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Has Debt Relief Been Beneficial To The Economic Growth of Africa?

Bachelor thesis in Economics (15 Credits)

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Abstract:

As of today very little has been done when it comes to the subject of empirical studies about debt relief. We write an empirical thesis on how the debt relief granted to some African countries (sample of 10[1]) has been beneficial or not beneficial to their respective economic growth. The countries in our sample are referred to as Highly Indebted Poor Countries (HIPC). We realise that this debt relief granted to these countries in its self cannot lead to economic growth. We carry out our empirical findings from 1993 to 2003 which falls within the debt relief decade.

[1]The 10 nations used in our sample for analysis include: Benin, Burkina Faso, Cameroon, Ethiopia, Ghana, Malawi, Madagascar, Mozambique, Senegal and Tanzania.

Acknowledgement

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Our gratitude also goes to our parents, brothers and sisters. Finally first in our hearts, thanks be to the Alpha and Omega who has given us the strength and breathe of life to pursue this thesis to the end.

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List of Figures, Tables and meaning of abbreviations

WDI = World Development Indicators

SAP = Structural Adjustment Programs

GDF = Global Development Finance

OECD = Organisation for Economic Co-operation and Development

HIPC = Highly Indebted Poor Countries

GDP = Gross Domestic Product

ADI = African Development Indicators

The Problem

The contradictory views of debt relief among researchers have led to great debt among economists. Some researchers say debt relief leads to growth, while others say debt relief independently cannot lead to debt relief.

Our Objective

We carry out an empirical thesis on this subject of debt relief, using models that carry debt indicators and variables that other researchers have used to see if debt relief leads to economic growth. We do not just copy from other authors, but we take a look at the different researches done by them. Then in each of their models we pick one or two variables which they used they have an impact on debt relief. This we do to allow for cross-sectionality, in other words we try to take the best line of fitness from the various researches done by other authors.

Our Method

We use theoretical facts from Macroeconomics and Econometrics to support the findings of our empirical model which is a modification of the model of Clements, Bhattacharya and Nguyen. The empirical model was implemented into EXCEL and Eviews.

Our Limitations

The reason we had to limit the countries and the time span to ten nation and ten years respectively was because debt relief was not offered every year to these nations. Therefore we had to focus on the relief decade (1990-2001), the period when most of these nations received the highest relief. The data for most of these nations when it comes to debt relief was fragmented because of wars and political instabilities that have been going on in most of the countries in Africa. Most of these nations also did not fulfil the requirements for debt relief at the same time. It should be noted that the process of computing the present value of debt relief (*PVDRE)* is very time consuming because the data collection comes from different sources, such as the World Bank, Global development Finance, World debt indicators and the African development indicators. The computation also entails a lot because the amounts of money given to these countries are in millions/ billions of U.S dollars, to handle this effectively for so many countries will prove time consuming taking into consideration the limited amount of time we have to get this job done.

1. Introduction

The issue of debt forgiveness is mainly to reorganise whatever nature of debt is incurred by a debtor, thus reducing their debt weight. There are three main ways debt can be rearranged. These are rescheduling of debt, debt relief and conversion of debt. It would be interesting to define each of these terms separately. Rescheduling of debt is defined as a change in the terms of agreement and conditions surrounding the amount of debt owed (Johansson, 2007). Debt relief is defined as the reduction in the amount of debt obligation (Johansson, 2007). Finally the conversion of debt arises when a creditor exchanges the debt claim for something of economic value other than another debt claim on the same debtor (IMF 2003). Most of the time debt forgiveness comes about as a result of default. This default situation arises when the debtor is not able to meet the commitment of payment. Sometimes this is offered as an aid to debtors with high debt weights

In Section 1 of this thesis, we look at the introduction, a brief definition of debt forgiveness. Next in section 2, we discuss on how this debt burden came about. There after section 3, will be dealing with the issue of debt relief and its possible effects. In section 4, we talk about authors who do not believe in the act that the debt relief granted to these African nations[1] can lead to economic growth. Then we proceed to section 5 to see what happens to growth over the decade period of the relief and the subsequent years. Section 6 deals with the model of Clements, Bhattacharya and Nguyen (2003) which is a major source of reference for us in the creation of our model. In Section 7, we show our empirical model, describing the dependent and independent variables that constitute its makeup. In section 8, we talk about the sources of the data we have used. Section 9, we talk about the main

results and the analysis of our data. Finally in Section 10, we conclude from our findings.

2. How the highly indebted poor countries raised their debt burden.

As we all know, the discussion of highly-indebted poor countries is not something that came up today. Before we start mentioning the reasons this debt burden came about, it is important to state that not only one of the reasons below raised their debt over the years, but a combination of them has been a stimulant to this increase.

A major reason for this is the fact that corruption has been at the top level in these nations. With their governments spending large amounts of money to fuel up the military and police forces as in the case of Haiti (Easterly, 2001). This same situation is a typical reference to most of the HIPC we will be looking at. In Cameroon especially high in takes are done for the military and police forces, and at times most of those admitted into the police force are drop outs from secondary schools and unqualified candidates offer bribes to get into the military.

Another main reason that brought about this debt about in the HIPC was that in 1973 there was an increase in price of fuel by four times in the organization of petroleum exporting countries, these countries now invested the extra funds into some commercial banks. These banks offered loans to the developing nations without properly following up what the loans were to be used for (Caritas International). Also as the oil prices and interest rates from the debts started rising, the exports from the HIPC reduced significantly as a result they were just struggling to cancel out the interest by borrowing even more money (Ricksecker, 2001).

The strict economic program called the Structural Adjustment Programs (SAP) has not also proved to be very effective especially in the Sub-Saharan Africa, with the implementation of this programs the HIPCs will struggle to reschedule their debt coupled with the fact that they have to spend less on health care, education at higher level and social services. These countries also had to devalue the national currency, reduce employment and wages for government workers and encourage privatization of public industries; it reduces the well being of the citizens in general and a main reason for economic and political instability. Devaluation of the national currency whereas the low wages of workers continue to grow over the years, it results in a situation in which citizens can't afford to pay basic needs such as health care, nutrition, education and accommodation facilities. Health care needs to be re-enforced too, in the sense, in most of these poor countries, the government can't still provide clean water and there is always a problem of even distribution. Thus this causes a lot of people to suffer or die from diseases such as cholera and tyhoid.

3. Debt relief and its possible effects

It is absolutely clear that everything has its effects either positively or negatively and debt relief is no exception to this rule. Since it lowers the debt service duties in the future of the debtor country, those who stand for debt relief believe that it can be of help to the debtors through the way it affects the public finances, it will also boost incentive for public policy as well. They also claim this could take away debt overhang.

3.1 How it affects Public Finances

Public spending is one of the main path through which debt relief can have an impact on a nations development. Given that this channel is through foreign tax or alternatively revenue from non-tax (aid from creditors), the government's budget constrain can be reduced if the debt relief is directed towards public spending. A look at the enhanced HIPC, debt relief has a main clause to HIPC to use the resources that have been set aside to develop areas like health and education. But the link between public spending and development has produced a lot of mixed results. Some governments will prefer not to touch nondebt service public spending and direct the funds from debt relief into tax reduction or reduce the accumulation rate of public debt.

3.2 How debt relief affects debt overhang

Debt relief can also help debtors to work on their policies. Most of the HIPC always try to work on their policies because this is one of the requirements for a relief to be granted. A good reply by debtors is their improvement in the policies of the nations. Krugman (1988) illustrated that an increase in the debt service commitments will lower the motivation of the debtors to work on policies that increase revenues. The revenues generated can be used for debt service, because a portion of it is accruing to the nations who offered the relief. In his model he says the available resources which the HIPC have obtained through debt relief is used on debt service and they must work on their policies in order to raise revenues from tax. In this case some kind of shock is realized, before getting to the point of shock and after the debt service is paid for, the debtor must work hard to maximize their expected revenues. As a result of this the debt relief nations want to create a balance between the

marginal disutility with the marginal increase in revenues as a matter of effort. The preceding statement is an issue of probability whether the nation can work out its debt service, because this probability of a nation entirely working out its debt services is inversely proportional to the quantity of debt service to be paid. Kraay and Depetris (2005) added that the debt service provided by the debtors is gotten from efforts. They describe this effort as policy reforms that increase revenues from tax. Consequently debt relief is able to increase the marginal benefit of effort. This can increase the expected value of the debt service the creditor will obtain and on the other hand cause the debtors to increase their efforts.

4. A brief look at other Authors who are against debt relief

4.1 Cax (2005)

She carried out her empirical work to find out if debt relief added a plus to growth. Her results illustrated that the debt relief chokes the course of the available aid in the future. She saw that this also creates an unwanted effect on the makeup of the aid that is available in these nations. Cax also proposed as her own solution that debt relief must not be treated independently of others factors like political and social factors, which for her could be part of the requirements to be met for a HIPC to qualify for debt relief.

4.2 Hepp (2005)

In the same year as Cax above, Hepp took a look at 122 HIPC and non-HIPC. He saw that the debt relief offered to the HIPC was able to take them out of the dilemma of poverty and thus increase growth. But still he saw that the non-HIPC have not really enjoyed from the initiative of debt relief and there is no significant

growth in the HIPC during the years the debt relief has been offered. With these put together he came to a conclusion that debt relief on an average level has not been beneficial to HIPC.

4.3 Lipumban (2004)

His study was focus on sustainable development in relation to debt relief. He wanted to see if this would satisfy the Millennium Development Goals (MDGs). He brought forward his argument that as the debt relief increases it only caused the poor to have a reduction in the global resources that were offered. In the non-HIPC there has been a growth in the economy and also in the political arena. Lipumban concluded that no matter the fact that these HIPC received debt relief, yet their debt service remain relatively high since they are still moving on slowly with the MDGs.

4.4 Easterly (1999)

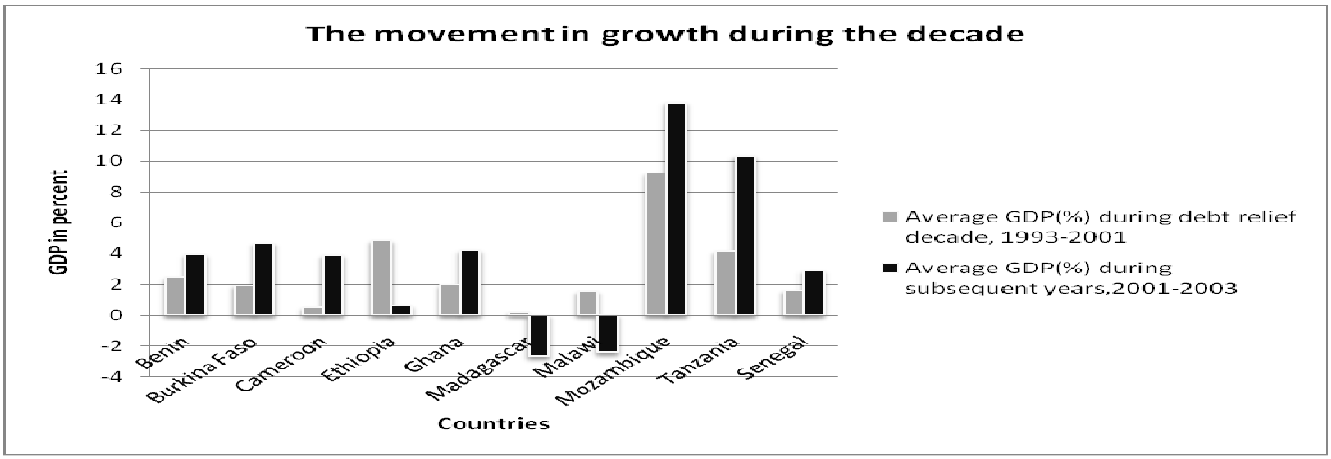
After doing his study on a sample of 41 HIPC, he saw that the debt relief that had been offered to these nations over a period of twenty years has only resulted to them borrowing again and also to deccumulation of asset. His argument was tied to the fact that since these countries know they could borrow again, debt relief gave no incentive to them and they played delaying tactics as to their policy reformation in anticipation of having a better/best agreement. He continues by saying that this degrades the moral standards, because they borrow having in mind that some part of their borrowing will be granted amnesty. He added that the debt relief will only continue to leave these nations in their poor state, if it only continues to encourage them to delay policies that would foster growth. To him he believes debt relief would only make more room for Foreign direct Investments and debtors could come out of private borrowing into borrowing officially, because of this he finalised by

saying debt relief is useless who decide not to make any changes to their preferences in the long run.

5. The Movements in Growth over the Decade

The *debt relief decade* is referred to the period 1990 to 2001 and the *subsequent years* is referred to as the year 2001 to 2004 (Fikru and Getachew, 2008). The debt relief decade stems from the fact that most nations in Sub-Saharan African and the countries we have used as our sample received their highest relief during this period. Therefore it will be worth stating that those countries that had positive movements in their growth rate per capita during the subsequent years (2001-2003). Countries like Benin, Burkina Faso, Cameroon, Ghana, Mozambique, Senegal and Tanzania had a significant rise in their GDP per capita. The other way round Ethiopia which was one of the countries which had the highest relief during this decade (Fikru and Getachew, pg. 12, 2008). Malawi and Madagascar had a sharp fall in their GDP per capita, this then add strength to our argument that debt relief on its own will not bring about growth in a nation.

Figure.1: The movement in growth during the decade



6. The Model of Clements, Bhattacharya and Nguyen (2003)

With reference to previous studies on growth, the standard growth model is formulated with variables that are able to reflect the effect of external debt on growth. Clements, Bhattacharya and Nguyen (2003) used four widely used indicators which constitute the external debt stock. These indicators are the face value of the stock of external debt as a share of the GDP, the net present value of the stock of external debt as a share of GDP, the face value of the stock of external debt as a share of export of goods and services and the net present value of debt as a share of exports of goods and services. As a principle, the net present value of the debt should be able to show the degree of concessionality of loans and because of this principle it can then correctly measure the weight of debt service payments expected in the future. They state that as all four measures have been used in other studies they also apply this in their model[2]. Below is a simplified version of the model presented by these three authors[3]:

$$GRPCY_{it} = \alpha r + \alpha_1 LYRPC(-1)_{it} + \alpha_2 TOTGR_{it} + \alpha_3 POPGR_{it} + \alpha_4 GSEC_{it} + \alpha_5 GROINV_{it} + \alpha_6 FISBAL_{it} + \alpha_7 OPEN_{it} + \alpha_8 DEBTSERX_{it} + \alpha_9 EXTDEBT^3_{it} + \mu_{it} \quad (5.1)$$

Where

GRPCY = growth of real per capita income (GDP)

LYRPC(-1) = real per capita income (GDP per capita, constant 1995 $U.S.)

lagged one period, measured in natural logs

TOTGR = percentage change in the terms of trade

POPGR = population growth rate, in percent

GSEC = gross secondary school enrollment rate

GROINV = gross domestic investment in percent of GDP

FISBAL = central government fiscal balance in percent of GDP

OPEN = openness indicator (exports plus imports as a share of GDP)

DEBTSERX = total debt service in percent of exports of goods and services

EXTDEBT[4] = one of four indicators of the stock of external debt,

measured in natural logs

μ_{it} = error term

In their model they added the lagged per capita income which has also been used in the Barro growth model[5] as an explanatory variable. Their reason for this inclusion is that it is able to test for convergence across the various countries over the time period leading to a common level of real capita per income.

7. Our Empirical Model

In our empirical models which is a modification of the model of Clements, Bhattacharya and Nguyen (2003), we have identified the different countries by subscript *j* and *t* for years. The simplified appearance of our model 1 is shown below:

$$GR_{jt} = \lambda_r + \lambda_1 PG_{jt} + \lambda_2 DX_{jt} + \lambda_3 OP_{jt} + \lambda_4 PVDRE_{jt} + \lambda_5 GDI_{jt} + \psi_{jt}$$

Where

GR = Growth rate of real GDP (GDP per capita growth)

PG = Population growth (in percent)

DX= Total external debt as a ratio of export of goods and services (in percent)

OP = Openness (sum of exports and Imports, a percentage of the GDP)

PVDRE = Present value of "debt relief" (a percentage of the GDP)

GDI = Gross Domestic Investment (a percentage of GDP)

ψ_{jt} = error term

We avoid including the lagged per capita income as our independent variable in our model. We decided to take another turn by choosing other independent variables that could be of interest as well in the study of debt relief.

Another reason is because of variation, we want to see what happens if we deviate from this, just like some other authors have focused on variables like health, poverty reduction and education (Wagman, 2008 and Chauvin and Kraay, 2007). We used data for the variable DX instead of debt service to exports ratio because of the existence of only fragmented data, which we could only find data from 1998 to 2003.

Model 2 is very similar to model 1; the only difference is the dummy variables that have been added for the different countries. Dummy variables are variables that take value 1 and 0. The main reason we used these two models is to see whether the introduction of dummy variables and the combination of the different countries into one sample to perform the regression will lead to any significant impact of debt relief on growth**.** We have left out Malawi, meaning we have *n*-1 variables, where *n* represents the total number of countries. The reason we put aside Malawi is because in our regression from Model 1, it showed a very high negative significance. **Model 2** is shown below:

$$GR_t = \lambda_1 + \lambda_2 PG_{jt} + \lambda_3 DX_{jt} + \lambda_4 OP_{jt} + \lambda_5 PVDRE_{jt} + \lambda_6 GDI_{jt} + \lambda_7 Cameroon_{jt} + \lambda_8 Benin_{jt} + \lambda_9 Ethiopia_{jt} + \lambda_{10} BurkinaFaso_{jt} + \lambda_{11} Ghana_{jt} + \lambda_{12} Madagascar_{jt} + \lambda_{13} Mozambique_{jt} + \lambda_{14} Senegal_{jt} + \lambda_{15} Tanzania_{jt} + \psi_{jt}$$

Where

GR = Growth rate of real GDP (GDP per capita growth)

PG = Population growth (in percent)

[2,3]Clements, Bhattacharya and Nguyen (2003)

[4]This analysis assumes that the capital stock increases as more debt is incurred, provided that at least part of the debt is used to finance investment. Thus, as external debt increases, so does the capacity to repay, but subject to diminishing returns to capital (Clements, Bhattacharya and Nguyen, 2003).

DX= Total external debt as a ratio of export of goods and services (in percent)

OP = Openness (sum of exports and Imports, a percentage of the GDP)

PVDRE = Present value of "debt relief" (a percentage of the GDP)

GDI = Gross Domestic Investment (a percentage of GDP)

Cameroon = 1, if the country is Cameroon and 0, otherwise

Benin = 1, if the country is Benin and 0, otherwise

Burkina Faso = 1, if the country is Burkina Faso and 0, otherwise

Ethiopia = 1, if the country is Ethiopia and 0, otherwise

Ghana = 1, if the country is Ghana and 0, otherwise

Madagascar = 1, if the country is Madagascar and 0, otherwise

Mozambique = 1, if the country is Mozambique and 0, otherwise

Senegal = 1, if the country is Senegal and 0, otherwise

Tanzania = 1, if the country is Tanzania and 0, otherwise

ψ_{jt} = error term

8) Data Sources

We use Eviews as our statistical tool for this thesis. Sources from where we got our data are shown in **Table 1: Data sources** below:

Variables	**Data Source**
Growth rate of real GDP	GDF &WDI
Population growth	GDF & WDI
Total External debt ratio of export of goods and services	GDF & WDI
Openness	GDF & WDI
Present Value of "Debt relief"	ADI & GDF 1999, 2003, 2005

Debt Stock Reduction	GDF 1999, 2003 & 2005
Concessionality rate	GDF 1999, 2003 & 2005
Total amount of debt rescheduled	GDF 1999, 2003 & 2005
Paris Club terms	GDF 1999, 2003 & 2005

Due to the problem we had with missing data for the year 2002 and 2003, we had to extrapolate the data for Benin and Cameroon using the statistical software EXCEL and then import the whole data into Eviews (statistical software). All the other countries in our sample provided data for the variable DX.

8a) How to Compute the Present Value of Debt Relief

According to the work published by Chauvin and Kraay (2005) and Johansson (2007), we were able to calculate the present value of debt relief. It is important to mention that if we would have used the nominal value of debt relief, the variable that make up the nominal value of debt relief are the Debt stock reduction, Interest forgiven and Debt forgiveness.

Assumptions:

- The concessionality rate of the debt outstanding is equal to the concessionality rate of the debt forgiven.
- With respect to the countries that signed the Paris Club agreement, half of the total amount of the debt rescheduled is on non-concessional terms. Therefore the left over half is considered under the terms of the Paris Club.
- If there is a country that is not under the Paris Club agreement, the total amount of its debt rescheduled is non-concessional.

At this point we can now use the formula below to calculate the present value of debt relief *(PVDRE)* which is given by:

Step 1:

*PVDRE (in millions U.S dollars) = (tadre*conra*pacte*0.5) + (desre*conra)*

Step 2:

PVDRE (% of GDP) = PVDRE/GDP, real constant 1995 & 2000 U.S. dollars

Step 3:

PVDRE(% of GDP) = PVDRE(% of GDP)/1.0×10^{15}

We divided our *PVDRE(% of GDP)/1.0×10*^{15} to add mathematical significance; the intuition that this may have adverse effect in the regression is not true, because we have tried this process and it added no change to the regression.

Where

PVDRE = Present Value of "Debt Relief"(in millions of U.S dollars)

desre = Debt Stock Reduction(in millions of U.S dollars)

conra = Concessionality rate(in millions of U.S dollars)

tadre = Total amount of debt rescheduled(in millions U.S dollars)

pacte = Paris Club terms (in percent)

8b) Reasons for Using the Present Value over Nominal Value of Debt Relief.

Chauvin and Kraay (2005) gave two reasons as to why the nominal values of debt relief from the World Bank data set may not be the best to use directly without computing them into present values in the study of debt relief. The reasons are:

1) The data are not able to portray the decrease in the present value of debt outstanding to debt relief ratio, but it rather only evaluates the face value of debt relief. Therefore a relief on the nominal amount of concessional debt that is high and has little present value of future debt service commitments should have a lesser effect on the receiving country than a relief on an equivalent nominal amount of non-

concessional debt. Because of the extensive variations that exist across the different countries it is vital for this demarcation to be pointed out.

2) Secondly, the data of World Bank do not sufficiently depict the variations in the present value of debt as a result of concessional rescheduling with respect to the debt relief issued. The reason for this is that the data lays emphasis on the flow decrease in debt service in a particular year with respect to old rescheduling, instead of calculating the decrease in the present value of future debt service with respect to a rescheduling.

9) Main Results and Data Analysis

9a) Testing for multicollinearity

For the situation of **model 2**, there exist no multicollinearity across the variables since after lagging at 17; the R-squared was just 36.1% which is not equal to or greater than 80%. A value 80% or more for R-squared indicates serious case of multicollinearity. But for the case of **model 1**, there is the presence of a very serious case of multicollinearity. The r-squared value being equal to 99.9% for the case of Benin as well as the other nine countries and this could be seen as early as lag 4 (see Appendix C). It is for this reason that we decided to use LAG variables to perform the regression again with the results shown in table 2 to solve this problem. The LAG variables are the same to that used in the model of Clements, Bhattacharya and Nguyen (pg. 13). The only difference is the notation we have used.

Table 9.1: Summary of Breusch-Godfrey serial correlation LM test, Benin

Variable	RESID(-1)	RESID(-2)	RESID(-3)	RESID(-4)	R-squared
coefficient	-4.6719	-3.0720	-0.5332	-1.2652	0.9996

9b) Test for White Heteroskedasticity

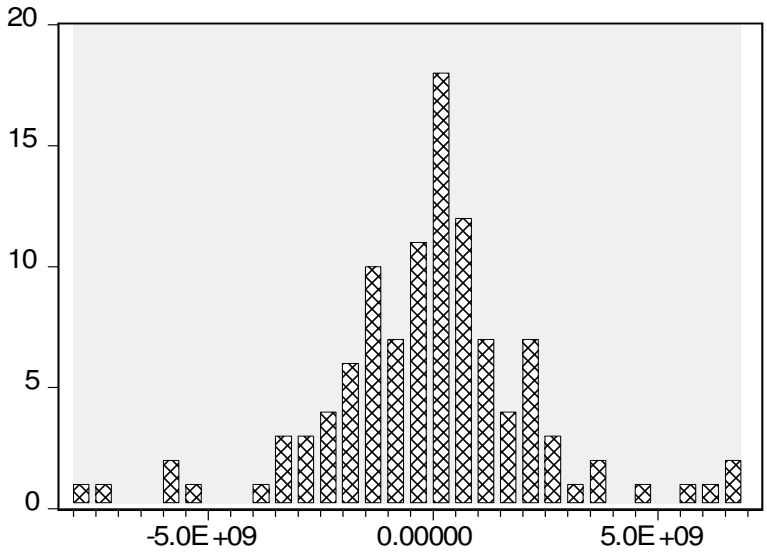
Table 9.2: Summary of White Heteroskedasticity test

Variable	C	MAD	MOZ	OP	OP^2
Coefficient	2.02E+19	-1.25E+19	-1.47E+19	-4.29E+08	-0.0048011
Variable	**PG**	**PG^2**	**PVDRE**	**PVDRE^2**	**GHA**
Coefficient	3.48E+09	-1.306113	2.68E+09	-0.451787	-1.51E+19
Variable	**GDI**	**GDI^2**	**ETIO**	**DX**	**DX^2**
Coefficient	3.29E+08	-0.208359	-1.79E+18	8.23E+09	-3.479921
Variable	**CMR**	**BF**	**SEN**	**TAN**	
Coefficient	-8.75E+18	-1.81E+19	-1.57E+19	-1.31E+19	

Our $N \times R^2$ = 109 $\times$0.270532 = 24.4880, this has asymptotically, a chi-square distribution with 109df (degree of freedom). Our 5 percent critical value is less than the value at the chosen level of significance, therefore there exist no heteroskedasticity.

9c) Testing for Normality

Figure 9c: Histogram of Normality test



Series: Residuals	
Sample 1 109	
Observations 109	
Mean	1.43E-07
Median	94084318
Maximum	6.99E+09
Minimum	-7.99E+09
Std. Dev.	2.47E+09
Skewness	-0.094787
Kurtosis	4.800712
Jarque-Bera	14.88987
Probability	0.000584

It seems to us that our error terms satisfy a normal distribution, since in this case we take into consideration that our sample is large (109), eventhough the probability is 0.06 in order to get a Jarque-Bera of 14.88987.

9d) Testing for Autocorrelation

To test to see if any autocorrelation exist we perform a Breusch-Godfrey Serial Correlation LM test using Eviews. We take a look at the Durbin-Watson statistics we have a reasonable of 2.45(see appendix c) which signifies no autocorrelation exist. The range where no autocorrelation should exist is from 1.75 to 2.5.

9e) Analysis

After performing our regression in EXCEL, we still decided to run the regression again in Eviews to see if there are any changes. The main results of our regression are shown in the tables below:

Table 2: Regression results for Model 1 using Lagged variables

	LAGPG	***LAGDX***	***LAGOP***	***LAGPVDRE***	***LAGGDI***
Benin	-0.3469	0.5711	0.3046	0.0978	-1.1165
	(-0.7635)	(1.1070)	(1.1864)	(0.2680)	(-0.7006)
Burkina Faso	-0.4574	-1717	-7.1937	0.1136	4.5309
	(-0.4125)	(-0.4664)	(-1.0276)	(0.1295)	(0.7962)
Cameroon	0.9218	0.1912	0.3244	0.6314	10.9104
	(0.5988)	(0.1180)	(0.4003)	(1.0822)	(0.9208)
Ethiopia	-0.8739	-5805	-0.7995	0.5264	2.0472
	(-0.5166)	(-0.9105)	(-0.6548)	(0.8052)	(0.2022)
Ghana	-0.5577	-9013	0.1328	-0.0240	-0.4942
	(-2.2309)	(-2.2969)	(1.3342)	(-0.0937)	(-1.5293)

Madagascar	-0.2651	2563	-0.1923	0.4038	1.6937
	(-0.4178)	(2.0425)	(-0.5521)	(1.3948)	(0.8848)
Malawi	-4.7189	-4255	-2.1781	-7.6585	-0.1241
	(-2.2421)	(-1.0710)	(-4.5634)	(-4.4934)	(-0.7681)
Mozambique	0.6340	1714	-1.4307	0.4765	-1.5590
	(0.4047)	(0.5333)	(-1.1846)	(0.9069)	(-1.2918)
Senegal	-0.4845	-3902	0.1484	0.1860	1.6234
	(-0.6897)	(-0.5221)	(0.5969)	(0.7613)	(0.4450)
Tanzania	-0.9639	-8399	0.5098	0.4820	3.3375
	(-1.7060)	(-2.1060)	(1.5513)	(1.5519)	(2.6179)

Table 3: regression results of Model 2

PG	***DX***	***OP***	***PVDRE***	***GDI***
0.0407	0.5253	-0.0098	0.1496	-0.0443
(0.1603)	(1.0489)	(-0.0683)	(1.1938)	(-0.2041)

Benin	***Burkina Faso***	***Cameroon***	***Ethiopia***	***Ghana***
8.03×10^{8}	6.65×10^{8}	-1.10×10^{9}	1.26×10^{8}	8.42×10^{8}
(0.6185)	(0.5260)	(-0.7934)	(0.0965)	(0.7094)

Madagascar	***Mozambique***	***Senegal***	***Tanzania***
-6.39×10^{8}	-5.53×10^{8}	5.46×10^{8}	2.25×10^{9}
(-0.5334)	(-0.4314)	(0.4471)	(1.7526)

Significant at 5%; t-values are in parentheses; coefficients are shown in gray

According to the regression (table 2) of Benin, Burkina Faso, Cameroon, Ethiopia, Ghana, Madagascar, Malawi, Mozambique, Senegal and Tanzania there is no significant relationship between the debt relief *(PVDRE)* and the growth. In

addition to this the other variables like population growth (*PG*) except in the case of Ghana, openness (*OP*), total external debt (*DX*) except in the case of Madagascar and domestic investment (*GDI*) show no significant relationship with the growth rate. To add more light the main variable which is debt relief together with the other independent variables with the exception of external debt shows no significant relationship to growth rate. We believe other economic factors might have led to this significant relationship. In the situation of Tanzania the external debt and the domestic investment were the only variables that had a positive effect on growth rate. Our empirical investigation confirms the findings of Patillon (2004). The debt relief gives no significant relationship in relation to economic growth. The conflicting empirical results which in some cases show positive effects of debt relief, external debt, population growth, openness and domestic investments show that other channels might have been responsible for growth in some of these nations. We believe the insignificant effect of external debt with growth might be due to the fact that it affects growth mostly through investments (Clements, Bhattacharya and Nguyen, 2004).

For the second model, there exist no positive relationship between the debt relief (*PVDRE*) and the growth rate (*GR*). There is also no positive effect of growth rate with the dummy variables such as *Cameroon, Benin, Burkina Faso, Ghana, Ethiopia, Madagascar, Mozambique, Senegal* and *Tanzania.*

10. Conclusions

With the initiation of the Multilateral Debt Relief Initiative (MDRI) which was introduced in 2006, whose objective was to provide these HIPC countries with more debt relief. From our empirical study the MDRI will still not be an effective way of taking these countries out of the poverty dilemma. Especially with reference to our case study Cameroon which shows fall in growth rate during the relief decade but yet showed an increase in the subsequent years. Disappointingly, we say that the growth rate might have been caused by other economic factors, which has to be detected through more research on debt relief. Eventhough, we are aware of the fact that high external debt will reduce the growth of a country, reducing the external debt as we have seen from our empirical analysis will not necessarily lead to growth. As we saw from the empirical results that it was only Malawi which had no significant effect of debt relief with growth, yet this nation was one of the lowest recipients of debt relief in the decade period. Giving us a signal that debt relief as an independent entity will not foster any growth. Countries like Ethiopia, Mozambique and Tanzania were one of the highest receivers of debt relief, showed no significant results between debt relief and growth rate. The previous statement tells us again that debt relief in its self cannot lead to growth and even if some growth is experienced it might be due to other factors like good governance, political stability, unemployment, etc. Finally from our study we conclude that debt relief does not propagate the economic growth or development in a country. It must be put together with other factors like aid, good governance, technological education at the university level(not secondary education) and health improvement to bring about growth.

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APPENDIX A: REGRESSION OUTPUT

a) Table 4- Benin

Dependent Variable: LAGGR
Method: Least Squares
Date: 05/20/09 Time: 17:29
Sample(adjusted): 1994 2003
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.11E+09	3.17E+09	1.298510	0.2639
LAGOP	0.304586	0.256729	1.186409	0.3011
LAGPG	-0.346858	0.454319	-0.763466	0.4877
LAGPVDRE	0.097775	0.364805	0.268019	0.8019
LAGGDI	-1.116496	1.593599	-0.700613	0.5222
LAGDX	0.571121	0.515905	1.107028	0.3304

R-squared	0.571703	Mean dependent var	2.15E+09
Adjusted R-squared	0.036332	S.D. dependent var	1.15E+09
S.E. of regression	1.13E+09	Akaike info criterion	44.81921
Sum squared resid	5.14E+18	Schwarz criterion	45.00076
Log likelihood	-218.0961	F-statistic	1.067864
Durbin-Watson stat	2.022294	Prob(F-statistic)	0.488256

b) Table 5 - Burkina Faso

Dependent Variable: LAGGR
Method: Least Squares
Date: 05/20/09 Time: 18:50
Sample(adjusted): 1994 2003
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.40E+10	2.23E+10	1.075444	0.3427
LAGOP	-7.193735	7.000772	-1.027563	0.3622
LAGPG	-0.457356	1.108839	-0.412464	0.7011
LAGPVDRE	0.113569	0.876812	0.129525	0.9032
LAGGDI	4.530933	5.690868	0.796176	0.4705
LAGDX	-17174870	23010125	-0.746405	0.4969

R-squared	0.220452	Mean dependent var	1.56E+09
Adjusted R-squared	-0.753982	S.D. dependent var	2.27E+09
S.E. of regression	3.01E+09	Akaike info criterion	46.77127
Sum squared resid	3.62E+19	Schwarz criterion	46.95282
Log likelihood	-227.8563	F-statistic	0.226236
Durbin-Watson stat	2.948077	Prob(F-statistic)	0.932711

c) Table 6 – Cameroon

Dependent Variable: LAGGR
Method: Least Squares
Date: 05/20/09 Time: 14:32
Sample(adjusted): 1994 2003
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.32E+10	1.86E+10	-1.247764	0.2802

LAGPVDRE	0.631359	0.583407	1.082195	0.3400
LAGPG	0.921815	1.539541	0.598759	0.5816
LAGOP	0.324409	0.810412	0.400301	0.7094
LAGGDI	10.91039	11.84835	0.920836	0.4092
LAGDX	0.191274	1.607477	0.118990	0.9110

R-squared	0.527457	Mean dependent var	6.11E+08
Adjusted R-squared	-0.063222	S.D. dependent var	3.28E+09
S.E. of regression	3.39E+09	Akaike info criterion	47.00787
Sum squared resid	4.59E+19	Schwarz criterion	47.18942
Log likelihood	-229.0393	F-statistic	0.892968
Durbin-Watson stat	1.635426	Prob(F-statistic)	0.559248

b) Table 7 – Ethiopia

Dependent Variable: LAGGR
Method: Least Squares
Date: 05/21/09 Time: 18:27
Sample(adjusted): 1994 2003
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.45E+09	1.62E+10	0.397244	0.7115
LAGOP	-0.799481	1.220939	-0.654808	0.5483
LAGPG	-0.873860	1.691475	-0.516626	0.6327
LAGPVDRE	0.526372	0.653743	0.805166	0.4659
LAGGDI	2.047223	10.12504	0.202194	0.8496
LAGDX	-580474.7	637516.9	-0.910524	0.4141

R-squared	0.373353	Mean dependent var	2.25E+09
Adjusted R-squared	-0.409956	S.D. dependent var	3.40E+09
S.E. of regression	4.04E+09	Akaike info criterion	47.35849
Sum squared resid	6.51E+19	Schwarz criterion	47.54004
Log likelihood	-230.7924	F-statistic	0.476635
Durbin-Watson stat	1.936708	Prob(F-statistic)	0.781395

d) Table 8 – Ghana

Dependent Variable: LAGGR
Method: Least Squares
Date: 05/21/09 Time: 18:45
Sample(adjusted): 1994 2003
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.79E+09	1.62E+09	3.570826	0.0234
LAGOP	0.132810	0.099545	1.334171	0.2530
LAGPG	-0.557701	0.249991	-2.230882	0.0895
LAGPVDRE	-0.024024	0.256261	-0.093749	0.9298
LAGGDI	-0.494195	0.323141	-1.529348	0.2009
LAGDX	-901264.3	392381.4	-2.296909	0.0832

R-squared	0.811726	Mean dependent var	1.70E+09
Adjusted R-squared	0.576383	S.D. dependent var	8.84E+08
S.E. of regression	5.76E+08	Akaike info criterion	43.46366
Sum squared resid	1.33E+18	Schwarz criterion	43.64521
Log likelihood	-211.3183	F-statistic	3.449120
Durbin-Watson stat	2.283254	Prob(F-statistic)	0.126942

e) Table 9 – Madagascar

Dependent Variable: LAGGR
Method: Least Squares
Date: 05/21/09 Time: 18:30
Sample(adjusted): 1994 2003
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.68E+09	2.46E+09	-1.090457	0.3368
LAGOP	-0.191254	0.346401	-0.552119	0.6103
LAGPG	-0.265084	0.634453	-0.417815	0.6975
LAGPVDRE	0.403756	0.289470	1.394808	0.2355
LAGGDI	1.693713	1.914154	0.884836	0.4262
LAGDX	256320.3	125492.8	2.042509	0.1106

R-squared	0.653737	Mean dependent var	-12050498
Adjusted R-squared	0.220908	S.D. dependent var	1.63E+09
S.E. of regression	1.44E+09	Akaike info criterion	45.29386
Sum squared resid	8.27E+18	Schwarz criterion	45.47541
Log likelihood	-220.4693	F-statistic	1.510381
Durbin-Watson stat	1.989227	Prob(F-statistic)	0.355327

f) Table 10 – Malawi

Dependent Variable: LAGGR
Method: Least Squares
Date: 05/20/09 Time: 14:25
Sample(adjusted): 1994 2003
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.80E+10	7.08E+09	3.960871	0.0167
LAGPVDRE	-7.658511	1.704386	-4.493413	0.0109
LAGPG	-4.718938	2.104720	-2.242074	0.0884
LAGOP	-2.178091	0.477296	-4.563401	0.0103
LAGGDI	-0.124074	0.161536	-0.768089	0.4853
LAGDX	-425519.5	397292.5	-1.071049	0.3445

R-squared	0.925498	Mean dependent var	9.10E+08
Adjusted R-squared	0.832369	S.D. dependent var	3.88E+09
S.E. of regression	1.59E+09	Akaike info criterion	45.49163
Sum squared resid	1.01E+19	Schwarz criterion	45.67318
Log likelihood	-221.4581	F-statistic	9.937897
Durbin-Watson stat	1.877787	Prob(F-statistic)	0.022500

h) Table 11 – Mozambique

Dependent Variable: LAGGR
Method: Least Squares

Date: 05/20/09 Time: 17:51
Sample(adjusted): 1994 2003
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.00E+09	7.71E+09	0.777617	0.4802
LAGOP	-1.430740	1.207759	-1.184623	0.3017
LAGPG	0.633958	1.566663	0.404655	0.7064
LAGPVDRE	0.476514	0.525410	0.906938	0.4157
LAGGDI	-1.558988	1.206815	-1.291820	0.2660
LAGDX	171476.4	321518.1	0.533334	0.6221

R-squared	0.412900	Mean dependent var	8.95E+08
Adjusted R-squared	-0.320974	S.D. dependent var	2.37E+09
S.E. of regression	2.72E+09	Akaike info criterion	46.56975
Sum squared resid	2.96E+19	Schwarz criterion	46.75130
Log likelihood	-226.8487	F-statistic	0.562631
Durbin-Watson stat	2.512992	Prob(F-statistic)	0.729658

i) Table 12 – Senegal

Dependent Variable: LAGGR
Method: Least Squares
Date: 05/20/09 Time: 17:38
Sample(adjusted): 1994 2003
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.95E+08	7.60E+09	-0.091492	0.9315
LAGOP	0.148434	0.248658	0.596942	0.5827
LAGPG	-0.484530	0.702535	-0.689689	0.5283
LAGPVDRE	0.185988	0.244291	0.761335	0.4889
LAGGDI	1.623422	3.648009	0.445016	0.6793
LAGDX	-390232.0	747340.4	-0.522161	0.6291

R-squared	0.423884	Mean dependent var	1.59E+09
Adjusted R-squared	-0.296260	S.D. dependent var	1.54E+09
S.E. of regression	1.75E+09	Akaike info criterion	45.68865
Sum squared resid	1.23E+19	Schwarz criterion	45.87020
Log likelihood	-222.4432	F-statistic	0.588610
Durbin-Watson stat	1.710437	Prob(F-statistic)	0.714530

j) Table 13 – Tanzania

Dependent Variable: LAGGR
Method: Least Squares
Date: 05/20/09 Time: 17:41
Sample(adjusted): 1994 2003
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.27E+08	2.96E+09	0.110472	0.9174
LAGOP	0.509821	0.328639	1.551310	0.1958
LAGPG	-0.963888	0.565004	-1.705984	0.1632
LAGPVDRE	0.482020	0.310609	1.551853	0.1956
LAGGDI	3.337469	1.274879	2.617872	0.0589
LAGDX	-839921.0	398811.5	-2.106060	0.1029

R-squared	0.846488	Mean dependent var	3.25E+09
Adjusted R-squared	0.654597	S.D. dependent var	2.35E+09
S.E. of regression	1.38E+09	Akaike info criterion	45.21798

Sum squared resid	7.66E+18	Schwarz criterion	45.39953
Log likelihood	-220.0899	F-statistic	4.411310
Durbin-Watson stat	2.271470	Prob(F-statistic)	0.087739

k) Table 14 – Model 2

Dependent Variable: GR
Method: Least Squares
Date: 05/20/09 Time: 17:03
Sample: 1 109
Included observations: 109

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.01E+09	1.46E+09	0.692594	0.4903
MAD	-6.39E+08	1.28E+09	-0.500362	0.6180
MOZ	-5.53E+08	1.28E+09	-0.431411	0.6672
OP	-0.009815	0.143798	-0.068254	0.9457
PG	0.040666	0.253736	0.160271	0.8730
PVDRE	0.149579	0.125292	1.193845	0.2355
GHA	8.42E+08	1.19E+09	0.709365	0.4799
GDI	-0.044268	0.216877	-0.204113	0.8387
ETIO	1.26E+08	1.31E+09	0.096509	0.9233
DX	0.525270	0.500789	1.048886	0.2969
CMR	-1.10E+09	1.39E+09	-0.793391	0.4295
BF	6.65E+08	1.26E+09	0.525971	0.6001
BEN	8.03E+08	1.30E+09	0.618494	0.5377
SEN	5.46E+08	1.22E+09	0.447131	0.6558
TAN	2.25E+09	1.28E+09	1.752606	0.0829

R-squared	0.125806	Mean dependent var	1.59E+09
Adjusted R-squared	-0.004393	S.D. dependent var	2.65E+09
S.E. of regression	2.65E+09	Akaike info criterion	46.36202
Sum squared resid	6.61E+20	Schwarz criterion	46.73239
Log likelihood	-2511.730	F-statistic	0.966260
Durbin-Watson stat	1.832645	Prob(F-statistic)	0.493326

APPENDIX B: WHITE HETEROSKEDASCITY TEST

White Heteroskedasticity Test:

F-statistic	1.737199	Probability	0.044233
Obs*R-squared	29.48803	Probability	0.058686

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/04/09 Time: 14:56
Sample: 1 109
Included observations: 109

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.02E+19	6.40E+18	3.163483	0.0021
MAD	-1.25E+19	5.90E+18	-2.120261	0.0368
MOZ	-1.47E+19	5.65E+18	-2.592763	0.0111
OP	-4.29E+08	1.83E+09	-0.233657	0.8158
OP^2	-0.048011	0.220328	-0.217905	0.8280
PG	3.48E+09	1.98E+09	1.761763	0.0815

PG^2	-1.306113	0.746904	-1.748701	0.0838
PVDRE	2.68E+09	1.50E+09	1.783672	0.0779
PVDRE^2	-0.451787	0.193574	-2.333920	0.0219
GHA	-1.51E+19	5.36E+18	-2.815954	0.0060
GDI	3.29E+08	2.49E+09	0.131990	0.8953
GDI^2	-0.208359	0.258040	-0.807467	0.4216
ETIO	-1.79E+18	6.26E+18	-0.286483	0.7752
DX	8.23E+09	1.50E+10	0.547488	0.5854
DX^2	-3.479921	4.854228	-0.716884	0.4753
CMR	-8.75E+18	6.39E+18	-1.370309	0.1740
BF	-1.46E+19	6.24E+18	-2.345223	0.0212
BEN	-1.81E+19	6.37E+18	-2.839628	0.0056
SEN	-1.57E+19	5.49E+18	-2.867027	0.0052
TAN	-1.31E+19	5.91E+18	-2.219103	0.0290

R-squared	0.270532	Mean dependent var	6.06E+18
Adjusted R-squared	0.114803	S.D. dependent var	1.19E+19
S.E. of regression	1.12E+19	Akaike info criterion	90.72242
Sum squared resid	1.11E+40	Schwarz criterion	91.21625
Log likelihood	-4924.372	F-statistic	1.737199
Durbin-Watson stat	2.134508	Prob(F-statistic)	0.044233

APPENDIX C: Breusch-Godfrey Serial Correlation LM test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	597.4398	Probability	0.030673
Obs*R-squared	10.99540	Probability	0.026616

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/04/09 Time: 17:15
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.53E+09	1.35E+08	18.78703	0.0339
PVDRE	0.328166	0.028537	11.49975	0.0552
PG	-1.195253	0.034451	-34.69468	0.0183
OP	2.042951	0.050011	40.85026	0.0156
GDI	-3.269130	0.110845	-29.49284	0.0216
DX	-0.049127	0.026874	-1.828016	0.3187
RESID(-1)	-4.671939	0.126120	-37.04349	0.0172
RESID(-2)	-3.072055	0.069195	-44.39701	0.0143
RESID(-3)	-0.533218	0.034191	-15.59511	0.0408
RESID(-4)	-1.265186	0.051634	-24.50303	0.0260

R-squared	0.999582	Mean dependent var	-3.31E-07
Adjusted R-squared	0.995817	S.D. dependent var	7.53E+08
S.E. of regression	48706844	Akaike info criterion	37.66082
Sum squared resid	2.37E+15	Schwarz criterion	38.02255
Log likelihood	-197.1345	F-statistic	265.5288
Durbin-Watson stat	2.451894	Prob(F-statistic)	0.047593