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The Impact of External Debt on Economic Growth in Highly Indebted Developing Countries

A Thesis

Presented to the

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In Partial Fulfillment

Of the requirements for the Degree

MASTER OF ARTS

IN

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By

Asaad Najib

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The Impact of External Debt on Economic Growth in Highly Indebted Developing Countries

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University of Nebraska at Omaha, 2005

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Abstract

This study investigates the relationship between external debt and the growth rate of GDP per capita based on a total sample of 57 countries consisting of two different groups. The first group is classified as Highly Indebted Poor Countries (HIPCs) because they qualify for HIPC debt relief initiative. The second group includes some middle income developing countries not qualifying for HIPC debt relief initiative. The study uses panel data with different methods of estimations. The results of this study indicate that the coefficients of debt variables were strongly significant and negatively related to economic growth, not only in the first group but in the second group as well.

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Introduction

This study investigates the impact of external debt on economic growth in two groups of highly indebted developing countries. In the mid -1980s, the worsening financial situation in a number of developing countries reached a critical peak, when highly indebted poor countries were unable to continue to pay their debt. The developing countries debt rose from $500 billion in 1980 to $1 trillion in 1986 and approximately $2 trillion in 2000 (IMF, 2001). This debt crisis is indicated by a number of statistical debt measures. The developing countries' ratio of debt to debt servicing abilities worsened as debts increased, particularly after 1973-74. As Table 1A shows, the ratio of debt to GNP in Least Developing Countries (LDC) increased from 14 percent in 1970 to 39.6 percent in 1987 and 37.7 percent in 1995. In Middle Income Countries the ratio was 39.2 percent in 1987 and declined to 36.5 percent in 1995. In Severely Middle Income Countries (SMIC), the ratio reached the highest in 1986, 62.3 percent, and decreased to 39.3 in 1995. Table 2A provides the ratio of debt services to exports, rising from 13.2 percent in 1982 to 23.7 in 1987 and after that declining to 18.3 percent in 1990. The ratio reached 16.3 in 1995.

The factors behind the growth of foreign debt in developing countries are varied and include a combination of internal and external factors. A number of studies in the literature, for example, William R. Cline (1984), Milton A. Iyoha (1999), and Haji H. H. Semboja (1998) have summarized these factors to include both demand and supply sides. On the demand side, there was a vital need in oil-importing developing countries for foreign exchange in order to finance balance of payment deficits and public projects

following the increase of oil price in the 1970s. These are joined with other domestic factors, such as high trade and budget deficits, low savings rates, the lack of sensible debt management, and poor project selection. On the supply side, the oil price shocks, high interest rates, and recessionary conditions in the developed countries forced the international banks to recycles their huge petro-dollar deposits through increasing loans to developing countries.

Because of low levels of external demand associated with world recession and reductions in international lending, the average growth rates of non-oil developing countries fell from 5 percent in 1973-1980 to 2.4 percent in 1982 and to only 0.9 percent in 1982 (Cline, 1984) Cline argued that debt problems not only effected growth in developing countries and created unstable international financial systems, but also contributed to reduced exports and jobs in industrial countries as developing countries have retrenched on their imports. From 1981 to 1982 exports of OPEC (Organization for Economic Cooperation and Development) countries to non-OPEC countries declined by $14 billion in real terms, an amount corresponding to approximately 350,000 jobs.[1] US exports to Latin American countries fell by $24 billion from 1981 to 1983, costing approximately 400,000 jobs (Dhar, 1983; Cline, 1984).

The discussion of the relationship between external debt and economic growth in the literature has two trends. The first trend is represented by Sachs and Kenen (1990). According to their view, the external debt overhang is a main cause of stunted economic growth in heavily indebted countries. For this reason, debt reduction and international

[1] IMF, International financial Statistics, June 1983 p. 56; OECD, Monthly Statistics of Foreign Trade, June 1983, PP 37, 42, 49. William R.

debt relief program facilities are needed. The beginning of the debate about the effect of public external debt on economic growth is from Paul Krugman (1987). According to Krugman, high governmental debt services payments require high tax rates which in turn discourage capital formation and repatriation of flight capital. The heavy debt service payments have put great pressure on budgets, leading to rising fiscal deficits in the highly indebted countries. Taxes must be increased to raise the resources to service the debt. One of the consequences of the anticipated tax burden is to depress private investment leading to reduced economic growth, the "debt overhang" effect. High debt service payments will lead to reduced public investment and also reduced public spending on health and education, which leads to negative impacts on economic growth. The diversion of resources from public investment to debt service payments is related to the "crowding out" hypothesis.

The second view is represented by Bulow and Rogoff (1990), who argue that the external debt of developing countries is a sign of poor economic management and performance rather than a primary cause of stifled growth. Bad domestic policy management, such as overvalued exchange rates, disadvantages the private sector in earning foreign exchange. Fiscal deficits and fear of inflation and taxes to finance actual and anticipated deficits scare away private investment.

Since the crisis of 1982 various plans and initiatives have been presented to provide debt relief to the most indebted developing countries. An example known as traditional debt relief, the Brady plan, encouraged the rescheduling of loans by converting

them into bonds that could be sold in the secondary market giving debtors more time to pay (Vasquez 1996).

Progress has been made on bilateral debt through the Paris Club, an informal grouping of the Export Credit Department of the main creditor countries. At first Paris Club creditors agreed to reduce low-income countries' debt, the net present value of rescheduled amount, by one third (Toronto Terms). The degree of debt forgiveness was increased in several steps. By the early and mid-1990s, under the "London Terms" and "Naples terms," Paris Club creditors were forgiving 50 percent and 67 percent, respectively, of the low income countries' eligible debts. However, the external debt situation for a number of low income countries was still extremely difficult, leading the International Monetary Fund and International Bank to provide the most comprehensive effort, known as the HIPC (Highly Indebted Poor Countries), initiative in 1996.

The aim of the HIPC initiative was to provide special assistance and a broad framework of debt relief to a number of very poor countries for whom traditional debt relief was not enough to bring down their debt burden to a sustainable level. At the same time the countries which qualify for HIPC initiative agreed to reform economic programs. Contrary to traditional debt relief mechanisms, the HIPC initiative included the relief of debt owed to the multilateral institutions like IMF and World Bank. Forty-one countries have been classified as eligible for the HIPC group. The debt of these countries grew from $59 billion in 1980 to $105 billion in 1985 and $190 billon in 1990 (IMF, 2000). As Figure 1A in the Figure Appendix shows, the average debt to GNP ratio increased from 75 percent in 1980-1984 to about 110 percent between 1985–1989 and to

approximately 140 percent in 1990- 94 . The average debt to exports ratio increased from 210 percent in 1980-1984 to about 440 percent in 1990-1994 (Figure 2A in the Appendix). However, the external debt problem was not limited to the countries qualifying for HIPC. Countries that were supposed to have sustainable debt burdens also suffered from increased debt service payments leading to increased taxes and reduced government spending. The result of this situation was a cancellation of some domestic development projects leading to negative impacts on economic growth.

The objective of this study is to investigate the impact of external debt on economic growth on two groups of developing countries. The first group contains 33 highly indebted poor countries which qualified for HIPC initiative. The second group consists of 24 developing countries that did not qualify for HIPC but did have debt burdens[2]. The study investigates the argument that a negative relationship between external debt burden and economic growth is not only true of the highly indebted poor countries receiving help from HIPC imitative, but also of a group of developing countries that don't qualify for HIPC initiative. This study uses panel data for 57 countries for the period 1971 to 1996.

After this introduction, the remainder of this study is divided into six chapters. The first chapter provides a brief overview of the debt problem and analysis of the determinants or causes of the debt crisis. Chapter two will deal with the traditional mechanisms of debt relief, the HIPC initiative, and a brief evaluation of the HIPC in relation to economic growth. Literature review on the role of external debt in economic

[2] World Bank Classification, available in http://www.worldbank.org/data/aboutdata/errata03/Class.htm#Moderately_indebted

growth will be provided in chapter three. The model specification and data description are presented in chapter four, the empirical results will be explained in chapter five. Conclusions and policy implication of findings will be provided in chapter six.

Chapter 1: Debt Problem

During the three decades beginning in the 1950s, deficits in the current account were considered normal. Countries were encouraged to borrow abroad and create an environment conductive to foreign investment to enhance their economic growth. In the practice little attention was paid to the liabilities side of the current account deficit, which increased the external indebtedness of these countries. In 1980, the world experienced a debt crisis in which highly indebted Latin America and other developing regions were unable to repay the debt. The problem exploded in August of 1982; as Mexico declared the inability to pay the interest on its debts to commercial banks, the International Monetary Fund, and the World Bank (Were, 2001). Soon, other countries including Brazil, Argentina, Bolivia, Venezuela and finally the Philippines, followed Mexico.

There are several schools of opinion about the debt crisis. One school maintains that lenders brought the crisis upon themselves as a result of excessive lending (Semboja, 1998). Another school of thought attributes the debt to the rise of oil prices and deflationary policies pursued by the developed world (Iyoha, 1999). Another group of researchers maintains that the commercial nature of the debt and the inherent instability of world capital markets are the major causes of debt crisis. According to Stambuli (1998), this view implies that it is necessary to check and regulate the flow of funds to the developing countries to match their requirements for development and create the capacity to finance repayment of loans.

Sachs and Radelet (1998) argue that the debt crisis was caused by both the debtors and creditors as a result of their miscalculations. Thus, cooperation between both sides is needed.

1.2 The causes of the debt problems

The major causes of the debt problem include both external influences and factors internal to the debtor country. The external factors of the debt problem were high oil prices in 1973-74 and 1979-1980, high international interest rates, and the global recession in 1980-1982. The main internal factors included domestic budgetary policy, and economic mismanagement.

1.2.1 Oil prices

The increases in oil prices created huge current account surpluses for OPEC members, and billions of dollars were transferred to OPEC members from oil importing countries. Until the late 1970s, banks in developed countries experienced a trend increase in deposits associated with underlying growth in Western world. However, in the late 1970s, the growth rate of deposits in most banks in developed countries was between 25 and 30 percent (Weintraub, 1984). Weintraub points out that most these deposits were created from excess foreign assets of oil companies in the gulf region. On the other hand, banks in developed countries preferred to lend to developing countries rather than to their own markets because the demand for loans by businesses in western countries decreased as a result of increasing real wages in the late 1970s (Weintraub,1984).

The trade surplus of OPEC member countries increased from only $7 billion in 1973 to $68 billion in 1974 (Weintraub, 1984). In the mid-1970s, OPEC members used their surpluses to purchase deposits. These deposits allowed banks to expand their lending to non-OPEC developing countries, who in turn increased their credit demands as a result of increased oil prices and the need for these loans to finance their current account deficient. However, when the current account surpluses of the OPEC countries fell in 1978 and 1982, the credit demands of non-developing countries did not decrease. Thus, oil price shocks are one of the most important exogenous factors of the debt burden in developing countries. As shown in Table 3A, the value of oil imports rose from 6 percent of total imported goods in 1973 to 20 percent in 1980-82. Cline (1984) provided a calculation of the cumulative additional costs of oil imports as a result of increase oil prices.[3] In Table 4A, the first column shows actual net oil imports by these countries since 1970. The second column shows the amount that would have been paid for these imports if the price of oil had risen no more than the US wholesale price index after 1973. As the table shows, the cumulative total cost as result of oil price shocks is $260 billion over the decade (Cline, 1984)

1.2.2 Interest rates

The global recession and high interest rates of 1980-82 added enough to the burden to precipitate several major debt crises by 1982. The changes in the average real interest rates played an important role in the debt crisis. During the 1970s the real interest rate

[3] See the Appendix Table 5

was low. In fact, the average was negative compared to 1961-70 when the average real interest rate was 4.1 percent (Cline 1984). Low interest rate during 1970s created a good environment for developing counties to borrow. By 1979-1980 real interest rates started to increase until reaching 7.5 percent in 1981 and 11 percent in 1982. This increase in interest rates reduced cash-flow for borrowers, making the debt problem more complicated.

Cline (1984) estimates the excess interest rate in 1981-82 as the amount by which real interest rates exceeded their average level for 1961-80. According to Cline, for the 1960s and 1970s real interest rates averaged 1.66 percent. In 1981 it was 7.46 percent, and in 1982 it reached 10.95 percent. Thus, the excess of interest rates level above the real level was 5.8 percentage points in 1981 and 9.29 percentage points in 1982. The total debt in non-oil developing countries was $240 in 1980, $293 billion in 1981, and $329 billion in 1982. By applying the estimated excess interest costs in 1981 and 1982, the total excess interest payment was estimated by Cline (1984) as $41 billion in 1981-82.

In 1980-82, the international economy experienced severe recession leading to decreased real growth in industrial countries, to –0.3 percent in 1982, after 3.2 percent annual growth between 1973 and 1979 (IMF, 1983). On the other hand, export prices for developing countries were affected and showed considerable declines over 1981- 82. Cline (1984) estimated the total effect from the terms of trade in 1981-1982 was approximately $79 billion: $25 billion loss in export value and import cost increases of $9.6 billion in 1881, and a loss of export value in 1982 by $44 billion. "In sum, high interest rates and global recession imposed large cumulative losses on non-oil developing

countries in 1981-82. In all, these countries lost approximately $141 billion in higher interest payments, lower export receipts, and higher import costs as the consequence of adverse international macroeconomic condition." (Cline, 1984 p.13)

A summary of the impact of exogenous shocks on external debt of non-oil developing countries is provided in Table 5A. As the Table shows, the total impact, as a result of the combination of oil price, real interest rate, terms of trade, and export volume loss, was to increase the debt of non-oil developing countries by $401 billion.

1-2-4 Debt because of military expansion

Researchers have attempted to establish that debt has increased because of military spending. Military spending leads to increased debt through imported arms. According to Stambuli (1998), this buildup of the military is taken as a reflection of increased demand for latest military technology by third world regimes, especially those under military rule. The empirical studies of the impact of military spending are limited because of the lack of data on imported arms. However, a few studies attempted to relate external debt problems to military spending. For example, Brzoska (1983) pointed out that military spending is an important variable in explaining the rise of foreign debt and in turn reducing economic growth in several developing countries. Military expenditures created the need for funding and the resources of funding were either from domestic sources or external sources. If the domestic sources were not large enough, the solution was to borrow. Another way to link military spending to debt was that the imported arms required a foreign currency for payment; the alternative was to obtain foreign exchange from external sources by borrowing.

1.2.5 Economic Mismanagement

Boulow and Rogoff (1990) argue that one of the causes of external debt in developing countries is related to the poor economic management; the main comment of governments of poor countries is that they should have responded to debt by focusing their policies towards increased generation of foreign exchange to meet future obligations for debt service. On the contrary, most developing countries adopted economic policies focusing on comprehensive ownership of the means of production that resulted in expanded public sectors (Stambuli, 1998). Most developing countries adopted industrial strategies aiming at domestic production of previously imported goods in order to be more independent and also to reduce the demand for foreign exchange. These strategies encouraged countries to invest in huge projects that need intensive capital. Given the lack of enough domestic resources, borrowing is the alternative way to finance these projects. Moreover, there are several domestic factors that play the role of building up external debt, such as the political system, corruption, the quality of bureaucracy, the level of the public sector, and the economy's degree of freedom and competition.

Chapter 2: Traditional Debt Relief Mechanisms and HIPC Initiative

This chapter provides briefly the history of debt relief, starting from traditional debt relief mechanisms and ending with the initiative for highly indebted poor countries in 1996. The traditional debt relief mechanisms are defined as all measures of debt relief that are not provided in the context of the HIPC initiative, such as non-Paris Club debt relief, Baker and Brady plans, and debt relief under Paris Club format, Toronto Terms, London Terms, and Naples Terms.

2-1 Non Paris Club debt relief

At the peak of the Latin American debt crisis in 1985, James Baker, the USA Treasury Secretary during the Ronald Reagan period, attempted to provide a systematic approach to the debt problem. This was known as Baker plan. The main point in this plan was that loans should be increased to indebted poor countries by banks and multilateral finance institutions. The plan advocated the increase of bank lending by $20 billion. The World Bank and other multilateral finance institutions were also to increase their lending by 50 percent to a target of $9 billion. Under these proposals, $2.7 billion of IMF money was to finance new flows to the poorest countries mainly in sub-Saharan Africa (Stambuli, 1999). At the same time, these countries had to agree to submit to adjustment conditions. By 1987-88, it was clear that the Baker Plan had been unsuccessful at either reducing debt or allowing the target countries to grow their way out of debt as had been intended. The Baker Plan was unable to provide the proper incentives for developing countries to introduce consistent market reforms, or for banks to supply new money that would finance such reforms (Vasquez, 1996).

The Brady plan intended to be flexible in dealing with debtors and creditors by providing a set of conditions and providing alternative options (Vasquez, 1996). The first country that agreed to deal with this plan was Mexico, which then became a guide for some countries. Vasquez (1996) examined this deal with Mexican government and representatives of more than 500 banks in 1989. According to this deal, there was a set of conditions which banks could choose from to reduce or increase their exposure. Three options were available. Existing loans could be swapped for 30-year debt-reduction bonds that would provide a discount of 35 percent of face value. Existing loans could also be swapped for 30-year par bonds that would effectively reduce Mexico's debt service on those loans through a below-market interest rate of 6.25 percent. Banks could also provide new loans at market interest rates over a four-year period of up to 25 percent of their 1989 exposure. In case of the Mexican deal, banks choose to swap 49 percent of their loans for discount bonds, 41 percent for par bonds, and 10 percent to provide new money. (Vasquez. 1996).

Among the countries following Mexico were Costa Rica (1989), Venezuela (1990), Uruguay (1991), Argentina (1992), and Brazil (1992). By May, 1994, 18 countries had agreed to Brady deals forgiving $60 billion of debt and representing about $190 billion in bank claims (long term). Under the plan, the World Bank and the IMF would provide $12 billion each, and the Japanese Import-Export Bank would provide about $8 billion for securitization; most of that money has already been committed for that purpose. The typical deal led to about 30 to 35 percent forgiveness of a country's debt (Cline, 1995). With respect to the relation between debt relief and

economic growth, Vasquez (1996) points out that there is no correlation between Brady Plan deals and positive economic indicators and that this plan seems to encourage a relationship between market reforms and positive indicators.

2-2 Paris Club

The bilateral donor provides traditional debt relief in the form of the Paris Club. This form has improved from one stage to the next. In early1980s, Paris Club creditors provided reschedulings for low-income countries on standard terms, with relatively short five-year grace and maturity (10 years) periods with market- related interest rates. From 1976 to 1988 the Paris Club provided 81 non-concessional flow reschedulings with 27 of countries (Daseking and Powell, 1999). But low income countries continued to have difficulties adhering to the resulting repayment schedules and the rescheduling of interest led to repay debt accumulation (Boote and Thugge, 1997). By the late 1980s, Paris Club creditors recognized that repeated reschedulings on standard terms over a long period did not provide a solution to the debt problems of the low-income countries because for most of them, their debt problems required not only cash- flow relief but also debt reduction. So in late 1988, Paris Club creditors agreed to provide concessional reschedulings for low-income countries on Toronto Terms.

Toronto Terms was the first initiative to provide a cancellation of the developing countries' debt. The amount of forgiveness by these terms is one third from the present value of the debt qualifying for rescheduling (Stambuli, 1999). Under Toronto Terms, a grace period of eight years facilitated debt service reduction. For longer maturities, a

grace period of 14 years applied. The period of amortization was extended to 14 years (post-grace period) while longer maturities attracted 25 years. As a principle, eligibility was limited to debt service falling within the period from October 1988 to June 1991(Stambuli, 1999). From 1988-91, 20 LIC countries received reschedulings on Toronto terms, with about $6 billion of payments falling due being either partially cancelled or rescheduled on a concessional basis (Daseking and Powell, 1999).

Stambuli (1999) argues that Toronto Terms made very limited impact after four years of combined attempts at debt stock and debt service reduction, and he points out that the main weaknesses arise from the fact that debt stock reduction available under "Toronto Terms" was limited to 33% calculated in net present value terms while debt service reduction qualified for between 20% and 30%. Toronto Terms also excluded long maturities from debt reduction.

In December 1991, a new set of terms with some improvement, "London Terms," was provided by the creditors. The level of forgiveness on eligible debt in NPV (Net Present Value) was increased to 50%. The period of amortization for existing stock was increased to 23 years while new Official Development Assistant (ODA) credits attracted 30 years amortization. Under the London Terms, creditors accept that after a period of good performance, three years, they would be willing to discuss the possibility of an agreement covering the full stock of eligible debt (Deseking and Powell, 1999).[4]

Naples economic summit in 1994 enhanced the terms for indebted countries. Under the Naples Terms, the forgiveness of net present value of debt service payable

[4] Eligible debt defined as pre cut-off date medium term debt : Daseking and Powell (1999)

during the consolidation period was raised to 67 percent. The grace period for longer maturities was extended to 20 years, and the maturities period was extended to 30 years (Deseking and Powell, 1999). Table 6A provides summary of the Paris Club rescheduling by type of terms from 1976-1998.

2-3 Multilateral debt relief

The role of multilateral financial agencies under the Paris Club was to help countries create economic policy and reform programs. These programs are to be supported by concessional lending from IMF and World Bank, the former under the Structural Adjustment Facility and Enhanced Structural Adjustment Facility (Stambuli, 1999).

2-4 HIPC initiative

In September 1996, at their Annual Meeting, the IMF and World Bank announced the HIPC debt initiative that aims to reduce the debt burdens of all eligible HIPCs to sustainable levels. This initiative defines a country as 'heavy indebted' if the traditional debt relief mechanisms are not enough to reduce its external debt to a sustainable level (Gunter, 2002). The HIPC initiative evaluates traditional debt relief as being too weak to raise the debt to sustainable level for heavy indebted poor countries. The difference is that HIPC initiative includes, for the first time, a cancellation of multilateral debt such as the debt from World Bank and International Monterey Fund. The initiative's goal is the reduction of eligible countries' external debt burdens to sustainable levels and

elimination of any debt overhang that might be a hindrance to growth and investment (Sun, 2004).

Compared to decades of bilateral debt rescheduling, Gunter (2002) argues that the HIPC initiative was a major advance for two related reasons. First, it was intended to be a comprehensive solution to unsustainable debt problems which would free HIPC countries from repeated debt rescheduling by reducing their external debt stock to sustainable levels. Second, given that increasingly external debt owed by the HIPCs was multilateral debt, the HIPC initiative included a reduction of multilateral debt. Further, three years after launching the initiative, the original HIPC framework was enhanced by the IMF and World Bank in September, 1999. The enhancements provide broader, deeper, and faster debt relief (Lisandro and Ross, 2001). To qualify for assistance under the HIPC initiative, the debtor country under review must adopt adjustment and reform programs supported by IMF and World Bank and pursue those programs for three years (Hjertholm, 1999). During that time, it will continue to receive concessional assistance from donors and multilateral agencies, as well as debt relief from bilateral creditors. A group of 41 countries were identified as HIPC in 1996. Since then Nigeria and Guinea have been removed from the initial list, while Malawi and the Gambia were added to the list as the NPV of their external debt was found to be unsustainable (Cassimon and Renard, 2002).[5]

As described earlier, the HIPC initiative was adopted in 1996 with the goal to provide a permanent exit from repeated debt rescheduling. Though the HIPC initiative

[5] The countries are Angola ,Benin , Bolivia, Burkina Faso, Burundi , Cameroon, Central African Republic, Chad, Congo, Conte d'Ivoire, Democratic Republic of the Conge, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Guyana, Honduras, Kenya ,Lao PDR, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nicaragua, Niger, Rwanda, Sao tome and Principe, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, Vietnam, Yemen, and Zambia.

had been enhanced in 1999, Gunter (2003) argues that there is mounting evidence that the enhanced HIPC initiative does not even provide short-term debt sustainability for many of the poor and highly indebt countries. Gunter states that a United State General Accounting Office report reviewed the HIPC initiative in spring 2000 and concluded that without strong and sustained economic support?, the initiative is not likely to provide lasting debt solutions (US GAO, 2000).

Chapter 3: Theory of Debt and Economic Growth

Based on a literature review relating the effect of a heavy foreign debt burden on economic growth, the dominant paradigm is the "debt overhang hypothesis". This hypothesis has two versions. According to the traditional version, private agents in the debtor country see a very high debt burden as a future tax on the return to capital (Krugman, 1987). The heavy debt burden means that government will have to increase taxes in the future to finance the high debt service payments. Increasing taxes means decreased return on capital lending, discouraging private investments, which in turn leads to lower economic growth. The other approach argues that government will engage in inflationary financing as a result of excess demand for foreign currency created by debt-servicing needs (Serieux and Samy, 2001). So a public debt overhang can effect macroeconomic stability through several channels: an increase in the fiscal deficit, exchange rate depreciation, monetary expansion and inflation from monetizing debt service obligations, and exceptional financing needs such as payments arrears and debt rescheduling. These tend to maintain uncertainty about the future debt-servicing profile of the public sector (Hjertholm, 1999).

Borensztein (1990) defines debt overhang as follows: "The debt overhang arises in a situation in which the debtor country benefits very little from the return to any additional investment because of debt service obligation. When foreign obligations cannot be fully met existing resources and actual debt payments are determined by some negotiation process between the debtor country and its creditors, the amount of payments can become linked to the economic performance of the debtor country, with the

consequences that at least part of the return to any increase in production would in fact be devoted to debt servicing. This creates a disincentive to investment from the point of view of the global interest of the debtor country." (Borensztein, 1990: 316). Karagol (2002) argues that the debt overhang "is based in the premise that if debt will exceed the country's repayment ability with some probability in the future, expected debt services is likely to be an increasing function of the country's output level (Karagol, 2002: 41). So the taxes will affect the return of domestic investment and discourage a new domestic and foreign investment.

Sachs (1990) and Kenen (1990) argued that the external debt overhang is the major cause of stunted economic growth in heavily indebted countries. The reasons for this are the following: first, the required debt service payments for some countries are so large that the country is unlikely to return to a growth path. Second, a large debt overhang slows private investment and government adoption of adjustment programs because of uncertainty and adverse incentives.

The debilitating effect of external debt on economic growth is explained by Krugman's (1987) argument that high governmental debt service payments require high tax rates, which in turn discourages capital formation and return of flight capital. The above view is also supported by Dornbusch (1988), who argues that since the government does most of the debt service payments in the highly indebted developing countries, currency devaluation will have a small effect on the trade balance. Thus, the debtor country shares in any increase in output and exports because a part 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 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" side of the debt Laffer curve. The debt Laffer curve relates the amount of debt repayment to the size of debt. The idea of Laffer curve implies that debt accumulation stimulates growth over some range, but there is a limit beyond which growth is not stimulated by debt (Elbadawi *et al.*, 1996). As shown in Figure 3A, the relationship between debt and growth is positive in the lift side of Laffer curve and negative in the right side of the curve (Gunter, 2001).

In summary, the impact of external debt on economic growth could come through the fiscal account because a significant portion of government revenue must be given over to debt servicing. Other areas of government spending will be reduced to face the obligation of debt service, with one area being public investment. This fiscal effect is known as the crowding-out effect (Serieux and Samy, 2001). External debt can also have an effect on growth through the external account. The debt services obligation creates a demand for foreign currency. In the absence of substantial reserve coverage or high exports, higher debt service payments mean reduced import capacity leading to a negative impact on growth. This effect through the external account is called "import compression" (Serieux and Samy, 2001).

3-1Empirical studies

There have been several attempts to empirically assess the external debt-economic growth link, the debt overhang and crowding out effects, primarily by using OLS and different debt indictors as a measures of debt, for example, the ratio of total debt to GDP

and ratio of debt services to exports. Most of the empirical studies include a fairly standard set of domestic, debt, policy and other exogenous explanatory variables. The majority of these empirical studies find at least one or more debt variables to be significantly and negatively correlated with investment or growth. For instance, Fischer (1991) examined the relationship among some macroeconomic variables and the growth rate of per-capita real GDP for the period of 1970 to 1985. He found that the coefficient of foreign debt is negative but not statistically significant in the cross-sectional analysis. Borensztein (1990) found that the debt overhang had an adverse effect on private investment in Philippines. The effect was strongest when private debt rather than total debt was used as a measure of the debt overhang.

Iyoha (1999), using data from 1970 to 1994, investigated the impact of external debt on economic growth in Sub-Saharan African countries using a small macroeconomic model that permits simulation of the effect of external debt on economic growth. The simulation model consists of three equations. Two of them are related to the production function and investment demand and the third one is the debt accumulation identity. The debt variables used in this study are the ratio of debt to GNP as a measure of debt overhang and the ratio of debt services to export as a measure of the crowding out effect. The coefficients of both the debt to GNP and debt services to export ratios have negative signs and are significant at the 1% level. An important finding in the Iyoha study is a confirmation of the debt overhang hypothesis and the existence of a crowding out effect in Sub-Saharan African. He concludes that a heavy debt burden acts to reduce investment through both the debt overhang and the "crowding out" effect.

Clements *et. al.* (2003) examine the channels through which external debt affects growth. They use panel regressions and data for 55 low-income countries for the period 1970-1999. This study uses two equations, growth and public investment as dependent variables with a set of controlling variables as independent variables, including debt indicators like the face value of the stock of external debt as a share of GDP, the net present value (NPV) of the stock of external debt as share of GDP, the face value of the stock of external debt as share of exports of goods and services, and the net present value of debt as a share of exports of goods and services. This study used fixed effects and system GMM. The results provide support for the debt overhang hypothesis and crowding-out effect. According to the result of the study, debt has a deleterious effect on growth only after debt reaches a threshold level. The study estimates the threshold level at around 50 percent of GDP for the face value of external debt, and at around 20-25 percent of GDP for its estimated net present value and 100-105 percent of exports. The study showed that debt service has a negative impact on growth through public investment and the relationship is nonlinear: on average, every 1 percentage point increase in debt service as share of GDP reduces public investment by 0.2 percentage points.

Along the same lines, Serieux and Samy (2001) studies the relationship between debt and growth. The aim of this study is to distinguish the channels through which debt effects growth. This study uses panel data for cross section of 53 low and lower middle income countries for the period 1970- 1999. The estimation is based on three equations, an investment equation, a human capital equation, and a growth equation. In the

investment equation, the coefficients of debt to export and debt services to export were negative and significant at 1% level but the coefficients of debt to revenues and debt services to revenues were insignificant. The exported-related debt variables become insignificant when included with revenue related variables. This result, according to Serieux (2001), supports the import compression effect and debt overhang hypothesis. In the human capital equations, the coefficients for the debt services to exports were significant and negative in both equation secondary and primary school. However, the coefficient of debt services to revenue was negative and significant in secondary school equation only. In the growth equation, both coefficients, debt services to exports and debt services to revenues, were negatively related to growth and significant at 1%. Both results, in the investment equation and growth equation, seem to support the crowding out and the import compression theories.

Elbadawi *et. al.* (1996) also confirmed a debt overhang effect on economic growth In their study using cross-section regression for 99 developing countries in Sub-Saharan Africa (SSA), Latin America, Asia, and Middle East, they identified three direct channels through which indebtedness in SSA works against growth: current debt inflows as a ratio to GDP, past debt accumulation and debt service ratio. The fourth indirect channel works through the impacts of the above channels on public sector expenditures. They found that debt accumulation discourages growth while current debt inflows encourage growth. Their results also showed that the debt burden has led to fiscal pain as evidenced by severely compressed budgets (Were, 2001).

Hansen (2001) investigates the impact of aid and external debt on growth and investment in developing countries. The study uses cross-country regressions and data for 54 developing countries for the period 1970-1993. The ratios of total debt to GDP and debt services to exports are used as a measure of debt in both equations. Aid is measured as total development assistance in current US$ as a percentage of GDP. When the study regresses the GDP per capita on initial GDP per capita, total aid to GDP, foreign direct investment, institutional quality, and dummy for Sub-Saharan Africa, it finds that both coefficients, debt to GDP and debt services to exports ratios, are negative and significant at 10% level, whereas, the coefficient of aid is positive and significant. When the study added several policy indictors like budget surpluses, inflation, and openness, the coefficients of debt became insignificant with no change for aid coefficient. In the investment equation, when the study includes all the variables related to aid and debt, the coefficient of aid and debt ratio are insignificant, but the debt services ratio was negative and significant. In summary, this study found that there is a quite strong evidence of positive impact of aid on both growth per capita and investment rate. A negative impact of debt and debt services on investment and growth were empirically supported. The results confirm that both the debt overhang hypothesis and crowding out effects exist. These results are consistent with the findings of the prior studies such as Elbadwai *et. al.* (1996) and Serious (2001)

Cohen (1993) finds no evidence for the general existence of a debt overhang using data for sample of 81 LDCs. Yet, for the Latin American countries, the study shows that high debt had a negative impact on their growth. This result is reconfirmed in a later

study by the same author (Cohen, 1997). This study also clearly finds that for African countries high debt is not a major cause for low levels of economic growth in the 1980s and 1990s. Classens (1990) finds a debt overhang for only a very limited number of LDCs. Oks and VanWeinberger (1995) test the debt overhang hypothesis for Mexico and conclude that it does not exist. Deshpande (1997) investigates the relationship between debt and economic growth in a sample of 13 countries, finding that the debt overhang does exist. External debt is found to exercise a negative influence on the investment ratio. For the period 1971-1991, the investment ratio for the sample countries displays first a rising tendency and then declines to the end of the eighties. The regression results show that while the relationship between the debt ratio and the investment ratio continues to be negative in both the periods, there are some favorable time factors that exercise a strong positive effect on investment in the first phase (1975-1983), and then negative effect of debt on investment in the second phase (1984-1991).

Using time series data for the period 1970-1995, Were (2001) investigates the impact of external debt on economic growth and investment in Kenya. The study uses three debt variables, current flow of debt as a ratio of GDP, past debt accumulation (debt lagged) as a ratio of GDP, current debt services to exports, and accumulation debt services as a ratio of exports (lagged debt services). In the growth equation, the coefficient of both the total debt to GDP and lagged total debt to GDP were negative and significant at 5% level. These results provide some verification of the debt overhang hypothesis and indicate that even current debt flows have negative impact on growth, in the short run. Contrary to the expectations of the study, the coefficient of debt services to

exports in the growth equation was positive and significant at 5% level. This unexpected result, according to the author, suggests that Kenya does not have a high level of debt services compared to the rest of low income countries. Another reason for Kenya's differences compared to other countries relates to the structure of the debt, in which a greater proportion of Kenya's external debt consists of official debts. The interest rate applied in this kind of debt is not high compared to commercial debt. In the investment equation, the coefficient of the current debt flows has positive sign and is significant at the 5% level, whereas accumulation debt has a negative relation to investment, also significant at the 5% level. These results provide strong support for the crowding-out effect and debt overhang theories.

Lin and Sosin (2001) examine the relationship between external debt and economic growth based on the total of 77 countries. This study uses a data sample from 1970 to 1992. The debt variable is the average ratio of foreign debt to GDP from 1970 to 1992. In contrast to other studies; this study investigates four different regions.[6] The study uses cross section regressions, an annual growth rate of per capita real GDP as dependent variable and the ratio of debt to GDP as an independent variable, including initial per capita real GDP, ratio of real government consumption to GDP, ratio of real investment to GDP, average population growth, and dummy variables for both Africa and Latin American. The coefficient of the external debt variable in the whole sample is negative and significant at 5% level in four equations, indicating that external debt has negative impact on the economic growth. When the study adds government spending to

[6] Among them 18 industrialized countries.

the equation, the debt coefficient was negative but insignificant. According to Lin and Sosin (2001) "a separate regression of government spending on foreign debt indicates that foreign debt and government spending are significantly positively related. Thus, foreign debt may affect economic growth partly through government spending."(Lin and Sosin, 2001: 644). This statement supports the existence of crowding out effect and is consistent with the findings of Iyoha (1999). In the regression results for African countries, the coefficient of the debt variable was negative and significant at 5% level, indicating that high debt levels in African countries led to lower economic growth. The negative relation between growth and external debt in Africa refers to the use of foreign funds. Lin and Sosin state that "foreign funds were invested in state enterprises, used to expand government expenditures and earmarked for paying debt." (Lin and Sosin, 2001: 648, 649). The coefficient of external debt in the regression result for Latin American was negative but insignificant, whereas, the debt variable for Asian and other developing countries was positive and insignificant. For the 18 industrialized countries the study found negative but not statistically significant relation between external debt and economic growth.

A recent study finds strong support for a nonlinear, Laffer-type relationship between the stock of external debt and growth. Using a large panel data of 93 developing countries over the period 1969-1998, Pattillo *et. al.* (2002) investigate the impact of external debt on economic growth. The objective of their study is to determine the level of external debt that has a negative impact on economic growth and the extent of its impact on economic growth. What are the channels through which the impact likely to

occur? They estimate the model by using OLS, instrumental variables, fixed effects, and system GMM. The dependent variable is per capita growth.[7] The independent variables are lagged income per capita, the investment rate, secondary school enrollment rate, population growth rate, openness, debt to GDP ratio, debt to export ratio, debt services to export ratio, net present value to GDP ratio, and net present value to export ratio. In the linear specification, the study found all debt indicators to be significant in the fixed effect specification, the debt to export ratio to be significant in the system-GMM specification, and debt to GDP ratio to be significant in the OLS specification. In nonlinear specification, debt appears to have an effect on economic growth.[8] The study finds that the average impact of external debt ratios on per capita GDP growth is negative for net present value of debt levels above 160-170 percent of exports and above 35-40 percent of GDP. These results are robust across different estimation methodologies and specifications, and suggest that doubling debt levels slows down annual per capita growth by about half to a full percentage point.

The same authors, in their recent study, investigate the channels through which debt effects growth (Pattillo *et. al.*, 2004). The study uses panel regressions for 61 developing countries for the period 1996- 98.[9] According to their results, at high levels of debt there was a large negative impact in growth. They imply that doubling debt ratios from any initial level above the threshold will reduce growth by about 1 percentage point. At lower levels of debt, the study found the effect was positive but not significant. The

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[7] Henceforth IV to correct for endogeneity

[8] To investigate the nonlinearity, this study uses several econometric specifications (quadratic debt terms, a model with debt dummies, a spline function).

[9] The countries are from Africa, Asia, Latin America, and the Middle East

negative impact of high debt on growth was through both a strong negative effect on physical-capital accumulation and total factor productivity.

Along the same lines, Schclarek and Ballester (2004) comprehensively study the impact of external debt on economic growth in 20 Latin American and Caribbean countries. This study uses panel data for the period 1970 to 2002. with four dependent variables and 15 different debt indicators.[10] The estimation results for the linear effects on GDP growth showed a strong negative relation between growth and debt indicators. When the dependent variable is GDP, the coefficients of total debt to GDP, debt to exports, and debt to revenues were negative and significant at the 1% level. The coefficients of public external debt to GDP, exports, and revenues were negatively related with growth and significant at 1%. However, the relation between private debt and growth was not significant indicating that the public external debt is responsible for the negative and significant relation. None of the coefficients of private debt were significant. Contrary to Pattillo *et. al.* (2002), (2004), the study did not find any evidence to support the nonlinear debt effects on GDP growth.

Karagol (2002) investigates the long run relationship between GNP and debt services in the Turkish economy for the period 1956-1996, using a standard production function model. The study found that debt service is negatively related to GNP in both short-run and long-run.

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[10] The dependent variables are real per capita GDP growth rate, total factor productivity growth TFP, capital stock growth rate per capita, and the private savings rate, total external debt to GDP, total external debt to export, and total external debt to revenues. The independent variables are public external debt to GDP, public external debt to export, public external debt to revenues, private external debt to GDP, private external debt to export, private external debt to revenues, Interest Payment to GDP, interest payment to exports , interest payment to revenues, debt services to GDP, debt services to export, and debt services to revenues.

The literature also suggests that debt may have negative effects on economic growth because of the uncertainty about what portion of debt will actually be serviced with the countries own resources. Dijkstra and Hermes (2001) empirically investigate the relationship between the uncertainty of debt service payments and economic growth, with particular reference to HIPCs. Using panel data for 104 LDCs from 1970 to 1998, the results show clearly that for the HIPCs uncertainty with respect to total debt service payments and long-term debt service payments negatively affects economic growth of HIPCs, but not for developing countries in general. Oks and Weinberger (1995) are the first to acknowledge the influence of uncertainty about debt service payments on economic growth. In their study, they empirically analyze this relationship for Mexico, based on monthly data for 1988.04-1999.12, and find that instability of debt services payments did matter.

In summary, most of empirical studies using different ways of estimating with a variety of debt indictors have found that external debt is likely to have negative relationship to economic growth if the debt reaches such level that a country is unable to pay its debt's obligations; that is, the debt overhang theory is supported. Also the studies show that external debt could effect growth through investment channels by crowding both private and public investments.

In this study we investigate the relationship between economic growth and external debt focusing in the concept of debt relief. This study differs from prior studies in that we focus on the group of HIPCs qualifying for the recent debt relief initiative. HIPCs are included as a dummy variable in the sample, so that the study can compare

HIPCs to other developing middle income countries with debt burdens. The results of this study will be helpful to evaluate the concept of debt relief and whether the debt relief initiatives should be limited to the HIPC group or expanded to other developing countries which have heavy and harmful debt levels.

Chapter 4: Econometric Model and Data

In this chapter, the econometric model used to estimate the impact of external debt on economic growth is presented. The main goal is to investigate the impact of external debt burden on economic growth in a sample of developing countries and to discover whether the impact would vary from countries qualifying for HIPC initiative to countries which did not qualify for this initiative. The study uses standard growth specification while adding two debt variables: total debt as share of GDP and debt services as a percent of total exports from goods and services

4.1 The model

The analysis uses panel regression for 57 countries. [11] Thirty-three of them are the countries qualifying for the HIPC initiative and the rest of the sample contains severely to moderately indebted countries that do not qualify for the HIPC initiative. The panel specifications are estimated using simple OLS, fixed effects to allow countries to have different intercepts, and random effects. The growth rate of GDP per capita is the dependent variable. On the right hand side, the independent control variables are the total investment rate share in GDP, the secondary school enrollment rate, the annul population growth rate, and openness. The debt variables used in this model are the ratio of total debt to GDP to capture the debt overhang effect and the ratio of debt services to total exports from goods and services to capture the crowding-out effect. Letting GDPPC be the growth rate of GDP per capita, POP the growth of the population, DGDP total external debt as percent of GDP, DSX debt services as a percent of export, IGDP investment share

[11] Please see appendix for the list of these countries

in total output, OPENNESS the ratio of the volume of trade (exports plus imports) to GDP, and a dummy variable for HIPC group, the regression model estimated is as following

$$GDPPC = a_0 + a_1 SS + a_2 OPENNESS + a_3 POP + a_4 DGDP + a_5 DSX + a_6 IGDP + a_7 d\,HIPC \quad (1)$$

The secondary school enrollment (SS) is usually used as a proxy for the quality of human capital. Theoretical analyses of international differences in growth rate have focused attention on the rate of human capital. Previous studies of growth have paid attention to several measures of schooling activities as indicators of relevant human capital. The most commonly employed measures are the rate of primary school enrollment and the rate of secondary school enrollment. These measures are used in previous studies, for instance Romer (1990), Robert J. Barro (1991), Clements *et. al.* (2003), and Pattillo *et. al.* (2004). Following these studies, we use secondary school as a measure of human capital and we expect positive relation between schooling enrollment rates and GDP per capita growth rate. The OPENNESS variable is expected to have positive sign. Openness has two sides, exports and imports. Exports will lead to increased saving, which in turn improves the level of the investment. In addition, exports improve the credit ratings of a country by generating hard currencies, leading domestic currency to appreciate, and increasing the country's ability for getting loans and paying its obligations. The imports may have positive impact on growth through importing capital goods, energy, and equipment related to technological advance. Grossman and Helpman

(1991) have argued that countries that are more open to the rest of the world have a greater ability to absorb technological advances.

The coefficient of population growth (POP) is expected to have a negative relationship to economic growth. According to Lin and Sosin (2001), the relation between growth and population "depends on the productivity of the growing population. On one hand, population growth increases the labor force. On the other hand, population growth increase the number of the consumers, tends to reduce the per capita growth." (Lin and Sosin, 2001: 640)

The coefficient of the external debt ratio (GDGP) can be used as a measure of the debt overhang. Based in this theory, the relation between debt and economic growth could be either positive or negative. Lower levels of debt appear to have positive impact on economic growth. However, when the level of debt reaches a point that a country is unable to meet its obligations, the relationship turns negative. Since our sample consists of severely and moderately indebted counties, the coefficient of debt is expected to have negative sign.

The coefficient of the debt services to exports ratio (DSX) is expected to have a negative relationship to economic growth. Large debt services could affect growth through different ways. First, government might increase taxes in order to increase the revenues to face the debt services obligations. Increasing taxes will have negative impact on private investment which in turn affect growth rate. Second, because of large debt services, public investment spending will be reduced. Reducing public investment will harm growth rate. Also debt obligations affect growth through the imports side. Large

debt services lead to increases in the demand for foreign currency which in turn reduces the value of imports. Thus, we expect that the coefficient of debt services in these high debt countries to have a negative sign.

The coefficient of the investment to GDP ratio (IGDP) is expected to have positive sign. Most of prior studies include investment as an explanatory variable and a find strong positive relationship to economic growth. For example, Levine and Renelt (1992), in their growth equation, use the investment to output ratio as an explanatory variable and they find a positive and robust correlation with growth rate. Along the same lines, Lin and Sosin (2001) include the investment to GDP as dependent variable and they find positive significant relation with per-capita growth rate.

The coefficient of the dummy for HIPC countries is expected to have a negative sign. This expectation based on the hypothesis of debt overhang which states that external debt burden and economic growth are negatively related. In addition, all these countries are poor and suffer from heavy external debt.

Table 1: Predicted effects of independent variables

Variable Name	Definition	Expected sign
DGDP	Total external debt as a percent of GDP (Gross Domestic Production) over the period of 1971 to 1996.	Negative
DSX	Total debt services as percent of total exports of goods and services	Negative
SS	Secondary school, the ratio of the number of children of official secondary school age (as defined by the national education system) who are enrolled in secondary school to the population of the corresponding official school age.	Positive
POP	The annual population growth rate	Negative
NGDP	The ratio of the total investment (private and public) to total real GDP	Positive
Openness	Ratio of total exports and imports to GDP	Positive
DHIPC	Dummy variable, equal to 1 for countries qualifying for HIPC initiative and 0 for non-HIPC	Negative

4.2 Data

The empirical analysis in this study uses data for 57 highly indebted countries. Thirty-three are classified as eligible for the highly indebted poor countries initiative and 24 are severely and moderately indebted countries that do not qualify for the HIPC initiative. The data cover the period 1971 to 1996. The data sources are described in more detail in the Data Appendix. The data on the growth rate of GDP per-capita were taken from Global Development Growth Database, William Easterly and Sewaden, World Bank. Data on external debt to GDP ratio, the population growth rate, and the secondary school enrollment were taken from World Bank Group, Global Development Network Growth database . The data on OPENNESS and the total investment as a share of GDP were taken from Penn World Tables, version 6.1. Data on debt services payments as a share of total exports were taken from World Resource Institute, Earth Trends.

Table 7A in the Appendix provides descriptive statistics for 57 countries in 1977. From the table, the mean of the GDP per-capita growth is 2.6 percent, the mean of the total debt as a percent of GDP is 41.9 percent, and 14.7 percent is the value of the total debt services as a percent of the total exports from goods and services. The mean of total investment as a percentage of GDP was 13.5 percent. Figures 4A to 7A in the Figure Appendix show that the regression lines were almost flat because the debt ratio to GDP and debt services to exports were at their low level in 1977 compared to 1983. As shown in Figures 8A to 11A, the regression lines are steeper indicating that the relationship and the trend of both GDP growth and debt indicators have opposite direction.

However, the situation changed in the mid-1980s. Table 8A provides a descriptive statistic for the same countries in 1983, the year when the debt crisis reached its peak. The mean of the GDP per-capita growth rate was negative (-1.5 percent). At the same time, the ratio of total debt to GDP was 80.4, an approximately 100% increase compared to 1977. This relation suggests that lower debt ratios are associated with positive economic growth. Figure 6A, the plot of these two variables, appears to confirm that the short term movements are in opposite directions. Particularly when the level of debt reaches a high level, the relationship is negative. Figures 8A through 10A show that the lower level of debt associates with strong positive growth, whereas a high level of debt associates with negative growth. This relationship between the total debt to GDP ratio and the growth rate supports the debt overhang hypothesis. The mean of total debt services to exports ratio increases from 14.7 in 1977 to 28.6 in 1983. When the level of debt services ratio is lower, the growth rate of GDP per capita seems to be positive (Figures 9A, and 11A). However, when the debt obligations increase, the growth rate is likely to be affected. If this is a result of government fiscal policy through increasing taxes and decreasing government public spending, then this supports the crowding out hypothesis.

Table 10A and 11A provide the correlation matrix between the variables in 1977 and 1983. From Table 11A, the correlation between external debt ratios and economic growth rates in 1977 growth was positive, whereas, there is a strong negative relation in 1983. The correlation between debt services and economic growth was negative in both years but stronger in 1983 than 1977.

In summary, the correlation between economic growth and debt indicators clearly supports the debt overhang hypothesis in that lower levels of debt are associated with positive economic growth and higher levels of debt with negative economic growth.

Chapter 5: Empirical Results

The empirical analysis results are based on two debt variables used in six regressions. The first two regressions include the whole sample (57 countries) with the 33 HIPC countries represented by a dummy variable. The second two regressions are for HIPC countries, and the third two regressions are for non-HIPC countries. The first regression for every group includes the ratio of total debt to GDP, and the second regression contains the total debt services to exports ratio. We initially employed three different methods: OLS, fixed effects, and random effects. The results for the first regression for the whole sample are presented in Table 2. When we test for the preferred panel model by using the Hausman test, we find that fixed effects model is preferred to random effects since the Chi-Sq. Statistic, 21.689, is greater than the tabulated value of 11.07 at 5 d.f.

The study uses the R-squared measure as the goodness of fit. In OLS estimation R-squared is about 0.16, which means that 16% of the variation in growth rate in GDP per capita could be explained by the variance of independent variables. For fixed effect, R-squared is about 0.24.

The F-statistic tests the joint hypothesis that the slope coefficients are equal: $B_2=B_3=B_4=B_5=B_6=0$. As Table 2 shows, in the OLS estimation, the F statistic with 6 and 1014-7=1007 degrees of freedom is about 33.7, and critical F value is 2.12 at 5% level. Since calculated F value is more than critical F value, we reject the null hypothesis that all explanatory variable coefficients are jointly insignificant. For the fixed and random effect, F statistic is greater than critical F at the 5 percent level too, so we reject the null hypothesis and state that the independent variables are jointly significant.

Table 2: Debt/GDP: Impact on Economic Growth, in all countries, 1971-1996

Variables	OLS Pooled	Panel Fixed effect	Panel Random Effect
DGDP	-.00088*** (0.0000)	-5.8534** (0.0001)	-0.0057** (0.0033)
PP	-.62103** (0.0082)	0.1306 (0.7175)	0.0204 (0.9445)
OPEN	0.0191** (0.0008)	0.0520** (0.0001)	0.0228** (0.0104)
Dummy	-1.3144** (0.0004)	-	-1.0109 (0.1721)
SS	-.0423*** (0.0000)	0.007218 (0.7673)	-0.0315** (0.0399)
IVGDP	0.1928*** (0.000)	0.3020*** (0.0000)	0.2499*** (0.000)
Constant	1.696353** (0.0272)	-5.8534** (0.0001)	-1.5702 (0.1870)
R-Squared	0.1675	0.2415	0.0797
F-statistic	33.7745	5.2544	14.4988
Durbin –Watson	1.6848	1.9129	1.8151
No. observations.	1014	1014	1014

Notes: (1) The numbers in parentheses are the P-values.
(2) * Indicates statistical significant at the 10% level with two-tailed test.
** Indicates statistical significant at the 5% level with two-tailed test.
*** Indicates statistical significant at the 1% level with two-tailed test.
(3) The Hausman test Chi-Sq is 21.689, which exceeds the tabulated value and rejects the hypothesis that the random effects model is not misspecified.

In the OLS estimation the ratio of debt over GDP is negatively related to the growth rate of GDP per Capita and significant at 1% level. The coefficient of the ratio of debt to GDP is negative and significant at 5% level in both fixed effect and random effect models. These results based upon different ways of estimating indicate a robust negative relationship between external debt and economic growth which is consistent with expectations. Similar results were found by prior studies such as Lin and Sosin (2001), Pattillo *et. al.* (2002), and Clemments (2003).

As expected, the annual population growth is negatively related to economic growth and significant at the 5% level in OLS estimation. In the fixed effect the coefficient is insignificant with an expected sign. According to the theory, the increase of population growth rate leads to increase in the labor force and decrease in the amount of capital stock per worker. Thus, the effect of population growth rate could be negative or positive (Lin and Sosin, 2001).

The coefficients show that OPENNESS is positively related to economic growth and significant at 5% level in the OLS estimation, fixed effect, and random effect. The result consistent with our expectation, and similar to the finding in previous such as Pattillo *et. al. (*2004), and Hansen (2001).[12]

The coefficient of the secondary school has an unexpected negative sign and is significant at 5% level. This result may be because in the sample for the study most countries are poor and severely indebted. Clements *et. al.* (2003) found insignificant positive secondary school coefficients, and state the following: "Our results suggest that

[12] Patillo et. al. use several methods of estimation, simple OLS, instrumental variable – henceforth IV--, fixed effects, differenced and system GMM. In their results, openness is significant in all the estimations

within the modest range of educational attainment levels in low-income countries, it is not possible to identify a positive relation between education and growth-although such a relation may exist for developing countries as a whole. Given the difficulty of identifying an empirical relationship between variables measuring human capital and growth, however, it is not possible to quantify how external debt might depress growth via this channel in low- income countries." (Clements, 2003: 11)

The coefficient of the ratio of total investment to GDP is highly significant and positive in all estimations at the 1% level of significant. This result is consistent with the forecast and similar to the findings in prior studies. For example, Levine and Renelt (1992) find a positive and strong relation between investment and economic growth, Pattillo *et. al.* (2002) find investment highly significant in all the regressions, Lin and Sosin (2001) find a positive relation that is highly significant at 1% level, and Dijkstra and Hermes (2001) find the relationship to be highly significant and positive in all regressions they used. .

As expected, the coefficient of the dummy for the HIPC group is negative and significant at 5% level in OLS estimation. Although all the countries included in the sample show a negative relation with economic growth, the HIPC group seems to suffer more from negative economic growth than the rest of the countries. This result is supported by the debt overhang hypothesis indicating that the countries which have unsuitable external debt seem to have negative economic growth.

Table 3: Debt / GDP: After Correction for Serial Correlation, 1971-1996

Variables	Original OLS	Serial Correlation Corrected
DGDP	-.00885 (0.0000) ***	-0.0076 (0.0011)**
PP	-.62103 (0.0082) **	-0.9036 (0.0028)**
OPEN	0.0191 (0.0008) **	0.0155 (0.0193)**
Dummy	-1.3144 (0.0004) **	-1.9088 (0.001)**
SS	-.0423 (0.0000) ***	-0.0575 (0.0000) ***
IVGDP	0.1928 (0.000) ***	0.1637 (0.0000) ***
Constant	1.6963 (0.0272) **	3.2193 (0.0001) **
R-Squared	0.1675	0.3252
F-statistic	33.7745	7.1800
Durbin –Watson-stat	1.6848	1.9905
No. observations.	1014	923

Notes: (1) The numbers in parentheses are the P-values.
(2) * Indicates statistical significant at the 10% level with two-tailed test.
** Indicates statistical significant at the 5% level with two-tailed test.
*** Indicates statistical significant at the 1% level with two-tailed test.

As table 2 shows, Durbin- Watson is about 1.68 in OLS estimation, which is an indeterminate result for serial correlation. In the fixed and random affect models, Durbin-Watson statistics are 1.9 and 1.8 respectively, greater than upper level DW bounds and smaller than 2, so we accept the null hypothesis that DW= 2, suggesting no serial correlation in both fixed and random effects models. In order to make sure that there is no serial correlation in OLS model, we correct for this by using a first-order autoregressive process AR (1). Column 3 in Table 3 provides the corrected results, while column 2 presents the original OLS results. The procedure used permits each country to have a unique AR(1) pattern. The Durbin-Watson statistic in the corrected model has increased to 1.99 indicating the absence of serial correlation. The R-squared increased to 0.32. The F statistic is greater than the critical F with 6 and 100 degree of freedom allowing us to reject the null hypothesis and state that this model has explanatory power at 5%. All the coefficients are remained significant in the corrected model.

We use the ratio of total debt services to export as another measure of debt burden. As indicated earlier, the Hausman test indicates that the fixed effect model is preferred to random effect model. The F-statistic for overall model validity is highly significant at 5% level in the OLS, fixed and random effect models. The results of the Durbin-Watson test indicate the absence of serial correlation in all the models.[13]

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[13] In OLS, Fixed Effects, and Random Effects, d_u upper limit is 1.78 and lower limit d_I is 1.56, since d_u ‹DW› 2 , we accept the null hypothesis of no serial correlation

Table 4: Debt services/ Exports: Impact on Economic Growth, 1971-1996

Variables	OLS	Fixed effect	Random Effect
DSX	-0.0379 (0.0002)**	-0.0167 (0.2588)	-0.0245 (0.0669)*
IVGDP	0.2415 (0.0000)***	+0.3474 (0.0000)***	+0.2868 (0.0000)***
OPEN	-0.0008 (0.8823)	+0.0428 (0.0016)	+0.010 (0.2426)
PP	-0.4404 (0.0739)*	0.0421 (0.91150)	0.0261 (0.9334)
SS	-0.0400 (0.0001)***	-0.0092 (0.0076)***	-0.0497 (0.0076)***
DUMMY	-1.4577 (0.0002)***	-	-1.6759 0.0441**
C	1.9557 (0.0118)**	-5.2604 0.0021***	-0.3743 (0.7791)
R-squared	0.1841	0.2473	0.0740
F-statistics	32.90	4.840	11.65
Durbin-Watson	1.802	1.962	1.874
No. observations	882	882	882

Notes: (1) The numbers in parentheses are the P-values.
(2) * Indicates statistical significant at the 10% level with two-tailed test.
** Indicates statistical significant at the 5% level with two-tailed test.
*** Indicates statistical significant at the 1% level with two-tailed test.

The results confirm the hypothesis of a negative relation between the debt burden and economic growth. A country which has large debt obligations seems to grow more slowly because increasing debt services leads to pressure in the country's budget in both revenues and expenditures sides. This in turn will harm economic growth indirectly in several ways, as we explained in chapter three. As Table 4 shows, the coefficient of the ratio of debt services to export is negative and significant in OLS estimation at 5%. Similarly to these findings, previous empirical studies such as Dijsksta and Hermes (2001), Karagol (2001) and Serieux and Samy (2001) find negative and significant relation between economic growth and debt services to exports. However, Clements *et. al.* (2003) find an insignificant relationship between debt services to GDP and economic growth as the fixed effect model suggests.

As Table 4 shows, the coefficient of the ratio of total investment to GDP is positive and strongly significant at 1% level in all three estimated models. Contrary to the first regression in Table 2, the coefficient of openness is insignificant in the OLS estimation. In the fixed effect the coefficient of openness is positive and significant, while debt services coefficient is insignificant. It is consistent with these results, although not proved, that debt services and openness are related to each other. Debt services may effect economic growth through volume of trade by reducing imported inputs. This is known as "import compression" effect, which is stated by Serieux and Samy (2001).

As predicted, the coefficient of dummy variable for HIPC group is negative and significant at 5% level in both OLS and random models. The results indicate that the debt obligations in highly indebted poor countries have greater negative impact on economic

growth than the rest of the countries. Dijkstra and Hermes (2001) is the only study reviewed that used a dummy variable for HIPC. They find a negative and significant relation between GDP per capita growth and the uncertainty of debt services. As reported in Tables 2 and 3, the coefficient of the population growth rate is significant and negative at 5% level in OLS estimation, while it is not significant in the fixed effects estimation.

In two regressions, we have used as explanatory variables two debt indicators, the ratio of total debt to GDP and the ratio of debt services to exports, and also a dummy variable to represent highly indebted poor countries. We also applied different methods (OLS, fixed effects, and random effects) to show how the results differ from one another. The coefficient of the ratio of debt to GDP is negative and highly statistically significant in all estimation methods. Most of the estimations provide a negative relationship between the ratio of debt services obligation to exports and economic growth. The dummy variable for highly indebted poor countries is negative and significant in all estimated models, indicating that the HIPC group suffers from negative growth more than the other countries. These results are consistent with debt overhang theory that suggests that a high level of debt is associated with negative growth rate.

The results also provide some evidence that the negative relationship between debt and economic growth is not limited to the highly indebted countries group but also is present in those countries that did not qualify for HIPC initiative. To support this hypothesis, the two groups are regressed separately. Table 11A in the Appendix provides the empirical results for HIPC group. As the table shows, the coefficients of debt to GDP

are negatively related to economic growth and strongly significant at different levels of significance: 1% level in OLS estimation and 5% level in both fixed effect and random effect panel regressions. The coefficients of debt services in regression two are negative and significant at 5% level in OLS estimation and negative but insignificant in fixed and random Effect estimations (Table 12A).

Table 13A provides the results for the second group of countries, the non-HIPC. As the table shows, the coefficients of total debt to GDP are negatively related to economic growth and significant at 5% level in all estimated methods. The coefficient of debt services to exports is a negative relationship and significant at the 1% level in OLS estimation, 5% level in fixed effect, and 5% level in random effect.

Conclusion

The theoretical literature on the relationship between debt and economic growth provides different explanations about the way that debt effects growth. In the debt overhang theory, lower level of debt is associated with positive economic growth. However, when the debt reaches a high level it has disincentive effects because expected future taxes lead to reductions in the return on capital and discourage private investments, which in turn effects growth in a negative way. High levels of debt can also have a negative impact on growth through the fiscal account by crowding out both private and public investment in two ways. The first way crowding out happens is through the revenues because high levels of debt services lead governments to raise taxes in order to increase their revenues to face the obligations of debt. These actions cause shrinkage in the opportunities for private investments. The second way is through government spending because higher levels of debt services mean reduced government spending, especially in education, public investment, and health, which leads to slower rates of economic growth.

In 1996, the International Monetary Fund and World Bank proposed a framework to provide special assistance for heavily indebted poor countries (HIPC) for which traditional debt relief mechanisms were not enough to bring down their debt to sustainable levels. This study investigated the impact of economic growth in a sample that includes two groups. The first group contains 33 countries qualifying for HIPC initiative; the second group consists of 24 middle-income developing countries that have a debt burden, but do not qualify for HIPC.

The study uses two debt variables, the total debt as ratio to GDP to measure debt overhang, and debt services as a ratio of export to measure the crowding-out effect. To make sure that the impact of debt on economic growth is robust, we use several different estimation methods, including ordinary least squared (OLS), fixed effects, and random effects techniques. The results of this study do support both the debt overhang theory and the crowding-out effect. In the first regression, the relationship between total debt and economic growth is negative and highly significant in all estimated methods. This result is consistent with debt and growth theory, indicating that high level of debt will have disincentive effect and a negative relationship to economic growth. This fact is supported by the correlation matrix between the level of debt and growth rate in 1977 and 1983. When the level of debt was low in 1977, the correlation between debt and growth was positive, but this relation changed to negative in 1983 as a result of increasing the level of debt by approximately 100%. Combining this result with the stronger regression results, we conclude the debt overhang theory is supported in our study.

Our results are also consistent with the crowding-out effect hypothesis, although this conclusion is not unanimous from the models. Debt services and economic growth are generally significant and negatively related. The negative relationship between economic growth and debt services means that governments in highly indebted poor countries apply inflationary fiscal policies by increasing taxes and reducing government spending in some important areas, causing crowding out of both private and public investment.

We have also shown that the impact of debt on economic growth is not limited to the highly indebted poor countries under the HIPC initiative, but also other countries from middle income levels suffer from heavy debt and have negative relationships between their growth rate and debt. For this reason and assuming that the initiative will have some benefits, the initiative should be spread to all developing countries whose debt levels are in the range for which growth rates are negatively related to debt indicators.

Although the HIPC initiative represents a great step forward compared with other debt initiatives over the past decades, the concept of sustainable debt should be related to the country's positive economic indicators rather than the capacity of debt service. Therefore, a further enhancement of policy making would be to use appropriate and sufficient indicators for making long term economic growth in indebted countries the main goal for any future initiatives.

In summary, two policy implications are recommended. First, all developing countries which have high levels of debt and suffer from negative growth should be included in the HIPC group to get benefits from the assistance provided. Second, a new relationship between rich and poor countries should be established. Both debtors and creditors share the causes of the debt crisis and they need to share the solution as well. In fact, solution of the debt problem represents the interests and the needs of both sides. Creditor countries should widen their markets in developing countries but this goal requires a sustainable positive growth in these countries. At the same time, developing countries cannot reach positive growth with heavy debt burdens. Based on this fact, the

objective of any debt relief initiative should be the enhancement of short and long term economic growth.

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Data Appendix

Dependent Variable

Growth rate of GDP per capita (GDPPC)

The values were computed using the annual growth rate and annual population growth. Global Development growth Database, William Easterly and Sewaden, World Bank. http://www.worldbank.org/research/growth/GDNdata.htm

Independent Variables

Total external debt as a ratio to GDP (DGDP)

Total external debt as a percent of GDP (Gross Domestic Production) from 1971-1996: this variable is available in Global Development Growth , William Eastrely and Sewaden, World Bank. http://www.worldbank.org/research/growth/GDNdata.htm.

Debt services to exports (DSX)

Total debt services as a ratio of exports from goods and services from 1971-1996: The data is available in world resources institute, Earth Trends, the environmental information www.erthtrands.wer.org/searchable-db/index.cfm

Population growth rate (POP)

The annual growth rate from 1971 to 1996 data were taken from Global Development Growth , William Eastrely and Sewaden, World Bank. http://www.worldbank.org/research/growth/GDNdata.htm

Secondary school (SS)

The ratio of the number of children of official secondary schools who were enrolled in secondary school to the population of the corresponding age. The data were taken from Global Development Growth, William Eastrely and Sewaden, World Bank, http://www.worldbank.org/research/growth/GDNdata.htm

Total investment as a ratio to GDP (INGDP)

Total private and public investment as a percentage of GDP data were taken from Penn world Tables Version 6.1 available in http://datacentre.chass.utoronto.ca/pwt/alphacountries.

Openness

The total of exports and imports as a ratio to GDP data were taken from Penn World Tables Version 6.1.available:

http://datacentre.chass.utoronto.ca/pwt/alphacountries.html

List of Countries

Group one: HIPC Countries

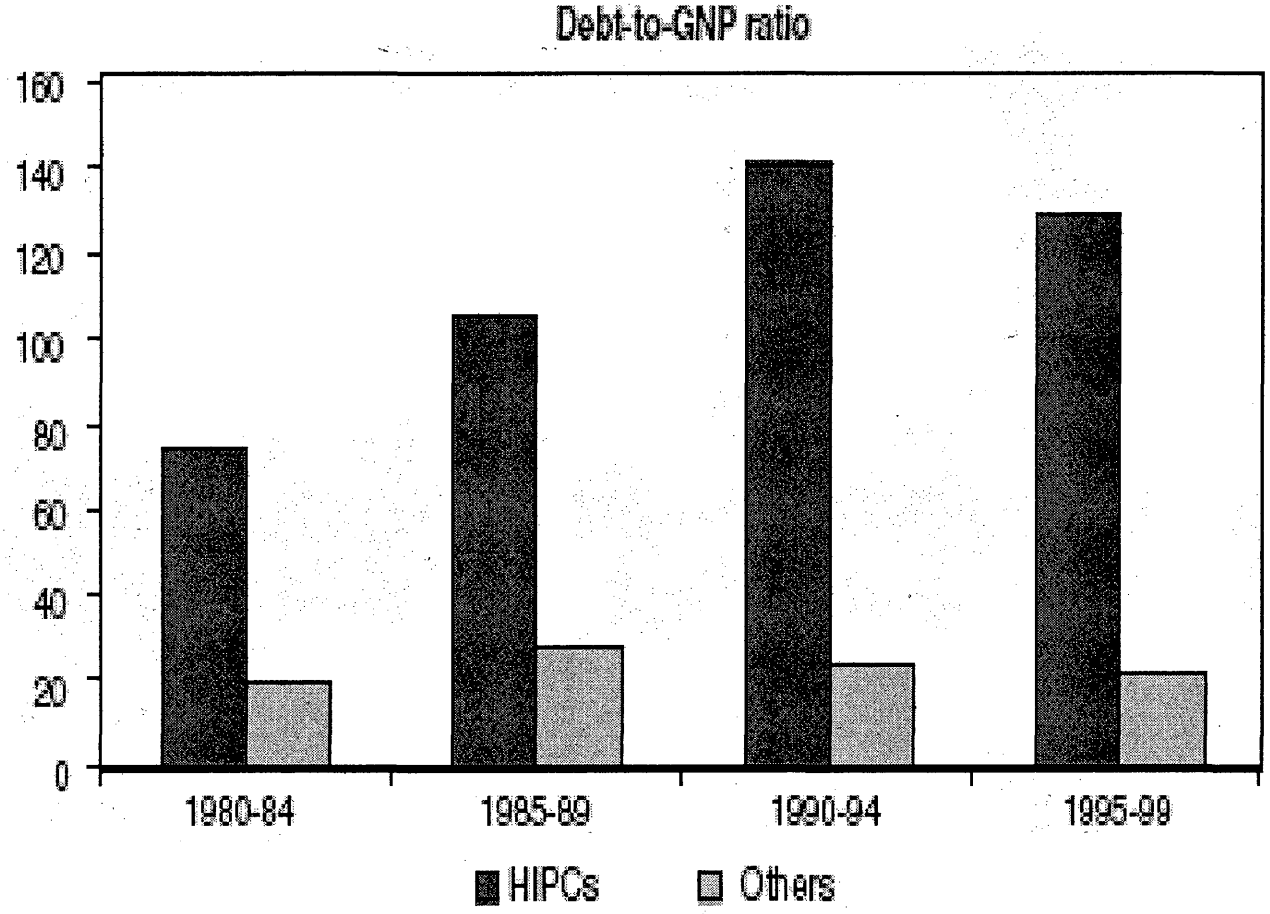
(1) Bolivia, (2) Benin, (3) Burkina Faso (4) Burundi, (5) Cameroon, (6) Central African Republic(7)Chad,(8) Congo, (9) Cote d'Ivoire, (10) Dem. R.Cog , (11) Ethiopia, (12) Gambia, (13) Ghana, (14) Guinea, (15) Guinea-Bissau, (16) Guyana, (17) Honduras, (18) Madagascar, (19) Malawi, (20) Mali, (21) Mauritania, (22) Myanmar, (23) Mozambique, (24) Nicaragua, (25) Niger, (26) Rwanda, (27) Senegal, (28) Sierraleone, (29) Somalia, (30) Sudan, (32) Uganda, (33) Zambia.

Group Two: Middle Income Developing Countries

(1) Algeria, (2) Argentina, (3) Bangladesh, (4) Brazil, (5) Chile (6) Colombia, (7) Costa Rica, (8) Dominican Republic, (9) Ecuador, (10) Egypt, (11) El Salvador, (12) Guatemala, (13) India, (14) Indonesia, (15) Jamaica, (16) Jordan, (17) Morocco, (18) Mexico, (19) Nigeria, (20) Pakistan, (21) Peru (22) Philippines, (23) Sri lanka, (24) Zimbabwe

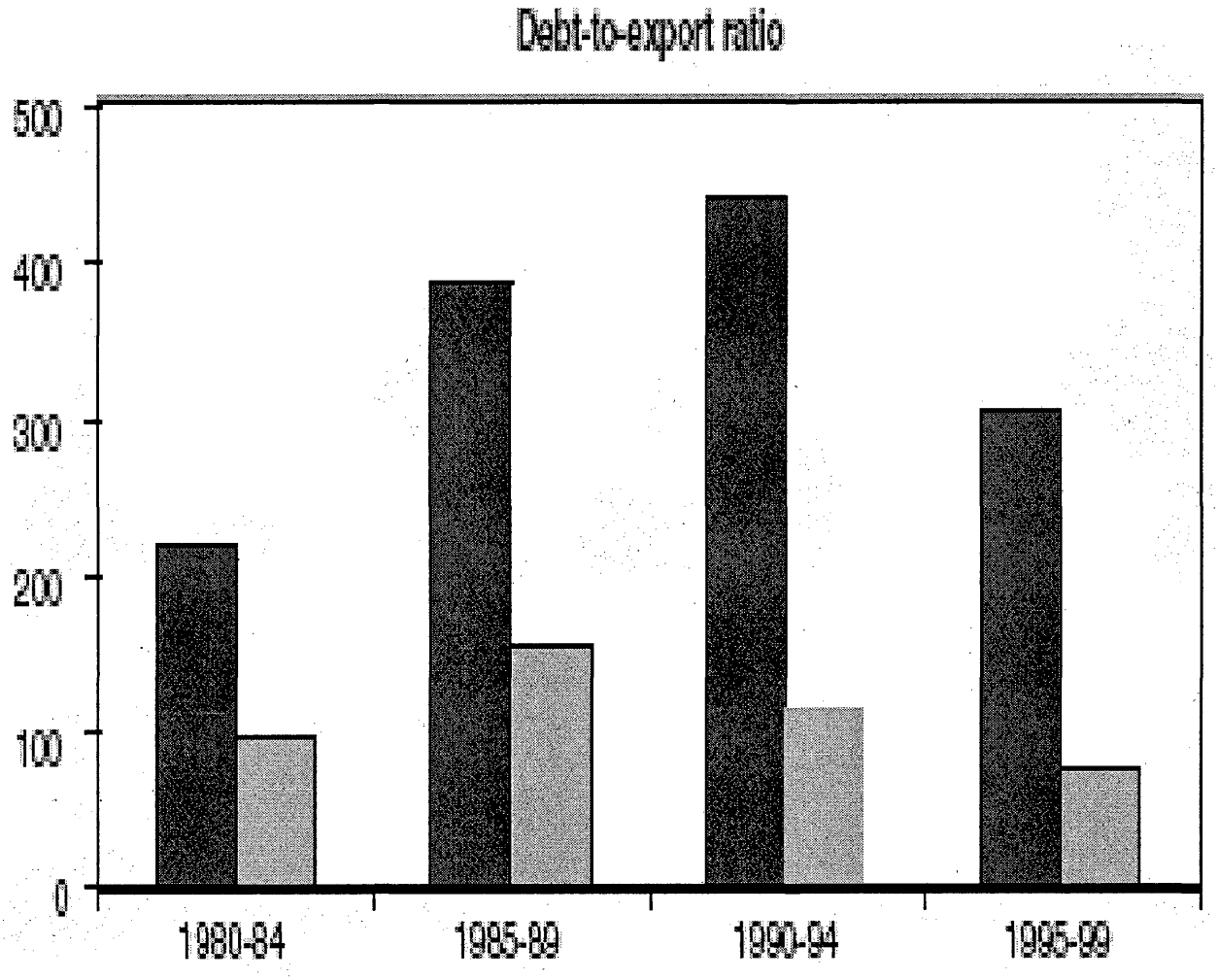
Figure Appendix

Figure 1A: Total debt as a ratio to GNP in HIPCs and other developing countries.



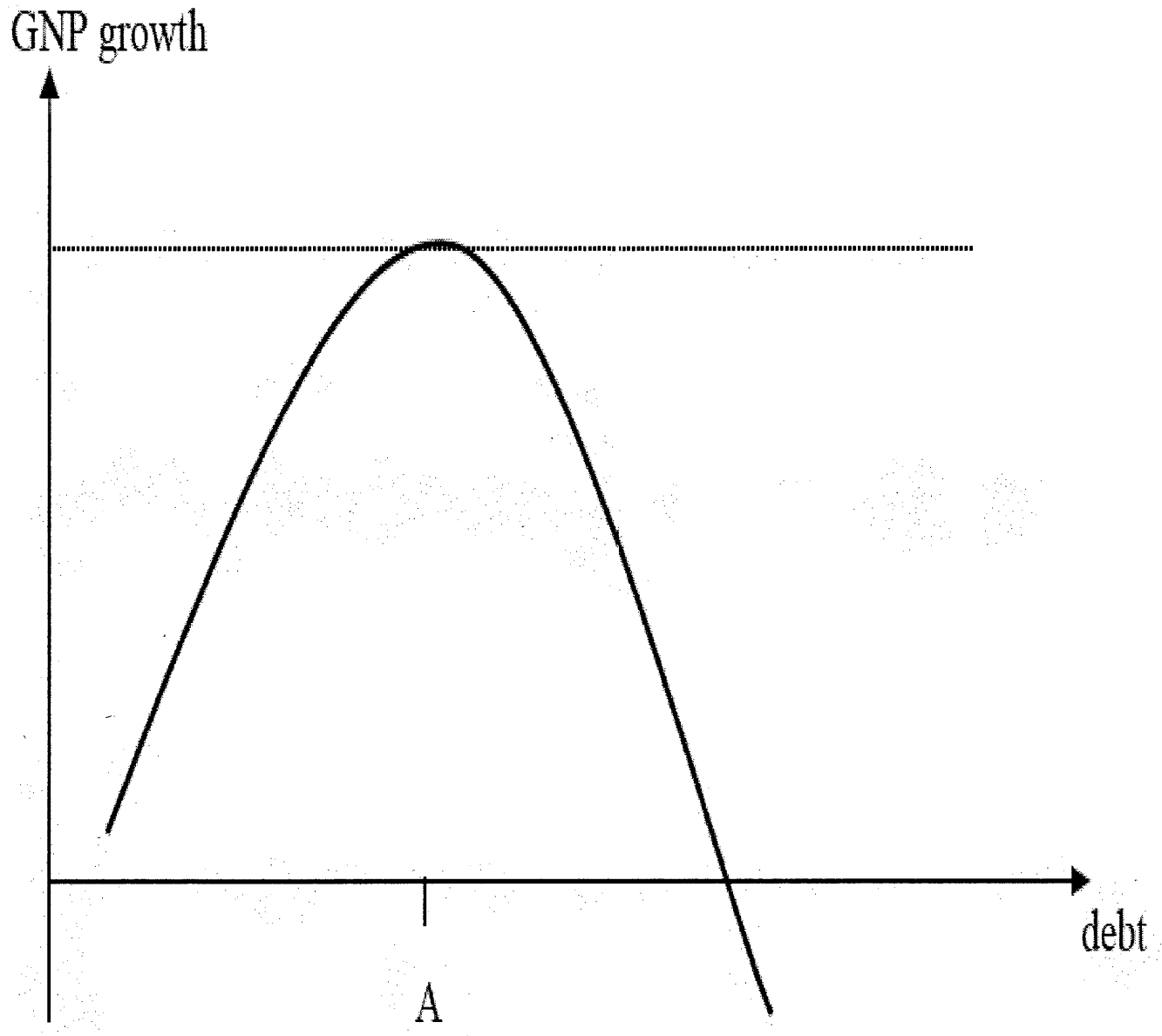
Source: Institute for International Economics (2002: 20)

Figure 2A: Total debt services as a ratio of goods and services to exports in HIPCs and other developing countries.



Source: Institute for International Economics (2002: 20)

Figure 3A: The relationship between debt and GNP in the debt overhang theory.



Source: Gunter (2003: 3)

Figure 4A: The relationship between the total debt ratio and growth rate of GDP per capita, 1977

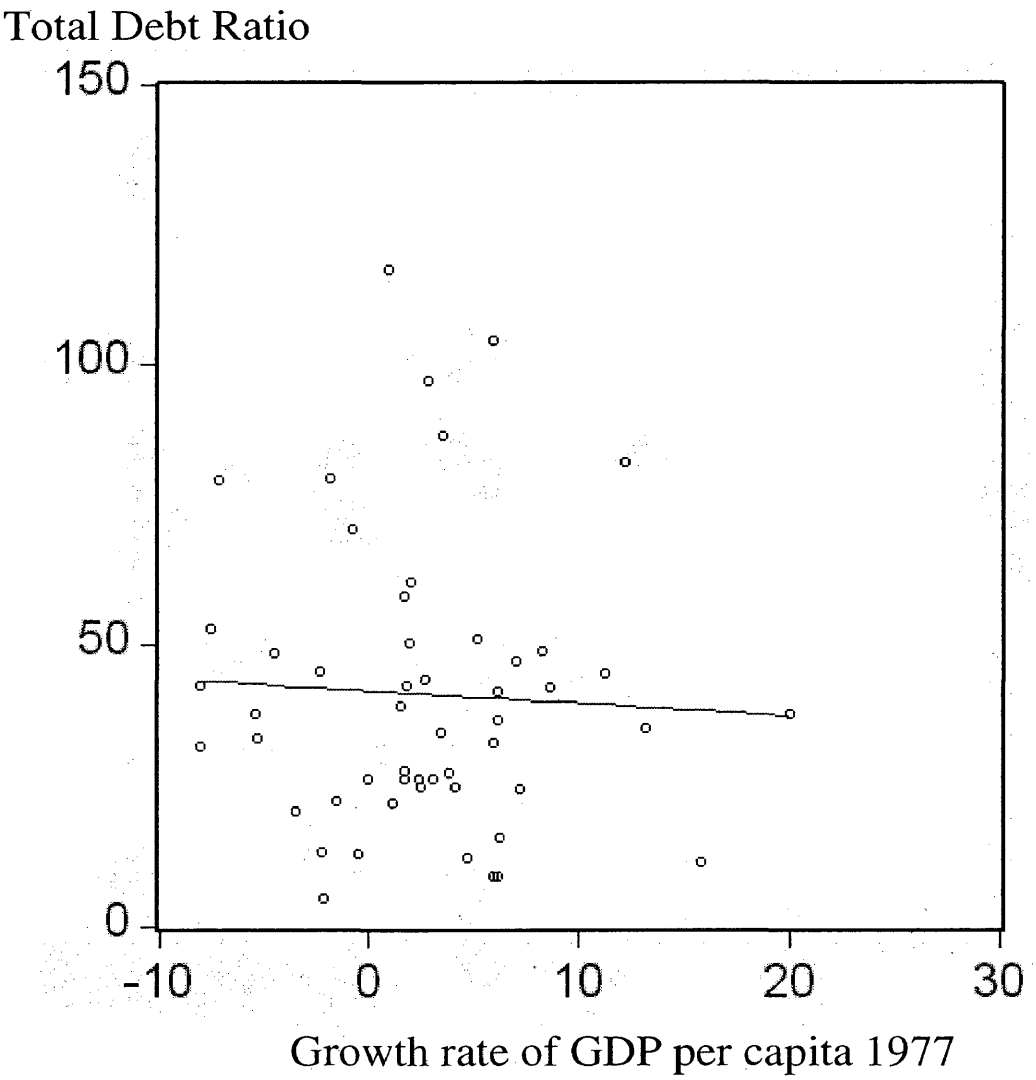
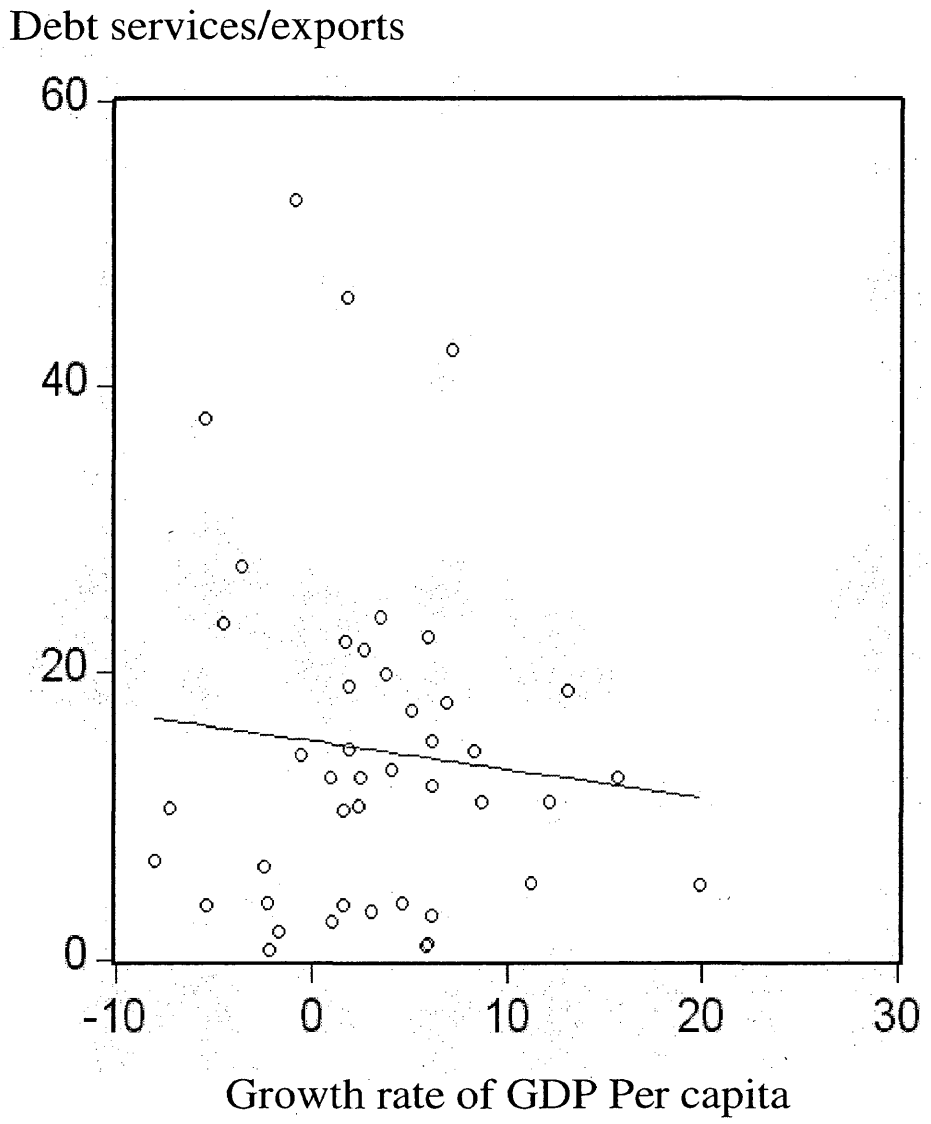
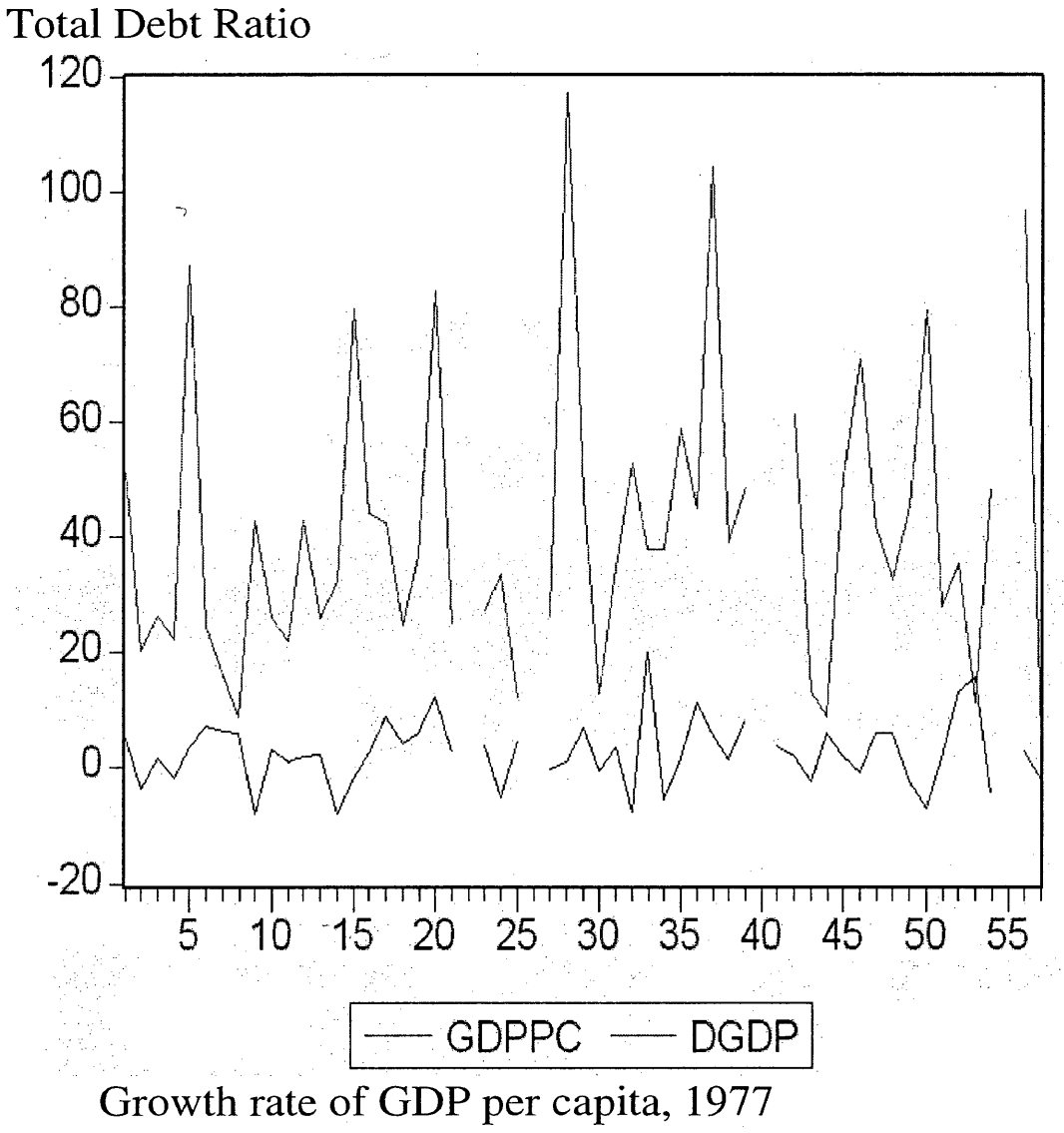


Figure 5A: The relationship between the ratio of debt services to exports and the GDP per capita growth rate, 1977.



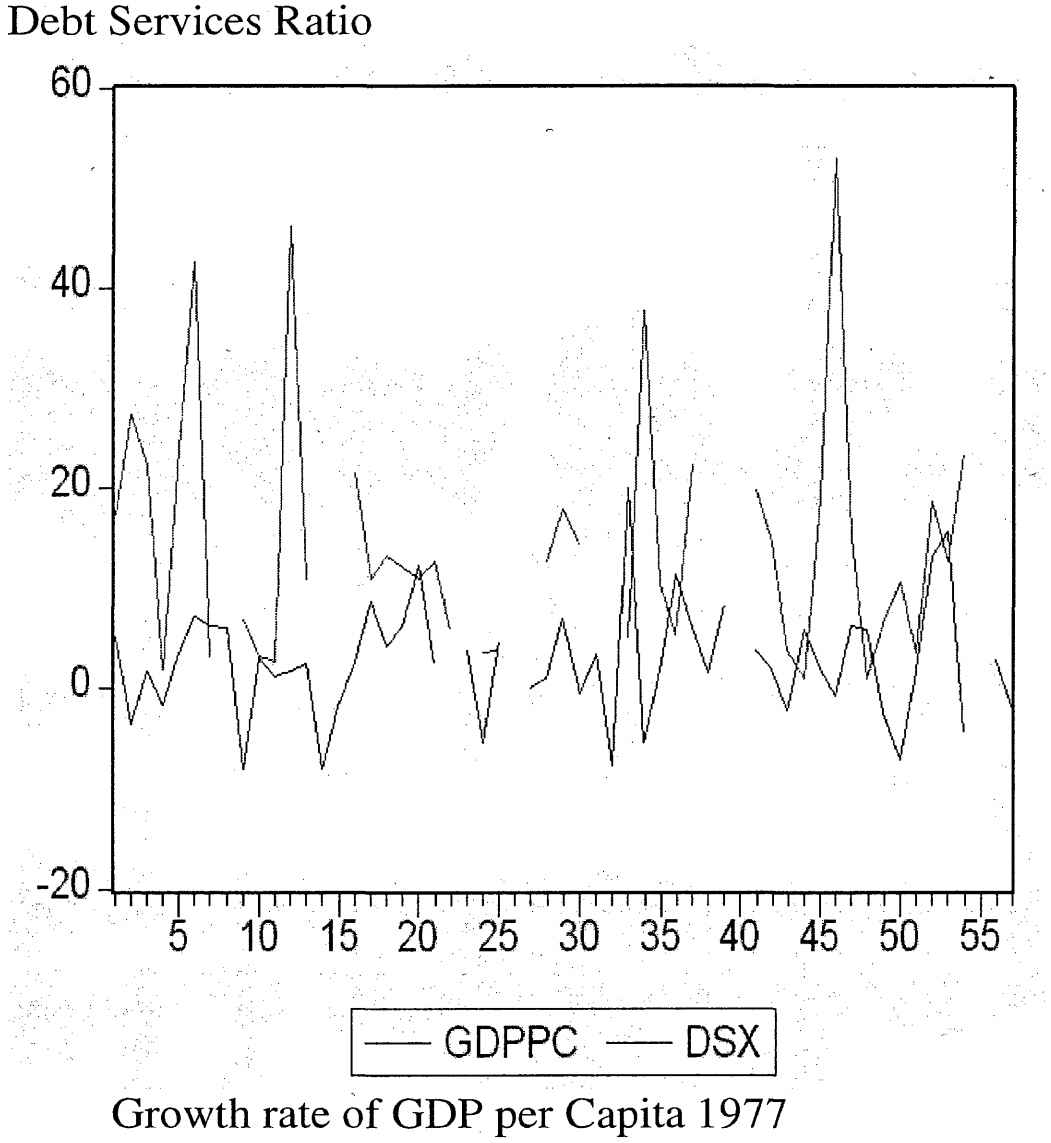
Source: See data appendix.

Figure 6A: Relationship between Total External Debt ratio and GDP per capita growth rates, 1977.



Source: See data appendix.

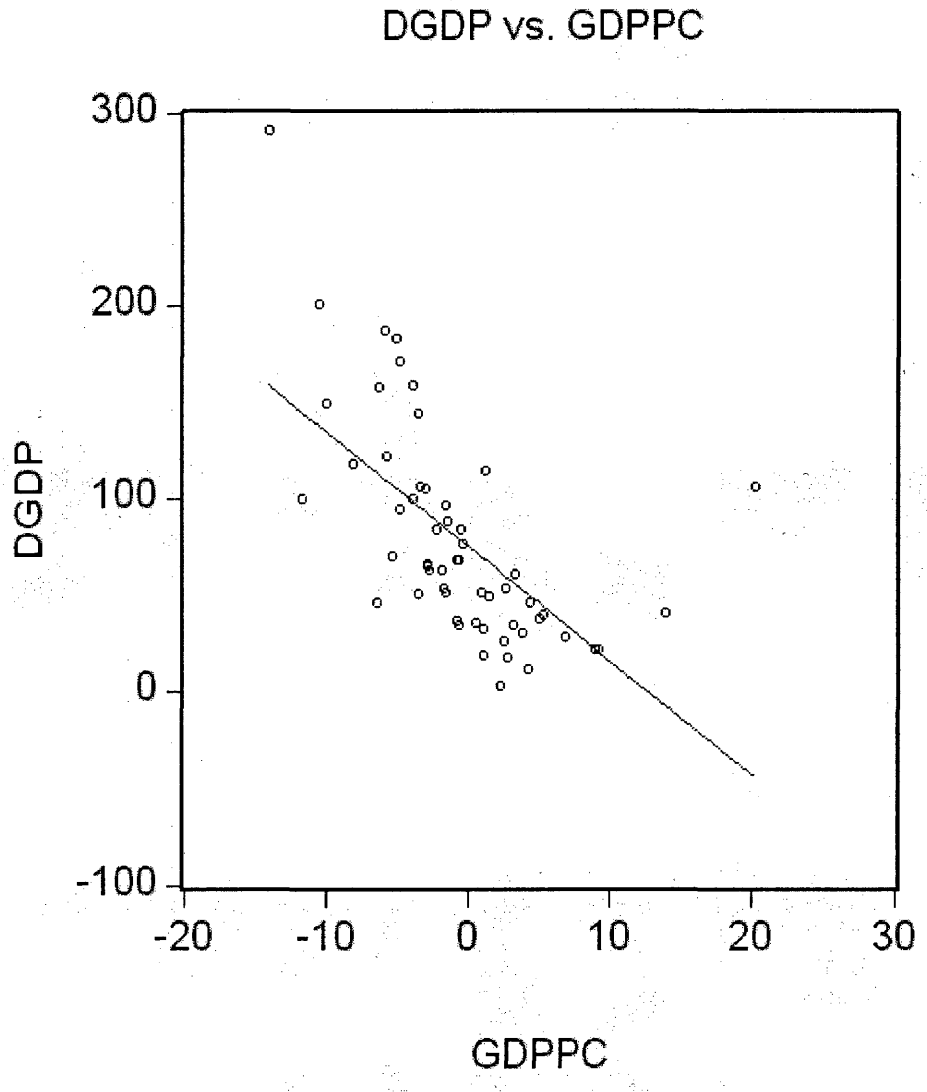
Figure 7A: Relationship between total debt services to exports ratio and the growth of GDP per capita, 1977.



Source: See data appendix.

Figure 8A: Relationship between total external debt ratio and growth of GDP per capita, 1983.

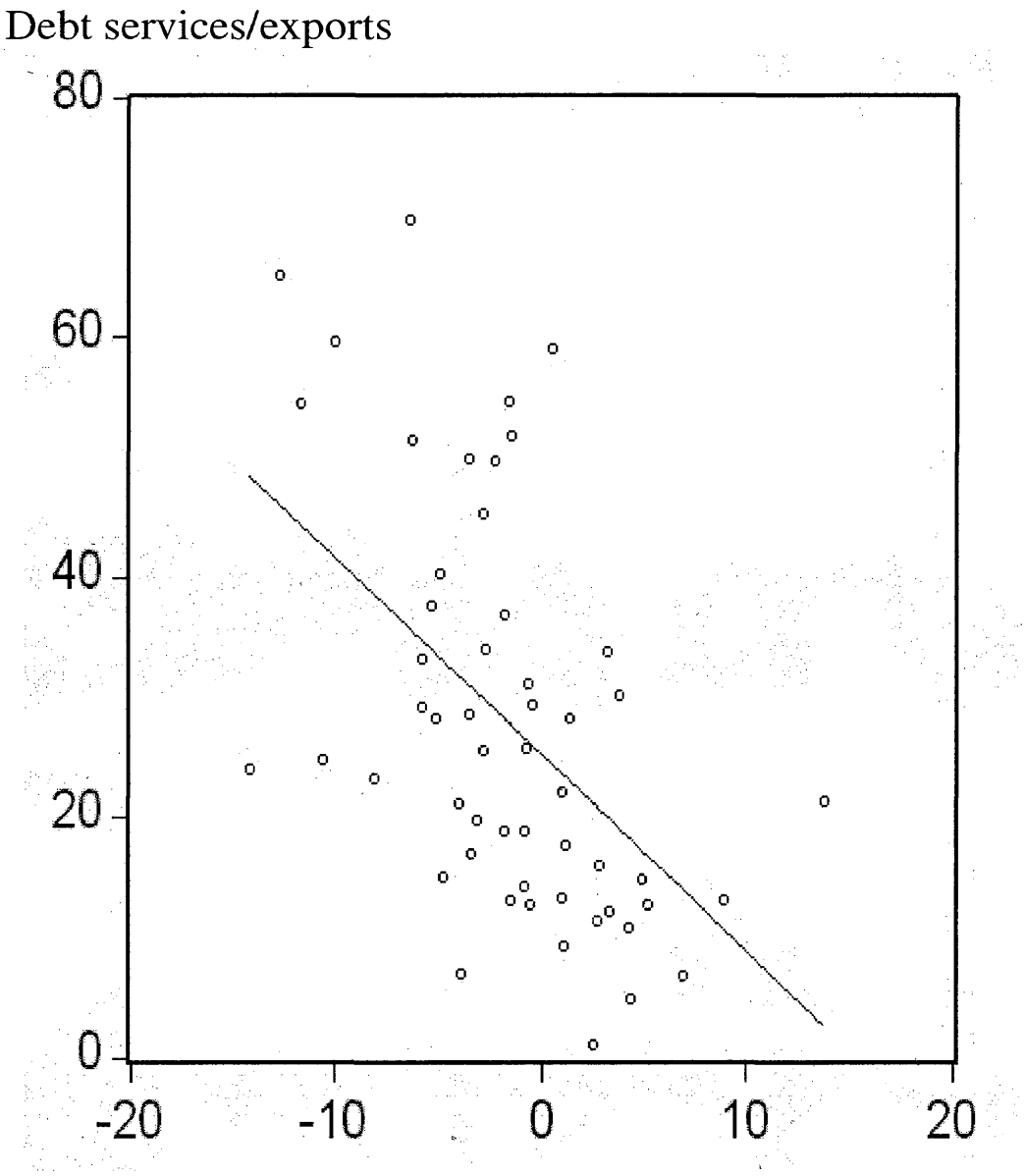
Total external debt ratio



Growth rate of GDP Per Capita

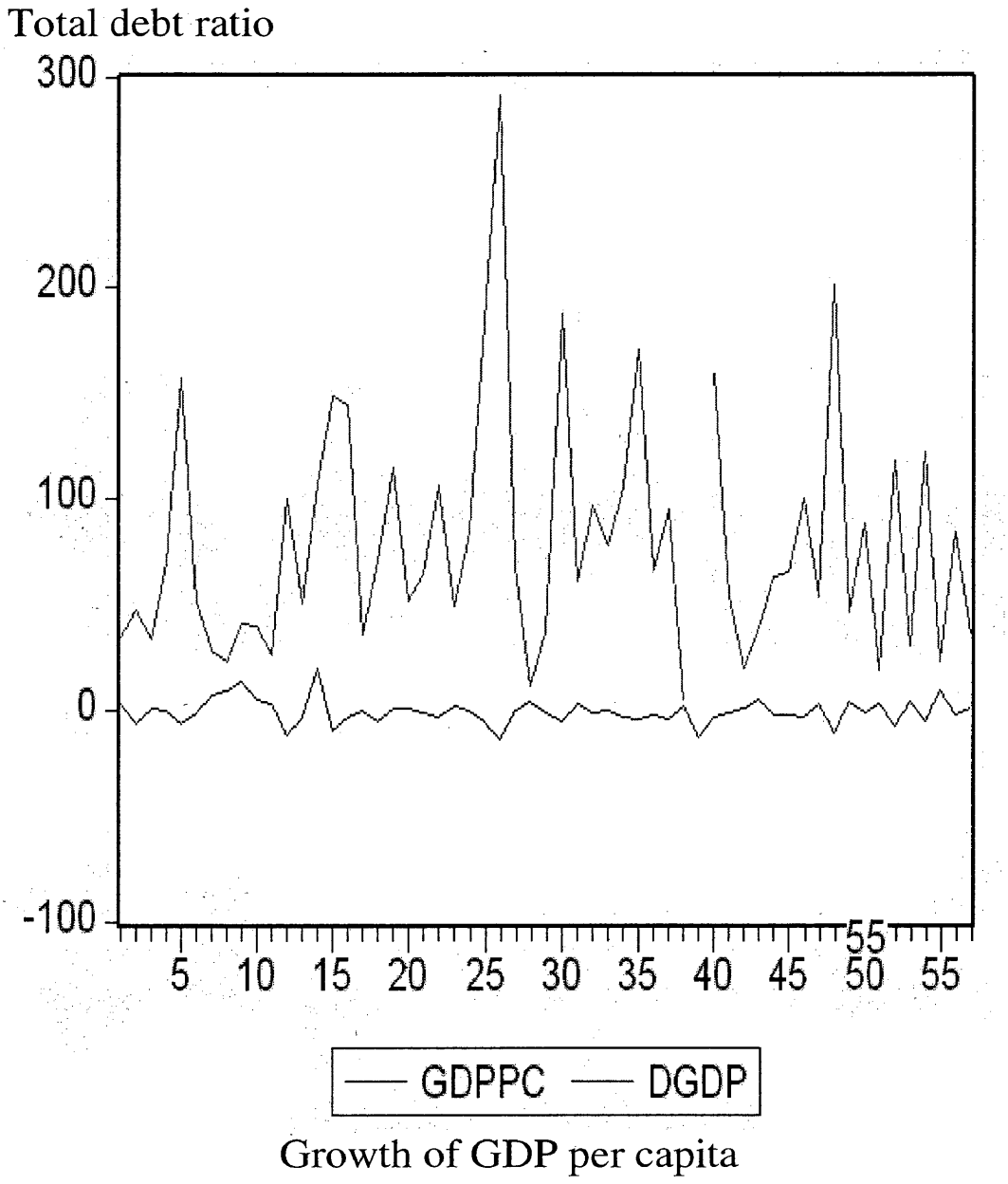
Source: See data appendix.

Figure 9A: Relationship between ratio of debt services to exports and the growth rate of GDP per capita, 1983.



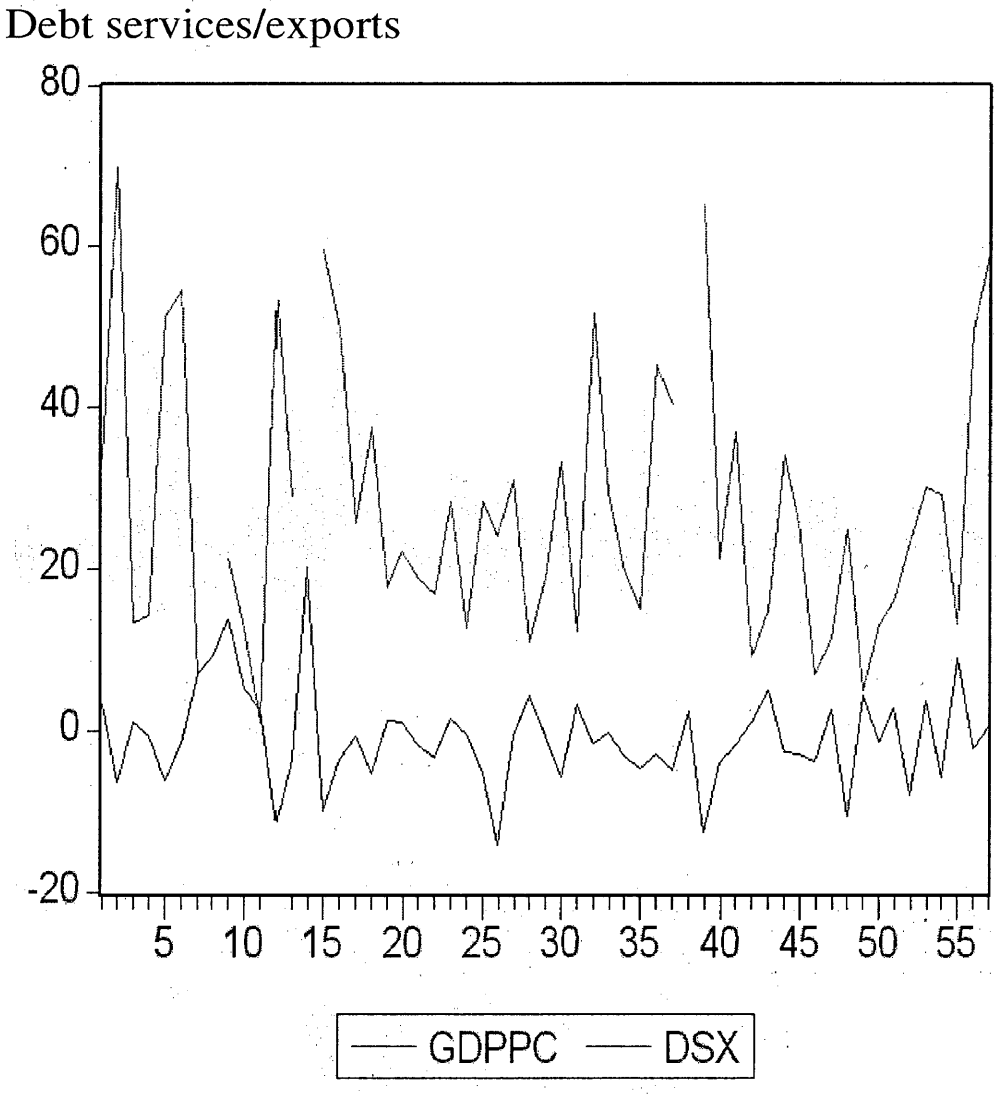
Source: See data appendix.

Figure 10A: Relationship between total debt ratios and growth of GDP per capita, 1983.



Source: See data appendix.

Figure 11A: Relationship between debt services ratio and growth rate of GDP per capita, 1983.



Source: See data appendix.

Table Appendix

Table 1A: Total External Debt/Gross National Product

	1980	1985	1986	1987	1988	1989
Sub-Saharan Africa	30.6	32.76	63.5	75.2	67.2	69.1
Severely Middle Income Countries	32.5	34.8	62.3	61	55.8	49.5
Middle Income Countries	29.1	31.1	38	39.2	34.1	31.6
Least Developed Countries	26.5	28.3	37.6	39.6	35.1	33.9
African Countries	40	43	57	86	88	92

	1990	1991	1992	1993	1994	1995
Sub-Saharan Africa	70.8	70.6	69.8	73.2	78.7	74.1
Severely Middle Income Countries	46.5	49.3	45.4	41.3	37.7	39.3
Middle Income Countries	30.4	32.4	32.9	33.9	34.9	36.5
Least Developed Countries	33.2	35.2	35.7	37	37.6	37.7
African Countries	92	103	99	106	117	117.3

Source: Semboja (1988: 40)

Table 2A: Total debt service/Total exports

	1980	1985	1986	1987	1988	1989
Sub-Saharan Africa	9.7	17.05	24.9	19.4	20.7	17.9
Severely Middle Income Countries	27.6	48.5	39.7	31.2	36.1	32.4
Middle Income Countries	13.8	24.4	26.1	24.5	23.6	20.4
Least Developed Countries	13.2	23.3	25.9	23.7	22.9	20.3
African Countries	15	29	26.9	27	30	28

	1990	1991	1992	1993	1994	1995
Sub-Saharan Africa	17.8	16.4	15.7	14.9	14	14.7
Severely Middle Income Countries	26.5	29.3	30.9	31.4	27.9	30.8
Middle Income Countries	18.1	18.7	17.3	18	17	16.6
Least Developed Countries	18.3	18.6	17.1	17.6	16.6	16.3
African Countries	27	27	26	25	26	25.3

Source: Semboja (1988: 41)

Table 3A: Indicators of external debt, non-oil developing countries, 1973-82 (billion dollars and percentages).

External debt	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Total	130.1	160.8	190.8	228.0	278.5	336.3	396.9	474.0	550.0	612.4
Long term	113.8	138.1	163.5	194.9	235.9	286.6	338.1	388.5	452.8	499.6
Total, 1975 prices[a]	169.0	175.7	190.8	218.0	250.9	281.0	294.7	308.6	331.3	357.8
Exports[b]	112.7	153.7	155.9	181.7	220.3	258.3	333.0	419.8	444.4	427.4
Debt /export percentage	115.4	104.6	122.4	125.5	126.4	130.2	119.2	121.9	124.9	143.3
Debt service[c] **/export Reported**	15.9	14.4	16.1	15.3	15.4	19.0	19.0	17.6	20.4	23.9
Adjusted[d]	n.a	-1.6	6.5	10.5	9.4	11.0	6.9	4.9	11.7	22.3
Debt/GDP	22.4	21.8	23.8	25.7	27.4	28.5	27.5	27.6	31.0	35.7
Oil as percentage of imports[e]	5.9	12.6	13.3	15.6	15.1	13.9	16.2	20.4	21.0	19.9

n.a: not available

Source: IMF, World Economic Outlook, 1982 and 1983; Cline (1984)

a. Deflated by US wholesale prices.
b. Goods and services.
c. Includes interest (but not amortization) on short–term debt.
d. Deducting inflationary erosion of debt.
e. Net oil importers only

Table 4A: Impact of oil prices on debt of non-oil developing countries (billion dollars)

Year	Actual A	Hypothetical B	Cost=A -B
1973	4.8	4.8	0.0
1974	16.1	5.3	10.8
1975	17.3	5.7	11.6
1976	21.3	6.8	14.5
1977	23.8	7.5	16.3
1978	26.0	8.6	17.4
1979	39.0	10.9	28.1
1980	63.2	11.9	51.3
1981	66.7	12.1	54.8
1982	66.7	11.9	54.8
Total	344.9	85.5	259.5

Source: IMF, world economic outlook (1982: 163)

a. Net oil importers
b. If oil prices had risen no more than the US wholesale price index from 1973.

Table 5A: Impact of exogenous shocks on external debt of non-oil developing countries (Billion Dollars)

Effect	amount
Oil price increase in excess of US inflation,1974- 82 cumulative	260
Real interest rate in excess of 1961-80	41
Terms of trade loss, 1981-82	79
Export volume loss caused by world recession, 1981-82	21
Total	401
Total debt : 1973	130
Total debt : 1982	612
Increase: 1973-82	482

Source: Cline (1984)

Table 6A: Paris Club rescheduling by type of terms of HIPC countries (1976-98)

Paris Club Terms	Date	Number of Rescheduling	Number of countries	Amount Consolidated (In millions) of dollars)
Non-concessional	Before Oct.1988	81	27	22803
Toronto terms	Oct- 1988-June-1991	28	20	5.994
London terms	Dec.1991-Dec. 1994	26	23	8857
Naples terms	Since January 1996	34	26	14664
Lyon terms	Since December 1996	5	4	2775

Source: (Daseking and Powell, 1999: 7).

Table 7A: Summary statistics for 57 countries, 1997.

	GDPPC	DGDP	SS	IGDP	PP	OPEN	DUM	DSX
Mean	2.613	41.984	25.272	13.976	2.5	55.410	0.545	14.721
Median	2.517	42.4	21	12.263	2.5	52.884	1	12.7
Maximum	12.206	117.1	61	28.220	3.9	141.975	1	53
Minimum	-8.009	4.7	2	3.449	0.6	12.256	0	0.6
Std. Dev.	4.768	26.825	17.676	6.745	0.627	27.402	0.505	12.968
Skewness	-0.128	1.047	0.607	0.703	-0.631	0.777	-0.182	1.370
Kurtosis	2.556	3.803	2.196	2.707	4.510	4.324	1.033	4.564
Jarque-Bera	0.361	6.922	2.920	2.838	5.334	5.739	5.501	13.700
Probability	0.834	0.031	0.232	0.241	0.069	0.056	0.063	0.0010
N.O	33	33	33	33	33	33	33	33

Source: See data appendix.

Table 8A: Summary statistics for 57 countries, 1983.

	GDPPC	DGDP	SS	INVGDP	PP	OPEN	DUMMY	DSX
Mean	-1.450	80.411	31.431	11.065	2.515	52.851	0.533	28.673
Median	-1.728	65	23.1	10.745	2.6	49.074	1	25.8
Maximum	13.860	291.2	77	26.424	3.8	112.97	1	69.7
Minimum	-14.085	11.7	3.2	2.275	0.6	14.772	0	6.7
Std. Dev.	5.183	55.505	20.091	4.858	0.690	25.331	0.504	15.929
Skewness	0.299	1.584	0.499	0.633	-0.669	0.852	-0.133	0.742
Kurtosis	3.999	6.025	1.986	3.591	3.280	3.158	1.017	2.701
Jarque-Bera	2.545	35.998	3.797	3.665	3.506	5.494	7.500	4.302
Probability	0.280	0	0.149	0.159	0.173	0.064	0.023	0.116
N.O	45	45	45	45	45	45	45	45

Source: See data appendix.

Table 9A: Correlation matrix, 1977.

	GDPC	DGDP	SS	INGDP	PP	OPEN	DUM	DS
GDPC	1	0.18	-0.07	0.04	0.21	0.11	-0.22	-0.01
DGDP	0.18452	1	0.35	-0.07	-0.22	0.62	0.21	0.31
SS	-0.0711	0.35	1	0.35	-0.51	-0.02	-0.51	0.56
IGDP	0.03605	-0.07	0.35	1	0.01	-0.16	-0.4	0.3
PP	0.2054	-0.22	-0.51	0.01	1	0.05	0.13	-0.15
OPEN	0.10939	0.62	-0.02	-0.16	0.05	1	0.43	-0.14
DUM	-0.2198	0.21	-0.51	-0.4	0.13	0.43	1	-0.44
DS	-0.0109	0.31	0.56	0.3	-0.15	-0.14	-0.44	1

Source: See data appendix.

Table 10A: Correlation matrix, 1983

	GDPC	DGDP	SS	IGDP	PP	OPN	DUM	DS
GDPC	1	-0.71	-0.38	0.027	0.266	-0.4	0.089	-0.47
DGDP	-0.71	1	0.159	-0.14	-0.26	0.721	0.243	0.167
SS	-0.38	0.159	1	0.53	-0.4	0.018	-0.67	0.523
IGDP	0.027	-0.14	0.53	1	-0.09	-0.19	-0.61	0.403
PP	0.266	-0.26	-0.4	-0.09	1	0.033	0.367	-0.16
OPEN	-0.4	0.721	0.018	-0.19	0.033	1	0.292	-0.16
DUM	0.089	0.243	-0.67	-0.61	0.367	0.292	1	-0.36
DS	-0.47	0.167	0.523	0.403	-0.16	-0.16	-0.36	1

Table 11A: Total Debt /GDP: Impact on economic growth, HIPC, 1971-96

Variables	OLS	Fixed Effect	Random Effect
DGDP	-.0090 (0.0000)***	-.0051 (0.0479)**	-.0058 (0.0096)**
INGDP	0.2726 (0.0000)***	0.3273 (0.0000)***	0.2956 (0.0000)***
PP	-0.4791 (0.1518)	0.0172 (0.9761)	0.3496 (0.4369)
SS	-0.0320 (0.0346)**	-0.0499 (0.3593)	-.00588 (0.1371)
Open	0.0234 (0.0025)**	0.0483 (0.0072)**	0.0276 (0.0271)**
Constant	-1.0071 (0.3558)	-4.5965 (0.0271)**	-3.9414 (0.0100)**
R-squared	0.1222	0.2045	0.0864
Durbin-Watson	1.840	2.0518	1.8564
F-statistic	10.8574	3.8863	10.0525
No. Observations	549	549	549

Notes: (1) The numbers in parentheses are the P-values.

(2) * Indicates statistical significant at the 10% level with two-tailed test.

** Indicates statistical significant at the 5% level with two-tailed test.

*** Indicates statistical significant at the 1% level with two-tailed test.

(3) The Hausman test rejects the hypothesis that random effect model is not misspecified.

Table 12A: Debt Services/Exports: Impact on economic growth, HIPC, 1971-1996

Variables	OLS	Fixed Effect	Random effect
DSX	-.0567 (0.0029)**	-.0028 (0.8993)	-0.0109 (0.5745)
IVGDP	0.2593 (0.0000)***	0.2842 (0.0006)**	0.0793 (0.0003)**
PP	-.0.3667 (0.3187)	0.2901 (0.6531)	0.5790 (0.2515)
SS	-0.0567 (0.0029)**	-0.1411 (0.0763)	-0.0793 0.0175
OPEN	0.0095 (0.2157)	0.0514 (0.0047)**	0.0243 (0.0631)**
Constant	-0.7642	-4.1278 (0.0862)	-3.8979 (0.0248)**
R-squared	0.0809	0.1899	0.0531
Durbin-Watson	1.8090	1.9858	1.7789
F-statistic	5.3374	3.1332	5.2641
No. observation	475	475	475

Notes: (1) The numbers in parentheses are the P-values.
(2) * Indicates statistical significant at the 10% level with two-tailed test.
** Indicates statistical significant at the 5% level with two-tailed test.
*** Indicates statistical significant at the 1% level with two-tailed test.
(3) The Hausman test rejects the hypothesis that random effects model is not misspecified

Table 13A: Total debt/GDP effect on economic growth, non-HIPC, 1971-1996

Variables	OLS	Fixed Effect	After correction for serial Correlation, AR(1)
DGDP	-0.0203 (0.0030)**	-.01686 (0.0511)**	-.0193 (0.0060)**
INVGDP	0.1318 (0.0002)**	0.0268 (0.0000)***	0.1499 (0.0005)**
PP	-0.5109 (0.1179)	0.4608 (0.2970)	-1.0866 (0.0036)
SS	-.0351 (0.0018)**	0.0293 (0.2484)	-0.0555 (0.0000)***
OPEN	0.1318 (0.0002)**	0.0625 (0.0002)**	0.0165 (0.1323)
C	2.9734 (0.0028)**	-6.8959 (0.0014)**	4.3189 (0.0000)***
F-Statistic	3.6886	5.3211	-
R-Squared	0.1369	0.2538	0.3368
Durbin-Watson	1.5316	1.8655	2.0193
No. observations	467	467	428

Notes: (1) The numbers in parentheses are the P-values.
(2) * Indicates statistical significant at the 10% level with two-tailed test.
** Indicates statistical significant at the 5% level with two-tailed test.
*** Indicates statistical significant at the 1% level with two-tailed test.

Table 14A: Debt services/ Exports: Impact on Economic Growth, non-HIPC. 1971-96

Variables	OLS	Fixed Effect	Random Effect	AR(1)
DSX	-0.0671 (0.0000)***	-0.0359 (0.0634)**	-.0049 (0.0068)**	-0.0648 (0.0001)**
INVGDP	0.2311 (0.0000)***	0.3986 (0.0000)***	0.3087 (0.0000)***	0.1862 (0.0000)***
PP	-0.4936 (0.1268)	0.1578 (0.7296)	-0.2564 (0.5040)	-0-6538 (0.0897)*
OPEN	-0.0231 (0.0111)**	0.0211 (0.3433)	-0.0103 (0.4733)	-0.0171 (0.1137)
SS	-0.0136 (0.2819)	0.0436 (0.1345)	-.0096 (0.6425)	-0.0233 (01220)**
C	2.8412 (0.0028)**	-6.7447 (0.0036)**	-0.2282 (0.8861)	3.6844 (0.0001)**
R-squared	0.1716	0.2665	0.0936	0.3525
F-statistic	6.1242	5.1158	8.6564	
Durbin-Watson	1.5866	1.8720	1.6961	2.1078
No. observations	425	425	425	388

Notes: (1) The numbers in parentheses are the P-values.
(2) * Indicates statistical significant at the 10% level with two-tailed test.
** Indicates statistical significant at the 5% level with two-tailed test.
*** Indicates statistical significant at the 1% level with two-tailed test.
(3) The Hausman test rejects the hypothesis that random effects model is not misspecified