14) while other authors are of the view that debt relief have no potential of improving economic performance on its own (15 and 16). This controversy prompts a country case study of external debt relief examination. These conflicting positions have given rise to the need for an examination of external debt relief using Nigeria as a case study. This research would go a long way to bring to light the external debt relief impact on economic growth by establishing the structural break in the relationship between external debt and economic growth in Nigeria.

2. Empirical Literature Review

Debt relief is an agreement by a creditor of an indebted firm or country to accept reduced or postponed interest and redemption payments from the debtor (17). In different country studies since the external debt relief initiative, some studies have shown the effect of external debt cancelation/relief on economic growth. Some empirical studies found positive effect of external debt relief on economic growth while others did not found any significant effect of external debt relief on economic growth. Both positive and negative findings are presented below.

From the literature review, debt relief in some case is evident in economic indicators, while in some other studies, it has no effect on economic performance because of several reasons and conditions. This prompts this study toexamine the effect of the $30billion relief in 2005 on economic growth in Nigeria.

3. Theoretical Perspective of External Debt Relief and Economic Growth

The position of economic theory on the relationship between external debt relief and economic growth is vital to this study. The literature presents both positive and negative effect of debt relief on economic growth. External debt relief lowers the debt service in the future of the debtor country. Proponents focus on two different channels: the incentive mechanisms and the resource mechanism (28). On the other hand, opponents question the existence of both the incentive and resource mechanism, particularly in low-income countries.

3.1. The Incentive Mechanism Theory (Debt Overhang Theory)

Table 1. Empirical Literature Review

A. Pro external debt Relief and Economic Growth					
S/N	Author	Year	Title	Method	Result
1	18	2011	What did 18 billion dollar achieve? The 2005 debt relief to Nigeria	Descriptive	Debt relief has a positive influence on Nigeria economic growth.
2	11	2010	Debt Forgiveness and its Impact on the Growth of Nigerian Economy: An Empirical Study	Econometric linear regression	Debt overhang problem of Nigeria had been alleviated by the debt relief package but the debt service relief did not positively influence economic growth
3	8	2009	Debt Relief Incentives in Highly Indebted Poor Countries (HIPC): An Empirical Assessment	general method of moment (GMM)	Low-income countries (LICs) included in HIPC marginally performed better on the average in investment, health care, gross secondary education enrollment, and GDP per capita growth than non-HIPCs.
4	19	2009	Deriving maximum social benefits from debt relief: A case of Zambia Viewpoint	Descriptive and econometric	Debt relief reduced money for debt servicing, domestic debt with strong social policy to reduce poverty. More free anti-retroviral drugs (ARVs), medical attention in the rural areas, free education at primary school levels in 2006, reallocated to education, health and social welfare investments. But empirical improvements in economic performance.
5	20	2006	Debt Relief: The development and poverty impact	Descriptive assessment	Debt relief like other forms of development finance is subject to diminishing returns and provides incentives for private investment. But admitted the scale of this effect is difficult to pin down. High

					uncertainty can dampen any positive investment response from debt relief per se.
6	21	2005	External public debt, economic growth, and welfare gains from debt relief for HIPCs	simulation analysis	Proposed two-third reduction in the external debt of HIPCs would increase their per capita GDP growth rate, on average, by about 1.6% points, direct and indirect effects of debt relief on growth and a substantial welfare gain for debtor countries
7	22	2004	Debt Relief and Poverty Reduction: Do We Need a HIPC iii?		Debt relief only provided a small part of the amounts needed to attain the Millennium Development Goals (MDGs). External debt relief could have a much more direct impact if OECD governments support poverty reduction objectives through a rapid acceleration and enforcement of corporate social responsibility initiatives and prudent use of available resources.
8	23	2003	Results of International Debt Relief 1990-1999	field research and desk studies	Debt relief has some benefits in some countries studied
B. Anti-External Debt Relief and Economic Growth					
S/N	**Author**	**Year**	**Title**	**Method**	**Result**
1	24	2011	Foreign aid, debt relief and Africa's development: problems and prospects,	Descriptive analysis	Debt relief provides some resource for investment in Africa but has little or no evidence to suggest that such an outcome is automatic
2	25	2010	External Debt and Growth: An Empirical Investigation and Ex-Post Evaluation of Debt Relief	growth model	Debt relief revealed that reductions in external debt are not associated with significant improvements in economic performance. However, when there are positive effects, they are likely to be conditional on a sound institutional framework
3	15	2009	Debt Relief Effectiveness and Institution Building	Descriptive and Multivariate Analysis	Debt relief is only weakly associated with subsequent improvements in economic performance. But debt relief correlates with increasing domestic debt in HIPCs. This undermines the positive achievement in reducing external debt service.
4	4	2009	Has Debt Relief Been Beneficial To The Economic Growth of Africa	OLS methodology	External debt relief granted does not have the potentials to drive economic growth in these countries.
5	26	2009	On the Sustainability of External Debt: Is Debt Relief Enough?	Geometry of Debt Sustainability (GDS)	Reducing the debt ratio, debt cancellation re-creates more space for debt accumulation in a consistent way if deliberate measures are not in place to sustain the external debt situation.
6	5	2008	Debt Relief, Investment and Growth;	growth model and an investment model	Findings from 1989 to 2004 were not supportive of external debt relief resulting to economic growth regarding neither the incentive mechanism nor the resource mechanism. Based on a sample of 61 developing countries, the study showed that debt relief did not affect growth directly or through capital investment.
7	16	2006	Will Debt Relief Make a Difference? Impact and Expectations of the Multilateral Debt Relief Initiative;	Descriptive	Debt relief and debt service obligations being cancelled were themselves relatively insignificant. For example, in 2004 the average African country in the program paid $19 million in debt service to the World Bank, but received 10 times that amount in new Bank credits and more than 50 times, as much in total aid grant received.
8	27	2005	Can Debt Relief Buy Growth?	growth model	He found that on an average, debt relief has no effect on growth rates of developing countries (both HIPCs and non-HIPC).
9	7	2004	calculating the Benefits of Debt Relief How cutting the External Debt Burden can Boost Growth in Low-Income Countries	Growth Model and General Method of Moments (GMM).	Empirical results revealed that for every 1 percentage point of GDP increase in debt service, public investment declines by about 0.2 percent of GDP. The modest size of this coefficient is somewhat surprising and indicates that high debt burdens have not had a very large effect on public investment in low-income countries. These results suggest that debt relief on its own cannot lead to large increases in public investment. In most cases, it leads either to greater public consumption, or lower taxes to higher private consumption.
10	28	2003	Debt Relief, Additionally, and Aid Allocation in Low-Income Countries,	Multiple regression	His preliminary cross-session revealed that debt relief to LICs neither crowd out other non-debt relief-related aid flows to the debtors concerned nor creates significant pool of resources for these countries. Nevertheless, he admitted it been too early to assess the resource implications of the enhanced HIPC Initiative.

The argument that debt relief affects economic growth through an incentive mechanism links a high debt to low economic growth. Increasing the level of debt may hamper growth through the effects of debt overhang (14). A debt overhang exists when a country's debt exceeds its expected ability to repay, and expected debt service is seen to be an

increasing function of the country's output. In essence, resources meant for investment in domestic economy are indirectly taxed away by foreign creditors in the form of debt service. This further increases the saving gap and increase uncertainty that discourages both domestic and foreign investments (29). When a country suffers from debt overhang, debt relief can improve economic efficiency (14). By reducing the stock of debt, debt relief reduces the implicit tax on investment and possibly reduces uncertainty. This is to reinstate the incentive for the debtor countries to undertake efficient investments and for new lenders to extend credit. This will enhance growth through increased volumes of investment, higher productivity better external shock.

3.2. The Resource Mechanism Theory

The resource mechanism theory emphasizes the crowding-out effect theory (30 and 31). In the case of a high debt burden, debt service payments crowd out investment and thereby impede economic growth. In this setting, debt relief can affect investment and growth through an expansion in public spending by easing the government's budget constraints. (28) provided an accounting identity to show how debt relief can actually generate resources and ease the government budget constraint. Some premises for resource mechanism are established. Resources are only freed if the country has actually been servicing its debt (P) and if the revenue collection in the country is not reduced (T). Moreover, debt relief has to be in addition to granted aid (A) (28). (32) looked at two accounting identities: the evolution of indebtedness and the fiscal constraint on a debtor.

$$\Delta D = (S - P) + (L - W) \quad (1)$$

Where **ΔD** is change in indebtedness (debt stock), **S** is contracted debt service payment, **P** is actual debt payments (both principal and interest), **L** is new total borrowing, and **W** is debt relief (which also reduces S). The fiscal constraint identity is

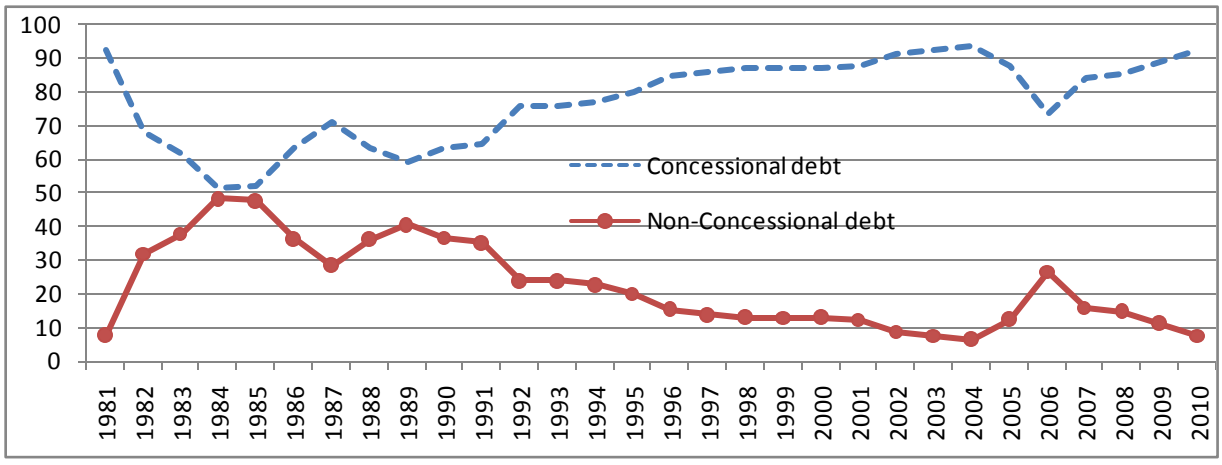
$$G = T + L - P + A \quad (2)$$

Where G is non-debt related government expenditure, A is aid granted, and T is tax receipts. If the debtor country has been defaulting servicing or has been rescheduling the debt (P = 0). No amount of debt relief will have any effect on government spending (G) or economic growth (28). Debt relief will only add to resource available for investment if such country has been servicing her debt and has policies that will now direct previous debt servicing funds to economic growth inducing ventures for the country. There is therefore a need to present the trend of Nigerian macroeconomic variables if the debt relief has any change in their movements.

4. The Trend of Some Macroeconomic Variablesin Nigeria

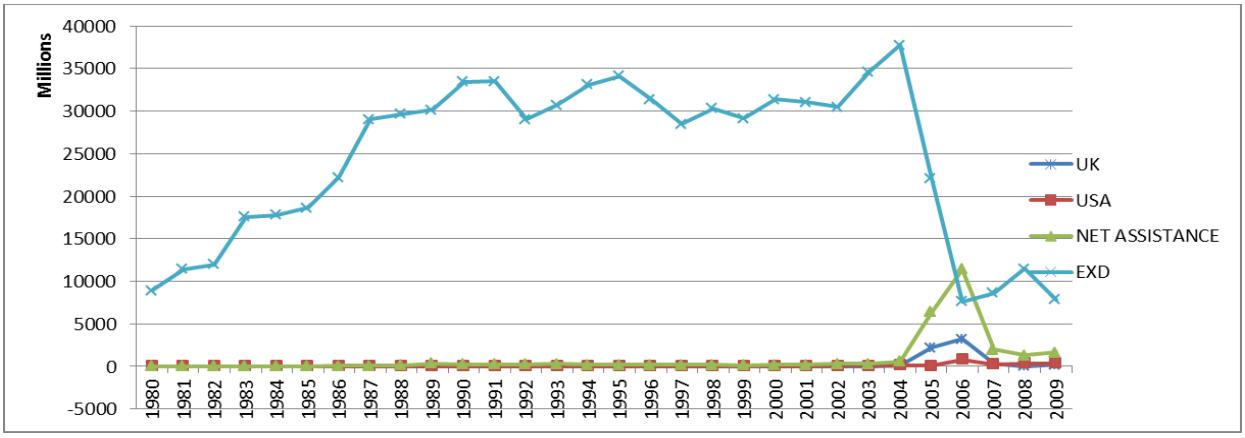
This section examines the trend of external debt, external debt service, financial aid, education, health, exchange rate and economic growth of Nigeria before and after the external debt relief to illustrate the behaviour of the variables of interest. The Nigeria external debt profile was both concessional and non-concessional borrowing but from the early 1990s, concessional borrowings were sought more in bridging the savings gap in the country as shown below.

As shown in figure 2, the value of external debt rose significantly above the value of aids from abroad. Before the external debt relief, aids from abroad increased between 2004 and 2005 but soon after the debt relief, the value of aids decreased significantly. More disturbing to the gains from the Paris Club debt relief was that the value of aid from the UK dropped sharply to the zero line. The need for investigating the aid flow from abroad was informed by the fact that aid was like debt relief, and aid from abroad may drop on the account that the country just benefited from debt relief. Indeed, aid from UK and other countries did drop and this may impede the gains from external debt relief. (28) asserted that if debt relief would improve economic growth, aid inflow must not drop, but if not, debt relief would just be an accounting exercise.



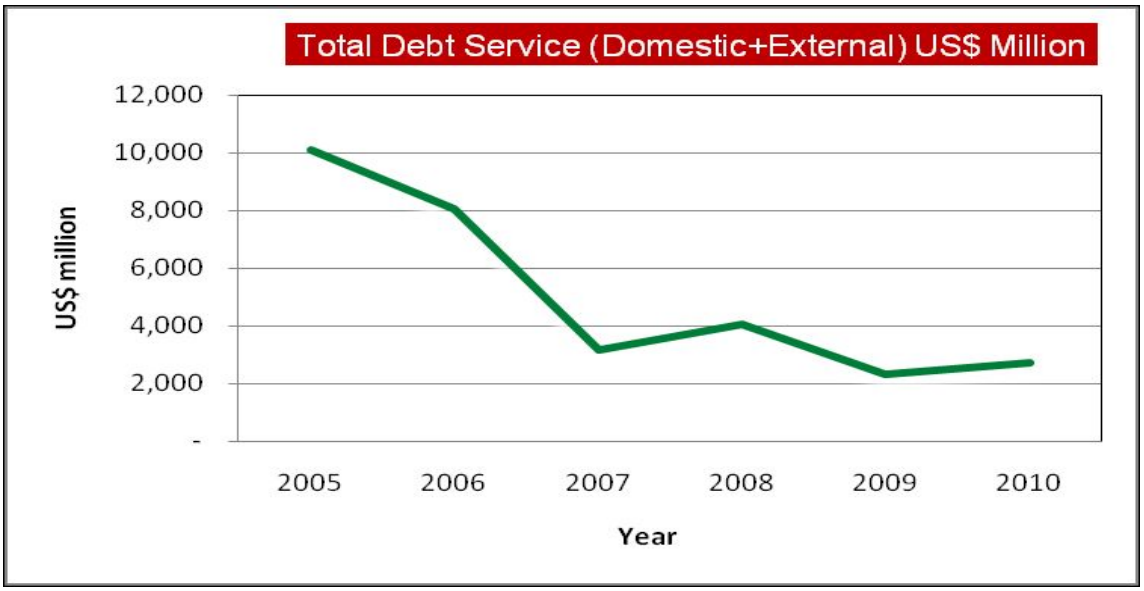
Source:Data from (33) and computed by author

Figure 1. Trend of Nigeria Concessional and Non-concessional External Debt (%)



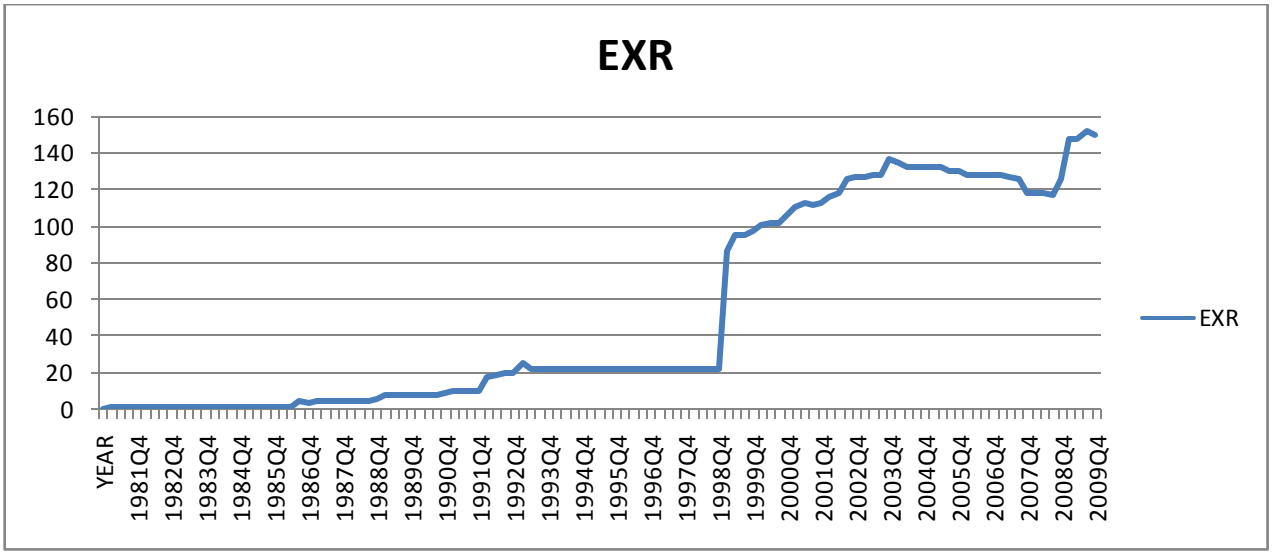
Source:Data from (34) and computed by author

Figure 2. Trend of Nigeria External Debt and Financial Aid Composition (1980-2009)



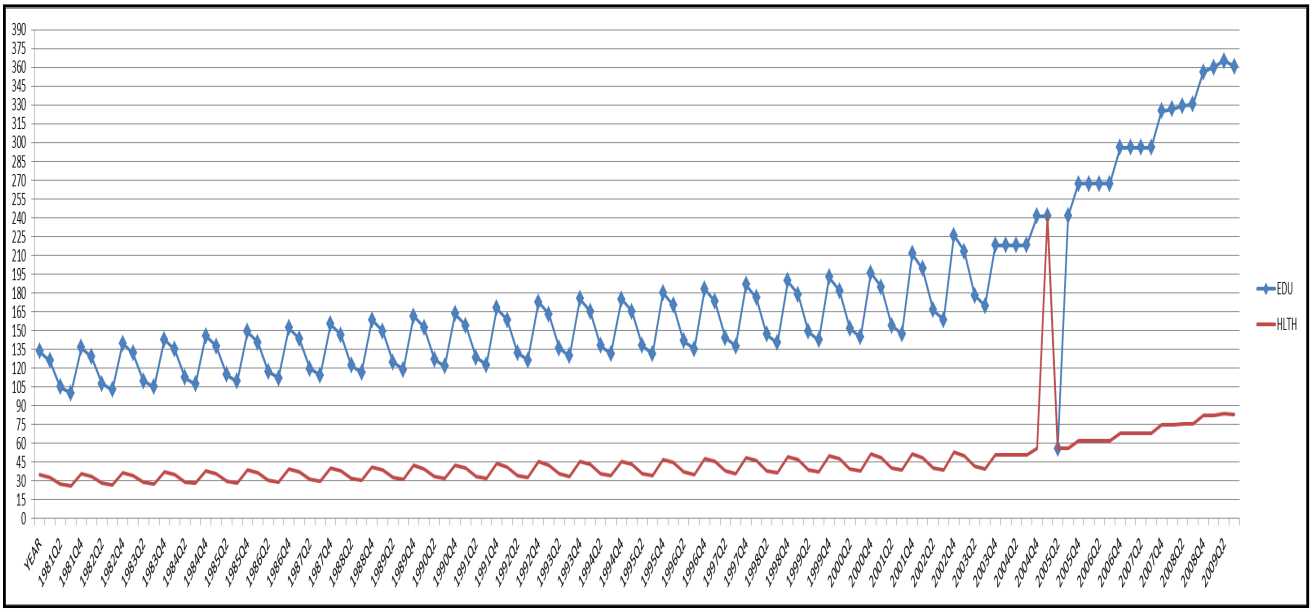
Source:Data from (33)

Figure 3. Trend of Total Debt Service in Nigeria (2005-2010)



Source:Data from (33) and computed by author

Figure 4. Trend of Nigeria Exchange Rate (1982:1-2009:3)



Source:Data from (33) and computed by author

Figure 5. Trend of Nigeria Health and Education Output (1982:2-2009:3)

The 2005 external debt relief as shown in Figure 3 led to a significant downward slope of external debt servicing in the country. Precisely, from 2009, the country services her external debt with less than $3billion compared to almost $10billion in 2005. This would provide resource allocation to the critical sectors of the economy to enhance citizens' welfare.

Figure 4 shows the trend of exchange rate in the country. Nigeria has been experiencing increasing exchange rate fluctuation from 1999 to 2009 except for between 2004 and 2008 when the exchange rate appreciated. The floating exchange rate regime made demand and supply of foreign currency the determination of the price of exchange rate from 1999 downward. It is believed in the literature that before the external debt relief in 2005, external debt depreciated the exchange rate because domestic currency was supplied in excess of demand for foreign currency for debt servicing (35). The external debt relief, all things being equal, is supposed to reduce the nation's demand for foreign currency and thereby cause the exchange rate to appreciate which is better for economic growth. Figure (4.4) showed appreciation of the exchange rate after the relief but its value later trend upward thereafter. This means that the gain from external debt relief to exchange rate was evident only in the short-run.

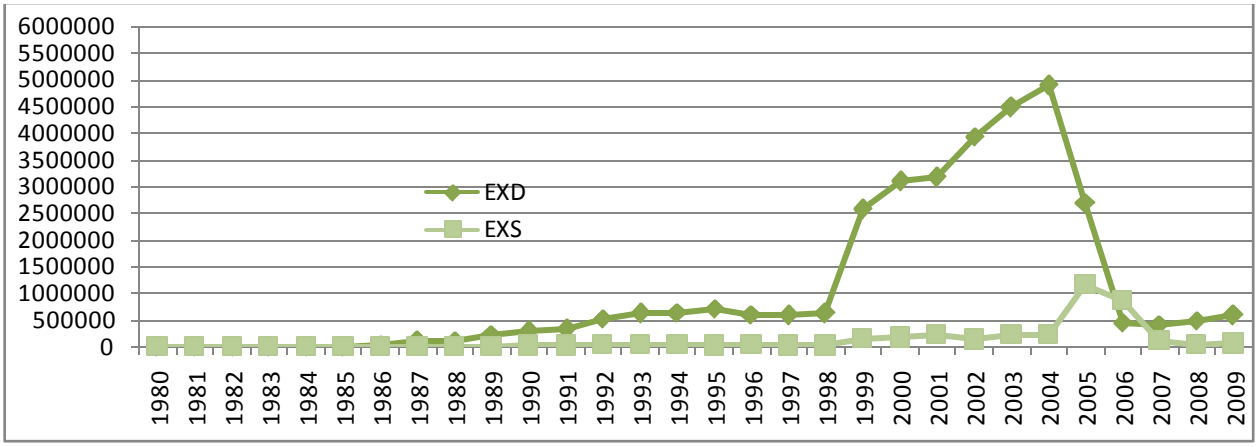
Figure 5 examine if the impediment of resource allocation to education and the health sectors by external debt servicing still persisted after the external debt relief. The need for this descriptive statistics was informed by the fact that external debt relief was granted to enable the country allocate resources to crucial sectors like education and health. The graph shows that the education output was more robust than the health output and the external debt relief freed resources for education and health sectors. First, the relief created an immediate increase in the health sector and a fall in education but both sectors witnessed an upward trend thereafter.

The fall in external debt and external debt service as illustrated in figure (4.6) during 2005 was because of the external debt relief. The point of concern is the likelihood of a possible rising trend of the graph again, in that for now the external debt is sustainable

From table 4.7, GDP growth rate declined further from 1982 to 1987 except in 1985. The growth rate trend upward from 1999 but fell in 2002 till 2005 when the external debt relief in 2005 was granted. However, economic growth trend became stable after the external debt relief all through till 2009. The economic growth graph showed a stable and small increase during the debt relief in the Nigerian economy. Though, it is too early to pass judgment based on the graph, economic growth increased during the external debt relief period. This means that the external debt relief brought stability and some increase in the growth rate of economic growth in the country.

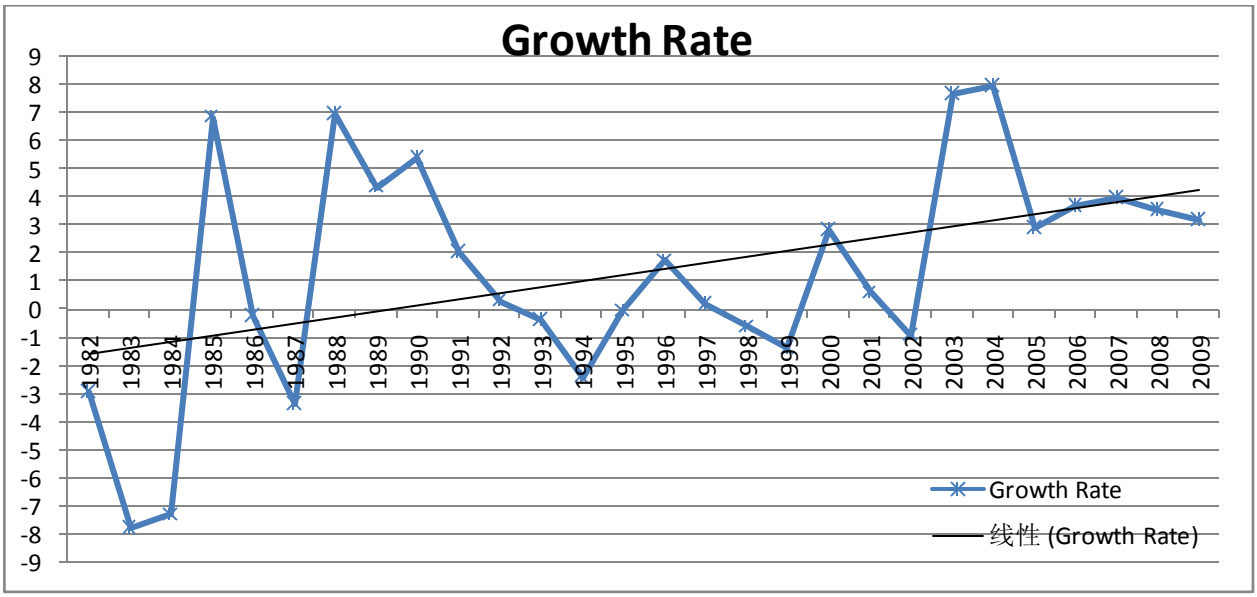
5. Method and Materials

The method used here would show if the external debt relief had caused any difference in the economic performance of Nigeria. Chow-test is a regression technique that shows if there is a structural break in the relationship between the regress (Y_t) and the regressor(s) (X_{it}). By structural change, the parameters of the model do not remain the same through the entire period (36). The period covered by this study is from 1980-2009. The choice of this period is because Nigerian external debt really began to mount within this period and the 1999 struggle for debt relief that finally came in 2005 (6).



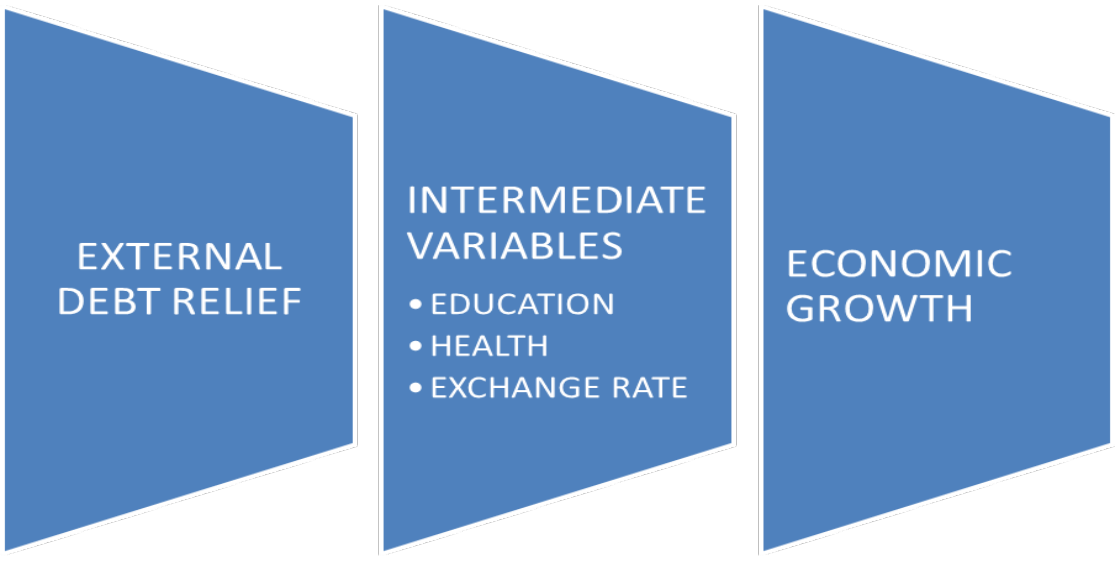
Source:Data from (33) and computed by author

Figure 6. Trend of Nigeria External Debt and External Debt Service (1980-2009)



Source:Data from (33) and computed by author

Figure 7. Trend of Nigeria GDP Growth Rate (1980-2009)



Source: Author's computation.

Figure 8. Transmission Mechanism of External Debt Relief Effect on Economic Growth

This study adopted the Incentive Mechanism concept (Debt overhang theory). The adoptedtheory linked a high debt to low economic growth. Increased level of debt hampers economic growth through the effects of debt overhang (14). But external debt relief would reposition the economy for economic growth as illustrated in the figure below.

From figure 8, external debt relief is expected to transmit through reduction in external debt stock and debt service to increase economic growth in Nigeria.

5.1. Identification of Structural Break Test

This section underscores the structural chow test with a view to establishing the structural relationship between external debt, external debt service and economic growth before and after the external debt relief in Nigeria. That is, if the Nigeria GDP significantly changed under the reviewed period (1980 to 2009) because of the external debt relief granted to Nigeria in the first quarter of 2005.

5.2. Model Specification

Two periods were observed: pre- and post-2005 external debt relief periods. Thus, we have three possible regression specifications:

Time period 1980(1) - 2005(1):

$$LogY_t = \mu_1 + \mu_2 LogX_{it} + \ldots + \varepsilon_{1t} \quad (5.1a)$$

Time period 2005(2) - 2009(4):

$$LogY_t = \gamma_1 + \gamma_2 LogX_{it} + \ldots + \varepsilon_{2t} \quad (5.2a)$$

Time period 1980(1)-2009(4):

$$LogY_t = \alpha_1 + \alpha_2 LogX_{it} + \ldots + \varepsilon_t \quad (5.3a)$$

Regression (5.3a) assumes there is no difference in economic growth between the two time period; that is, no structural parameter break over the entire period (1980-2009) caused by external debt relief. Hence, the null hypothesis:

H_0: equation (5.1a) and (5.2a) are statistically the same (i.e. no structural parameter break)

To test this hypothesis, *F*-statistic was computed using the residual sum of squares of the above regressions:

$$F = \frac{(RSS_R - RSS_{UR})/k}{(RSS_{UR})/(n_1+n_2-2k)} \sim F_{[k,(n_1+n_2-2k)]} \quad (5.4)$$

ε = residual term

log = logarithm on the variables

The null hypothesis of parameter stability is accepted if computed F value does not exceed the critical F value; otherwise, it is rejected.

Where Y_t = Gross domestic product (GDP)

X_{it} = External debt stock (EXD) and External debt service (EXS), RSS_{UR} = Unrestricted Residual Sum of Squares = $RSS_1 + RSS_2$

RSS_R = Restricted Residual Sum of Squares = RSS_3

k = number of parameters estimated

n = number of observation

5.3. Chow Test Estimation

From our specification in subsection 5.2, regression 5.3a assumed that there was no difference in economic growth between the two time period; that is, no structural break over the entire period (1980-2009) caused by external debt relief. Hence, the regression estimates thus:

BETWEEN 1980:1-2005:1

$$LOG(GDP) = 6.205960 + 0.228675LOG(EXD) + 0.018575LOG(EXS) \quad (5.1b)$$

t= (8.2990)* (1.335398) (0.164804)

$R^2_1 = 0.26$, $dw_1 = 2.77$, $F_1 = 2.94$, ($F_{tab} = 2.76$), $RSS_1 = 11.19$, $df_1 = (N_1 - K) = 98$, $N_1 = 101$

BETWEEN 2005:2-2009:4

$$LOG(GDP) = 39.3304 - 3.047696LOG(EXD) + 0.25071LOG(EXS) \quad (5.2b)$$

t= (1.329540) (-1.052128)(1.945324)*

$R^2_2 = 0.60$, $dw_2 = 3.23$, $F_2 = 2.28$, $F_{tab} = 3.24$ (but 1.51 @ 25%), $RSS_2 = 0.94$, $df_2 = (N_2 - K) = 16$, $N = 19$

BETWEEN 1980:1-2009:4

$$Log(GDP) = 5.579448 + 0.310528LOG(EXD) + 0.041464LOG(EXS) \quad (5.3b)$$

t= (9.860591)* (3.093107)*(0.552547)

$R^2_3 = 0.52$, $dw_3 = 2.47$, $F_3 = 12.36$ ($F_{tab} = 2.68$), $RSS_R = 14.42$ $df_R = (N_1 + N_2 - 2k) = 114$, $N_R = 120$

In the preceding regressions, the figures in parentheses are the estimated T values and RSS denotes the residual sum of squares. Since the two sets of samples are deemed independent, we can add RSS_1 and RSS_2 to obtain the unrestricted residual sum of squares (RSS_{UR})

$$\mathbf{RSSUR = RSS1 + RSS2} = 11.18876 + 0.940429 = 12.129189$$

Where * Shows statistical significant at 5% and RSS_3 or RSS_R is the restricted or pooled RSS

The estimated regressions suggested that the relationship between external debt (EXD), external debt service (EXS) and gross domestic product (GDP) were not the same in the two subperiods. The partial slope coefficients in the first regression 5.1b showed that EXD contributed 0.23 units to one unit change in GDP. External debt service contributed 0.02 units to one unit change in GDP. The result showed that external debt positively contributed to economic growth in the country between 1980:1 and 2005:1 with a significant F statistics and positive autocorrelation among the variables. Between 2005:2 and 2009:4 in the second regression, EXD negatively contributed to GDP (though with a weak t statistical proof) while EXS presented a positive coefficient of 0.25 units. This result also have high explanatory power (R^2=60%) with the required Durbin Watson (DW=2.28) regression correlation but significant F statistics only at 25%. This can be attributed to the small degree of freedom. The third regression (5.3b), where we assumed no structural break (pooled regression), showed R^2=52 (52% explanatory power) and no serial autocorrelation of DW=2.5 among the variables with a significant F statistics. The result showed that EXD positively contributed 0.31 to a unit change in GDP significantly at 5% and EXS contributed 0.04 to a unit change in GDP.

The mechanism of Chow test depends less on individual coefficients and regressions significances but rather, the result of the overall *F* statistic of the model. But it would be useful to have a formal test of the reliability of the Chow test

result before it becomes our deciding tool if external debt relief indeed has a structural break in the relation between external debt and GDP. This is where the test for similarity of error variance test comes in handy (37).

5.4. Testing the Similarity of Error Variances

A crucial requirement underlying the usage of chow test and to rely on the result was that the error variances in the regressions in (5.1b and 5.2b) were the same (36). Since we cannot observe the true error variances of regression (5.1a) and (5.2a), we can observe their estimates from the RSS given in regression (5.1b) and (5.2b).

$$\delta\tilde{}^{2}_{1} = \frac{RSS1}{n1-3} = \frac{11.18876}{101-3} = \frac{11.18876}{98} = 0.1142$$

$$\delta\tilde{}^{2}_{2} = \frac{RSS2}{n2-3} = \frac{0.940429}{16-3} = \frac{0.940429}{13} = 0.0723$$

$$F = \frac{\delta\tilde{}^{2}_{1}}{\delta\tilde{}^{2}_{2}} = \frac{0.1142}{0.0723} = 1.58$$

Since the *F* calculated (1.58) is not greater than the critical *F* value (from the *F* table, for 3 and 114 df, at 5 percent-critical *F* value is 2.68) $F_{(3,114)} = 2.68$, the null hypothesis of similarity of error variances is not to be rejected. This means that the error variances of the two subperiod are statistically the same (i.e. the sub regressions are from the same sampled population) and the chow test is to be validly used.

5.5. Discussion of Chow Test Result

The computed *F* value is obtained as (from equation 4.1, 4.2 and 4.3)

$$F = \frac{(14.4231 - 12.1292)/3}{(12.1292)/114} = \frac{0.7646}{0.1064} = 7.19$$

5% critical F value $F_{(3,114)} = 2.68$

Since the computed F value 7.19 is greater than the critical F value 2.68, the 2005 external debt relief did significantly caused a change in how external debt, external debt service relations with economic growth in Nigeria. The null hypothesis of no structural break between 1980 and 2009 is rejected. The Chow test therefore seems to support our earlier hunch that the external debt–economic growth relation has undergone a structural change in Nigeria over the period 1980–2009 because of the 2005 external debt relief granted to Nigeria. It shows that the present external debt of Nigeria because of the debt relief has reduced the amount allotted for external debt servicing in the country. This has provided resources to growth enhancing investments in the country. The current stable economic growth trend could be a pointer to our result (33).

5.6. Dummy Structural Break Estimate and Result

The Chow test method did not tell us the source of such break, whether in intercept or slope coefficient. A popular tool that guided this work to further affirm and identify any structural break sources is the dummy structural break test (dummy Chow Test method). We quantify the effect of the 2005 external debt relief on economic growth by constructing a nominal artificial variable (dummy variable). Here, the dummy variable (called the differential intercept) assumed 0 in period before the external debt relief (1981:1-2005:1) and the period after the debt relief was assigned 1 (2005:2-2009:4) in a single regression and slope drifters to capture the effect of the external debt cancellation granted to Nigeria by the Paris Club of London in 2005 on Nigerian economic growth. The regression estimates are presented bellow;

Table 5.1. Dummy Structural Break Estimate

Model 1(PERIOD 1981:1-2009:4) Endogenous: (GDP)			
Exogenous	**Coefficient**	**t-Statistic**	**P Value**
Constant	218047.3	4.18*	0.0001
D_1	5856800.	10.31*	0.0000
EXS	1.11	0.28	0.7780
EXD	22.43	4.97*	0.0000
D_1EXD	-22.51	-4.63*	0.0000
D_1EXS	-8.41	-2.09*	0.0387
R-square	0.95		
F- stat	412.64		0.0000
D.W stat	0.5280		
df(N_1-K)	113		
Number	116		

*represent statistical significance at 5%
Source: Author's Computation with Eview 5

Precisely, the dummy variable showed that the debt relief significantly caused a change of how external debt and external debt service relates to economic growth in Nigeria. Similarly, there was also change in the differential slope coefficients as external debt and external debt service coefficients drifted significantly at 5% (negatively) by 22.51 and 8.41 respectively. The overall F statistics (412.64) further strengthened the dissimilar regression result and affirm the claim that the 2005 external debt relief caused a structural break both in the intercept term and slope coefficients in external debt, external debt service and economic growth relation in Nigeria.

6. Discussion of Basic Findings

Here the major findings from the study based on the set objectives are highlighted.

6.1. Sources of External Debt and Trend

(i)The study revealed that Nigeria external debt was more from concessional official source (87.5% in 2005 and 92.7% in 2010) than non-concessional private source (12.5% in 2005 and 7.3% in 2010). Specifically, Paris Club before the external debt relief constituted larger portion (75.3%) of the

Nigerian external debt but after the debt relief, multilateral external debt became the major source (92.7%).

(ii)External debt (EXD) and external debt service (EXS) graphs showed that the external debt relief brought a significant fall in EXD and EXS in the country. However, the graph of aid from the UK and other developed countries dropped significantly. Specifically, aid from the UK before the debt relief trend upward but dropped to the zero line soon after the debt relief.

(iii)Economic growth rate, health and education output graphs showed significant upward trend during the 2005 external debt relief. Also, the Nigerian exchange rate (EXR) improved during the period.

6.2. Debt Relief and Economic Growth: Structural Break

(i)A pooled sample test of external debt, external debt service and GDP before and after the external debt relief of 2005 revealed that the different samples are significantly from the same populations. This significant finding is crucial in applying a structural break test among the different period samples to validly investigate the effect of the 2005 external debt relief in the Nigerian economy.

(ii)The null hypothesis of no structural break between 1980 and 2009 is rejected. The Chow test therefore support our earlier hunch that the external debt–economic growth relation has undergone a structural change in Nigeria over the period 1980–2009 because of the 2005 external debt relief granted to Nigeria. A further verification of the sources of the break through dummy chow test confirmed both intercept and slope coefficient structural break relationship of external debt and economic growth in Nigeria

(iii)The present external debt of Nigeria because of the debt relief has reduced the amount allotted for external debt servicing in the country. This has provided resources to growth enhancing investments in the country.

(iv)the study revealed that the impact of debt relief on economic growth is not in the act of the debt cancellation but the venture resources previously used in servicing the debt is been put into that would reflect on the economic output of such recipient organisation or country.

(v)Hence, from the study, the 2005 debt relief released resources for investment in human capital and this has paid up in the stable economic growth observed in the study.

7. Conclusions

The general observation from the study revealed that Nigeria external debt constitute more of concessional than non-concessional debt. The external debt and external debt service significantly reduced because of the external debt relief in the country. However, financial aid from the UK and other developed countries dropped significantly. Specifically, aid from the UK before the debt relief trend upward but dropped to the zero line soon after the debt relief. Economic growth rate, health, Nigerian exchange rate and education outputs significantly improved during the 2005 debt relief.

A structural break in the relationship between external debt and economic growth in Nigeria was identifies as a result of the external debt relief from both the intercept and slope coefficient, including a significant over all F statistic at 5% level of significant. The study therefore concludes that because of the 2005 external debt relief, the Nigerian economy has undergone a structural change in external debt – economic growth relation through investment in human capital in the country

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