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## The Impact of External Indebtedness on Poverty in Low-Income Countries

*Boileau Loko, Montfort Mlachila,  
Raj Nallari, and Kadima Kalonji*

## IMF Working Paper

Policy Development and Review Department

### **The Impact of External Indebtedness on Poverty in Low-Income Countries**

Prepared by Boileau Loko, Montfort Mlachila, Raj Nallari, and Kadima Kalonji<sup>1</sup>

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#### **Abstract**

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

This paper explores the relationship between external debt and poverty. A number of observers have argued that high external indebtedness is a major cause of poverty. Using the first-differenced general method of moments (GMM) estimator, the paper models the impact of external debt on poverty, measured by life expectancy, infant mortality, and gross primary enrollment rates, while duly taking into account the impact of external debt on income. The paper thus endeavors to bring together the literature that links external debt with income growth and poverty. The main conclusion is that once the effect of income on poverty has been taken into account, external indebtedness indicators have a limited but important impact on poverty.

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Author's E-Mail Address: [bloko@imf.org](mailto:bloko@imf.org), [mmlachila@imf.org](mailto:mmlachila@imf.org), [kkalonji@imf.org](mailto:kkalonji@imf.org),  
[rnallari@worldbank.org](mailto:rnallari@worldbank.org)

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## I. INTRODUCTION

*Unsustainable developing country debt is currently at about \$100 billion .... As poor countries spend more and more each year to honor debt payments, less and less funds are going to much needed human resources development. To say that the debt crisis is one of the key issues that exacerbate poverty is an understatement.*

*Catholic Institute for International Relations, on EURODAD website, [www.eurodad.org/article/default.aspx?id=245](http://www.eurodad.org/article/default.aspx?id=245)*

Several observers, notably international nongovernmental organizations (NGOs), have long argued that a large external debt<sup>2</sup> burden is a major cause of poverty through its effects on economic growth and human development. Some have even advanced the hypothesis that external debt is *the* cause of poverty. While there is a substantive literature on the relationship between growth and poverty, and on that between external debt and growth, for example in Dollar and Kraay (2001) and Moser and Ichida (2001), we are not aware of a systematic study of the linkages between external debt and poverty. Links between external debt and poverty are complex, reflecting, among other things, the multidimensional aspects of poverty.

There is no generally accepted definition of poverty, but based on a comprehensive survey of the poor ("*Voices of the Poor*"<sup>3</sup>), the World Bank defines poverty as a "multidimensional phenomenon, encompassing inability to satisfy basic needs, lack of control over resources, lack of education and skills, poor health, malnutrition, lack of shelter, poor access to water and sanitation, vulnerability to shocks, violence and crime, lack of political freedom and voice". However, this definition, while comprehensive and intellectually appealing, is too vast to be empirically useful. In practice, poverty is generally defined in terms of income (for example, people living on less than \$1 a day), non-income (for example, other criteria such as life expectancy at birth, infant mortality rate, gross primary enrollment rate), or both (for example, the United Nations Human Development Index (HDI) or the World Bank Human Poverty Index (HPI)).

There is increasing empirical evidence that economic growth plays a key role in poverty reduction. Dollar and Kraay (2001) summed it of best with the title of their paper, "Growth IS Good for the Poor." However, there is still an ongoing debate on the extent to which growth actually affects poverty. For example, Ghura and others (2002) question the extent to which the income of the poorest one-fifth of the population grows in direct proportion to average income. Using fairly robust statistical methods, they identify what they call "super pro-poor" conditions on top of growth itself. Thus, contrary to Dollar and Kraay, they find that the average growth of income does not lead to a one-to-one increase in the income of the poorest quintiles.

The links between growth and poverty have been long debated by economists and social scientists. One view is represented by "trickle-down" growth optimists who believe that growth eventually benefits the poor. The other view focuses on reducing income inequality to combat poverty (Barro,

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<sup>2</sup> External debt defined by residency.

<sup>3</sup> Available on its website, <http://poverty.worldbank.org/library>

2000; Galor and Moav, 2000). For example, using a headcount ratio of poverty, based on the US\$1 a day cutoff, Ravallion and Chen (1997) find that poverty falls systematically with higher GDP per capita, with an average elasticity of  $-3.1$ . A number of studies have found income to be a key determinant of non-income poverty indicators, such as the infant mortality rate and education levels (Deaton, 1999). At the same time, several studies have also found that better health and education increase growth (Ranis and others, 2000), suggesting a two-way relationship between economic growth and poverty. Therefore, it would seem that growth normally reduces poverty, but that its effects vary significantly across countries in a given period and across periods in a given country (Ravallion, 2001).

There is also evidence that external debt may affect growth. Most studies suggest that the impact of external debt on growth occurs mostly through the investment channel. First, the servicing of heavy debt may directly divert budgetary resources from investments necessary to stimulate economic growth (Krugman, 1988; Sachs, 1989). Second, high indebtedness discourages private sector-led investment and employment (and therefore growth) owing to uncertainty about government actions in servicing the large external debt (Serven, 1997). Third, high indebtedness may lead to capital flight (Ajayi and Khan, 2000). Finally, a country with high indebtedness is often perceived by international financial markets and donors as exhibiting problems of economic mismanagement and bad governance, and therefore to be risky for investment. New flows of external resources to countries faced with large external debts could be thus be curtailed.

The available empirical evidence thus indicates that the level of external debt has an impact on economic growth, which, in turn, is found in many studies to be a key determinant of poverty. Hence, external debt is likely to affect poverty through its impact on economic growth. However, the explicit link among indebtedness, growth, and poverty has generally been lacking in the empirical literature. This paper is an attempt to partially fill this void.

This paper empirically explores the links through which external indebtedness has an effect upon poverty, measured by life expectancy, the infant mortality rate, and the primary gross enrollment rate. High debt service can directly reduce government resources that are available for the poor, for example, health and education expenditures and expenditures on social safety nets. Even if two countries consistently have the same growth rate, the country with a high debt service is likely to spend less on provision of social services, thereby having a negative effect on non-income poverty indicators (Gupta, Verhoeven, and Tiongson, 2001).

High indebtedness can also indirectly affect poverty by reducing growth through the investment channel by increasing uncertainties and reducing expenditures on economic infrastructure. The paper's main findings confirm that once the effect of income on poverty has been taken into account, external indebtedness indicators have only a limited impact on non-income poverty indicators, such as life expectancy at birth and the infant mortality rate.

The rest of the paper is organized as follows; Section II provides an overview of the theoretical and empirical literature. Section III presents the model and the estimation methods. Section IV gives a description of the data used. Section V presents the econometric results, and Section VI presents the conclusion and discusses potential policy implications.

## II. EXTERNAL DEBT, GROWTH, AND POVERTY IN THE LITERATURE

This section identifies the direct and indirect transmission channels through which high external indebtedness impacts upon economic growth, human development, and poverty. It draws on the both the theoretical and empirical literature in order to inform the development of a testable empirical model.

### A. Theoretical Considerations

External indebtedness is likely to affect poverty indirectly through its impact on economic growth and directly by reducing government resources that are available for poverty related spending.

#### **External Indebtedness, Growth, and Poverty**

Studies investigating the link between external debt and growth place a strong emphasis on the role of investment. Large debt stocks are typically expected to lower growth through the channel of reduced investment which is usually described by the debt overhang hypothesis (Krugman, 1988; Sachs, 1989). Outstanding debt ultimately becomes so large that investment will be inefficiently low without sizable debt or debt service reduction (Claessens and Diwan, 1989; and Claessens and others, 1989 and 2000). The burden of large debt sooner or later can lead to extreme scarcity in liquidity, negatively impacting upon capital formation, growth, and consumption. The incentive effect of this hypothesis refers to the low public and private investment because a larger and larger share of resources is transferred abroad for debt servicing. In other words, some of the returns from investing in the domestic economy are effectively taxed away.

Another strand of the debt overhang theory emphasizes the point that large debt stocks increase expectations that debt service tends to be financed by distortionary measures (inflation tax or cuts in public investment) as in Agenor and Montiel (1996). Under such uncertainty, private investors will prefer to exercise their option of waiting (Serven, 1997) and may choose to invest less, or divert their resources towards quick, financial returns with high risk, or resort to transfer their money abroad (capital flight).

The original Laffer debt curve (Cline, 1995) graphs the expected repayment against the face value of debt service. It shows that as outstanding debt increases beyond a threshold level, the expected repayment begins to fall due to the adverse effects mentioned above. Pattillo and others (2002) discuss the possible nonlinear relationship between debt and growth.

#### **Direct Impact of External Indebtedness on Poverty**

First, the crowding-out effect of debt service payments on social spending is a plausible channel. Underlying the debt relief debate is the belief that fiscal resources released by the debt relief will be channeled towards social sectors. The assertion is that debt relief will lead to increased public spending on improving the access to and quality of health, education, water, sanitation and other essential services to the poor. A key assumption is that an increase in social spending leads to better social outcomes. Lopes (2002), based on a study on 48 sub-Saharan African countries for the period

1980–99, found that absolute social spending allocations are paramount in determining social outcomes. Thus a key component of poverty reduction strategies in low-income countries is for countries to focus on “investing in people.” Increased pro-poor spending is widely regarded as crucial for low-income countries to achieve the Millennium Development Goals (MDGs), which includes goals for reducing child and infant mortality rates and improving education enrollment rates. In this context, high levels of indebtedness, due to the attendant high debt service, is assumed to lead to a reduction in available resources to meet the needs of the poor.

Second, as we have already mentioned, a country with high indebtedness is often perceived by international financial markets and donors as exhibiting problems of economic mismanagement and bad governance, and therefore to be risky for investment. High indebtedness could then lead to a decline in new flows of external resources. As a result, poverty-related spending could be curtailed. In the long run, the impact of the reduction in investment in social sectors would affect poverty through income. However, in the short run, reducing investment in social sectors would affect directly health and education outcomes.

## **B. Empirical Studies**

Most of the empirical studies find one or more debt variables to be significantly and negatively correlated with investment or growth, for example, Borensztein (1990) for the Philippines, Iyoha (2000) for sub-Saharan African countries, Elbadawi and others (1997) for sub-Saharan African countries, Were (2001) for Kenya. Similar results were found by Degefe (1992), Osei (1995), Mbire and Atingi (1997), and Ajayi and Khan (2000). The debt-to-long-run growth relationship was analyzed by Cohen (1993, 1997), and Cohen and Sachs (1986).

Notwithstanding the attractiveness of the debt overhang hypothesis as an explanation for high debt-low growth nexus, empirical evidence of the effects of a debt overhang has been mixed. Claessens (1990) found that five of the 29 middle-income countries in his sample were on the wrong side of the Laffer debt curve, suggesting that partial debt reduction would increase the expected repayment to the creditors. For middle-income countries, Warner (1992) concludes that the debt crisis did not depress investment, while Cohen (1993) found that it was the crowding-out effect of current debt servicing that was significant. Oks and van Wijnbergen (1995) concluded that overhang did not exist for Mexico.

Several other studies concluded that it is difficult to disentangle the impact of debt variables on growth and the role of debt overhang from other factors on growth and that debt burden can negatively impact other factors (for example, debt can affect domestic real interest rates which can impact on investment and growth).

The second difficulty relates to the crowding out effect. Most studies on investment equations do not distinguish between these two effects. In this context, statistically significant debt variables do not isolate the debt overhang effect. To distinguish between these two effects, both contemporaneous debt service and a variable capturing the burden of future debt service such as the debt stock or the net present value of future debt service should be included in the regression analysis. By this methodology, Greene and Villaneuva (1991) found evidence of debt overhang,

while Savvides (1992) found that although debt service crowded out investment, the ratio of debt to GNP had a negative but insignificant coefficient, thereby indicating no debt overhang effects.

In a recent study, Patillo and others (2002) show that for the 93 developing countries that they examine, there seems to be a nonlinear, Laffer-type relationship between debt and growth. They find that the average impact of external debt on per capita growth appears to be negative for the net present value (NPV) of debt levels above 160–170 percent of exports and 35–40 percent of GDP. Furthermore, their results suggest that doubling debt levels slows per capita GDP growth between one-half and a full percentage point.

### III. MODEL SPECIFICATION AND ESTIMATION METHODOLOGY

The guidance from the theoretical literature is not very clear as to the exact nature, intensity, and transmission mechanisms through which external indebtedness affects growth and poverty. Nonetheless, there seem to be direct and indirect linkages between debt and growth, and between growth and poverty. The relationship between debt and poverty is likely to be both direct and indirect, and nonlinear. In the absence of a solid theoretical framework, we hope to shed some empirical light on this issue, while guarding against what Sala-i-Martin (1997) calls “creative theorizing”. In order to investigate the impact of external debt on poverty, we use a model of the form.<sup>4</sup>

$$PI_{c,t} = \alpha_1 + \alpha_2 Y_{c,t} + \alpha_3 D_{c,t} + \alpha_4 X_{c,t} + \mu_c + \nu_t + e_{c,t} \quad (1)$$

Where:

- $PI_{c,t}$  represents the measure of poverty in country  $c$  at time  $t$
- $Y_{c,t}$  per capita income in country  $c$  at time  $t$
- $D_{c,t}$  the measure of external indebtedness in country  $c$  at time  $t$
- $X_{c,t}$  a set of control variables in country  $c$  at time  $t$ .
- The disturbance term represents a country-specific effect ( $\mu_c$ ), a time-specific effect ( $\nu_t$ ) and a common error term ( $e_{c,t}$ ).

Our empirical specification allows us to identify the relationship between external debt and poverty. First, we estimate equation (1) without control variables ( $\alpha_4=0$ ) using the simple ordinary least squares (OLS), with the different measures of poverty (life expectancy at birth, infant mortality rate, primary gross enrollment rate) and indebtedness. Real per capita GDP might be endogenous, and failing to control this would lead to inconsistent estimates. As we have already indicated, real per capita GDP is likely to be a cause as well as the result of poverty. It is possible to estimate equation (1) using instrumental variables (IV) to correct for endogeneity. However, this estimator corrects only for endogeneity, but not the omitted variable bias, which could also lead to inconsistent estimates.

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<sup>4</sup> Dollar and Kraay estimate the regression of the logarithm of per capita income of the poor on the logarithm of average per capita income and a set of additional control variables.



The first-differenced generalized method of moments (GMM) estimator (Blundell and Bond, 1998) is usually used to address simultaneously both omitted variable bias and issues of endogeneity. This method consists of taking the first-differences of the equation to remove unobserved time-invariant country specific effects, and then instrument the right-hand-side variables with the levels of the variables lagged two periods or more. Nonetheless, Blundell and Bond (1998) have shown that the first-differenced GMM estimators are biased when the instruments used are weak. Moreover, the previous methods do not account for the presence of country-specific effects, while it is likely that poverty may be correlated with the unobserved country-specific effects.

To address simultaneously omitted variable bias, issues of endogeneity, while not entirely removing the country-specific effects (Bond, Hoeffler, and Temple, 2001), Blundell and Bond (1998) have suggested to use the system GMM method that jointly estimates the equation in levels (1) and in first difference (2), imposing the restriction that the coefficients in the level and differenced equation are equal:

$$\Delta PI_{c,t} = \alpha_1 + \alpha_2 \Delta Y_{c,t} + \alpha_3 \Delta D_{c,t} + \alpha_4 \Delta X_{c,t} + \Delta e_{c,t} \quad (2)$$

$$L(\Delta PI_{c,t-1}, \Delta Y_{c,t-1}, \Delta D_{c,t-1}), D(PI_{c,1}, \dots, PI_{c,t-2}, Y_{c,1}, \dots, Y_{c,t-2}, D_{c,1}, \dots, D_{c,t-2}) \quad (3)$$

The instruments used in the level equation (L) are the lagged first differences of the variables. The GMM-type instruments for the differenced equation (D) are the lagged levels of the variables. The equation in levels allows one to exploit the large cross-country variation in the variables, whereas in the differenced equation, time-invariant, country-specific, sources of heterogeneity are removed. In addition, the use of appropriate lags of right-hand side variables as instruments allows one to address the three problems of measurement error, omitted variables, and endogeneity (Dollar and Kraay, 2001). In what follows, we estimate equation (1) using also the system GMM method. To ensure that our results are not driven by time specific effects, we estimate all regressions with time dummies. The validity of the GMM instruments are tested using Sargan tests of over-identifying restrictions.

The basic specification allows us to capture through the income variable the impact of a number of macroeconomic policies.<sup>5</sup> We nonetheless expand the basic model by introducing two control variables: openness, and a country-risk indicator. Trade openness is expected to affect positively human development. Wei and Wu (2002), report several pieces of evidence suggesting that higher trade openness is associated with a longer life expectancy and a lower infant mortality rate. An improvement in the country risk indicator, measured by the overall International Country Risk

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<sup>5</sup> Civil conflict and the spread of HIV/AIDS are probably two important factors affecting poverty. Ichida and Moser (2001) found that civil conflict has adverse impact on life expectancy and infant mortality rate. These authors found also that countries with higher HIV/AIDS prevalence rate exhibit lower life expectancy. Haacker (2001) provides an extensive review of the impact of HIV/AIDS on health outcomes.

Guide (ICRG) index,<sup>6</sup> is expected to have a positive impact on human development. The latter allows to assess the possibility that bad institutions, corruption, and economic mismanagement and bad governance may lead to lower flow of foreign resources, low level and efficiency of investment in social sectors.

#### IV. DATA ANALYSIS

One measure of poverty has been generally in terms of consumption or income. The most widely used income poverty indicators are the headcount index, per capita GNP, and per capita GDP corrected for purchasing power parity (PPP). However, new perspectives on the causes and manifestations of poverty have shown that poverty is a multidimensional phenomenon, and can be expressed in terms of income, and basic needs such as access to health services and education. We use three standard human development indicators to measure poverty: the life expectancy at birth, infant mortality rate and primary gross enrollment rate. Several studies have shown that these indicators could be used to measure the variations in the physical well-being of people (*World Development Report*, 2000/2001), and that in many countries health and education indicators are worse for the income-poor than for the income-nonpoor. In South Africa, for example, the under-5 mortality rate is twice as high as the rate for the richest 20 percent, and in Northeast and Southeast Brazil, it is three times as high.<sup>7</sup>

The theoretical literature is rather vague on the preferred definition of external debt indicators. In line with empirical practice, we are rather agnostic on what is the best indicator. Admittedly, each indicator is amenable to a different interpretation. We therefore use three different external debt indicators. First, we use the ratio of nominal debt to GDP, which is a useful indicator to assess the overall resource basis available to the country. However, the face value of the external debt stock is generally not a good measure of a country's debt burden when a significant part of the debt is concessional, i.e., contains a grant element, as is usually the case for debt contracted by low-income countries. We thus also use the ratio of NPV of debt to exports to assess the country's capacity to repay (solvency). This ratio is a key variable in debt sustainability analyses, especially within the HIPC (Highly Indebted Poor Countries) Initiative framework. These two ratios will help to isolate any debt overhang effect. To take into account the potential liquidity effect or crowding out effect, we used the ratio of debt service to exports.

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<sup>6</sup> Details on content of the index and its computation are given at the Political Risk Services ([www.Prsgroup.com](http://www.Prsgroup.com)).

<sup>7</sup> Similar disparities were found regarding access to schooling. The primary enrollment rate for 6-to-14 year olds is 52 percentage points lower for the poorest households than for the richest households in Senegal, 36 percentage points lower in Zambia, and 19 points lower in Ghana. For more details on this issue, see Filmer and Pritchett (1998).

The analysis uses annual data for 67 low-income countries<sup>8</sup> (of which 41 are HIPC<sup>9</sup>), over the period 1985–99. The main data set comprises the three non-income poverty indicators (life expectancy, infant mortality rate, and gross primary school enrollment rate), GDP per capita PPP, and three external debt indicators (nominal debt to GDP, NPV of debt to exports, and debt service to exports).

Various sources are used to gather the data. Life expectancy at birth (years), infant mortality rate (number of deaths per 1,000 live birth) and primary gross enrollment rate (gross percent) are from the *World Development Indicators* (World Bank). These data are available for 1985, 1987, 1990, 1992, 1995, 1997. Nominal stock of debt, total debt service, GDP and exports are from the *Global Development Finance* (World Bank). Net present value of debt data are from Easterly (2000). Real purchasing power parity GDP, terms of trade, openness ((import+export)/GDP) are from the WEO database of the IMF.

Table 1 shows the evolution of average per capita income, external debt and poverty indicators for the entire sample of countries for the period 1985 to 1997. First, during the period 1985–92 (and prior to the bilateral and multilateral debt relief), as average per capita income increased, the external debt indicators also increased rapidly, which indicates that new external borrowings may have been a key factor in economic growth and development. Second, since 1992, as debt relief under the aegis of Paris Club and other initiatives was accelerated, the external debt indicators have decreased. Third, perhaps due to averaging of indicators across the sample size, no systematic pattern is observed over time in the poverty indicators of infant mortality, primary education and life expectancy. Moreover, there appears to be a neither positive nor a negative relationship between per capita income and the poverty indicators.

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<sup>8</sup> Islamic State of Afghanistan, Angola, Armenia, Azerbaijan, Bangladesh, Benin, Bhutan, Bolivia, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Comoros, Democratic Rep. of Congo, Republic of Congo, Côte d'Ivoire, Eritrea, Ethiopia, The Gambia, Georgia, Ghana, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Kenya, People's Republic of Korea, Kyrgyz Republic, Lao PDR, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Moldova, Mongolia, Mozambique, Myanmar, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Rwanda, São Tomé and Príncipe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, Tajikistan, Tanzania, Togo, Turkmenistan, Uganda, Ukraine, Uzbekistan, Vietnam, Yemen, Zambia, and Zimbabwe.

<sup>9</sup> These are the “original” HIPC. The current list of HIPC that have obtained or are expected to require debt relief under the HIPC Initiative is somewhat shorter (about 36).

Table 1. Evolution of Average Per Capita Income, Debt, and Poverty Indicators

Year	Per capita income (U.S. dollar, PPP)	Life expectancy (years)	Infant mortality rate (per 1000)	Primary Gross enrollment rate (percent)	Nominal debt (percent of GDP)	NPV of debt (percent of exports)	Debt service (percent of exports)
1985	1,160.2	54.6	106.3	83.1	85.8	330.5	23.6
1987	1,610.4	53.9	105.2	81.3	104.4	426.2	25.6
1990	1,721.3	54.3	120.5	83.6	134.6	408.9	21.0
1992	1,545.91	53.6	101.7	80.4	119.9	445.5	18.4
1995	1,471.8	54.4	92.9	80.8	121.0	267.2	19.6
1997	1,512.5	54.1	125.7	80.8	105.0	232.6	14.6

Two main findings could be drawn when analyzing the bivariate relationship between per capita GDP, non-income poverty indicators and debt indicators:

- First, there seems to be a relationship between real GDP per capita and health indicators. Figure 1 shows that life expectancy increases with real per capita GDP. Infant mortality rate decreases with real per capita GDP (Figure 2). In contrast, Figure 3 does not show a uniform link between primary gross enrollment rate and real per capita GDP. Table 2, which reports non-income indicators by income groups, confirms these findings. It shows that higher real GDP per capita is associated with better life expectancy and infant mortality rate. These results are similar to those found by McCarthy and Wolf (2001).<sup>10</sup> Moreover, the correlation matrix (Annex 1) shows that real GDP per capita is positively correlated with life expectancy and negatively correlated with infant mortality rate, confirming that health indicators are worse for the income-poor than for the income-nonpoor. However, as already mentioned, there is probably a two-way relationship between income and non-income poverty indicators. Increasing real GDP per capita would lead to better health outcome but improving health outcomes would also lead to higher income. The correlation between real GDP per capita and primary gross enrollment rate although positive is relatively low (less than 10 percent).
- Second, the correlation matrix suggests that external debt burden indicators are negatively correlated with GDP per capita and life expectancy, and positively correlated with infant mortality rate, thereby indicating possible adverse impact of indebtedness on income and health outcome indicators (Annex 2). These findings are

<sup>10</sup> McCarthy and Wolf (2001) divided African countries into three groups: countries with per capita incomes below \$1,000; countries with per capita incomes between \$1,000 and \$2,000; and countries per capita incomes above \$2,000. They found that higher income per capita is associated with better health outcomes (life expectancy, infant mortality rate, low birth weight, and malnutrition in children).

confirmed by Table 3, which compares poverty indicators for countries with NPV of debt less than 150 percent of exports and NPV of debt higher than 150 percent of exports, and for countries with nominal debt to GDP less and higher than 40 percent.<sup>11</sup> Poverty indicators appear to be worse in countries with NPV of debt to export higher than 150 percent and in countries with nominal debt to GDP higher than 40 percent.

Table 2. Poverty Indicators, by Income Groups

	(averages)				
	Total	y <\$500	500<y<\$1000	\$1000<y< \$2000	y> \$2000
Income (y) (US\$)	1,513	438.3	750.7	1,451.7	3,405.0
Life expectancy (years)	54.1	47.3	47.8	55.8	59.8
Infant mortality rate (per 1000 births)	108.8	151.5	142.2	104.5	72.5
Primary gross enrollment rate (%)	81.7	72.7	78.4	83.9	84.5
Nominal debt to GDP (percent)		123.0	106.7	58.4	151.6
NPV of debt to exports (in percent)		737.6	409.1	238.9	366.6
Total debt service to exports (percent)		31.4	20.3	17.8	22.1

Table 3. Poverty Indicators, by External Indebtedness Groups

	(averages)			
	NPV/X <150%	NPV/X >150%	Nominal debt to GDP <40 %	Nominal debt to GDP >40 %
Income (US\$)	1,591	1,492	1,578.2	1,498.2
Life expectancy (years)	57.0	53.5	56.1	53.8
Infant mortality rate (per 1000 birth)	86.3	113.5	85.0	113.1
Primary gross enrollment rate (%)	90.0	79.9	77.7	82.5

<sup>11</sup> Under the enhanced HIPC Initiative, a country is eligible if its NPV of external debt to exports ratio after traditional debt relief mechanisms is above 150 percent, or above 250 percent of government revenues. Another approach is to use a threshold of 40 percent for the ratio of nominal debt-to-GDP.

Figure 1. Life Expectancy (lle) and Per Capita GDP (ly)  
(in logarithms; each point represents a country-year pair)

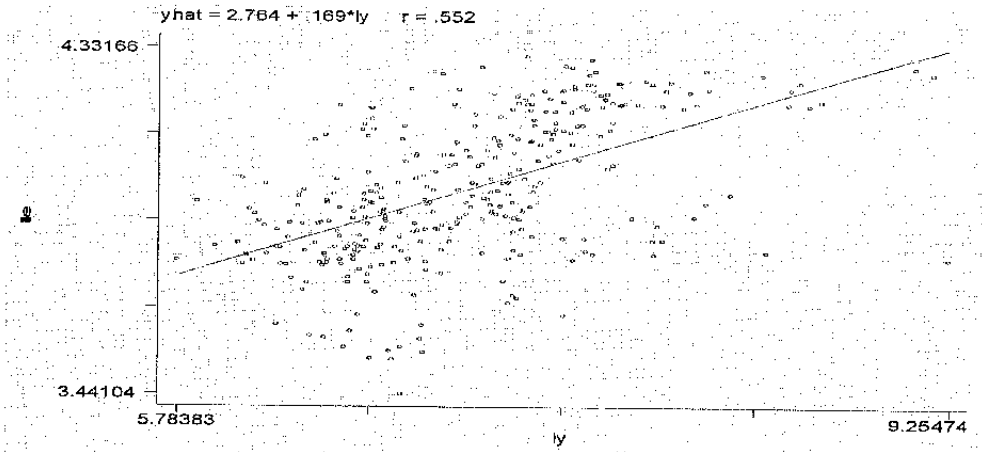


Figure 2. Infant Mortality Rate (lmr) and Per Capita GDP (ly)

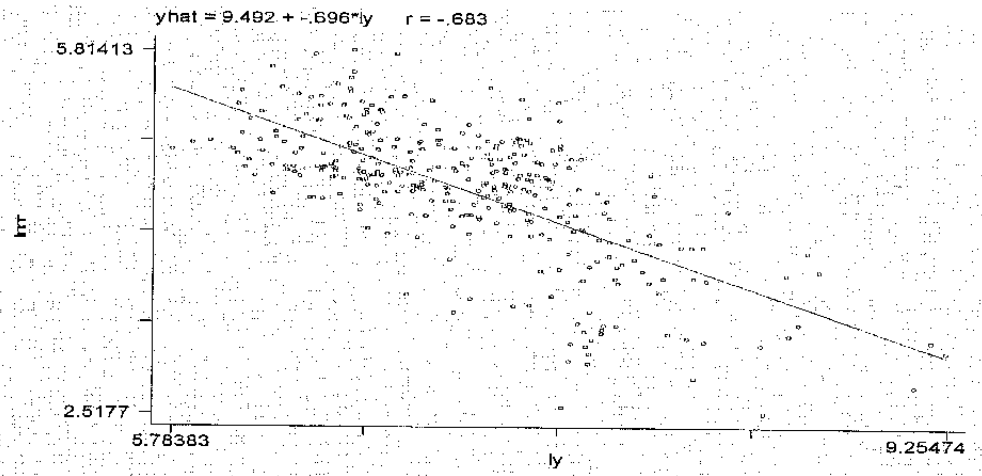
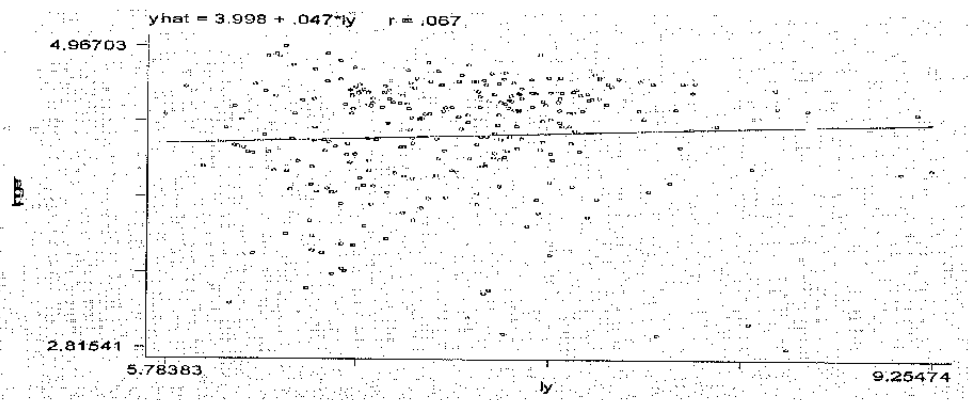


Figure 3. Primary Gross Enrollment Rate (lpger), and Per Capita GDP (ly)



## V. ESTIMATION RESULTS

The OLS results<sup>12</sup> for the basic model (without control variables) confirm that life expectancy is related positively to real per capita GDP and negatively to the five debt indicators (Table 4). We find that a 5 percent increase in real per capita GDP will lead to about 1 percent increase in life expectancy. This result is different from the one reported by Moser and Ichida (2001) who found that a 10 percent increase in real GDP per capita will lead to a 1 percent increase in life expectancy.<sup>13</sup> All the estimated coefficients on the three debt indicators are statistically significant and negative,<sup>14</sup> suggesting that high external indebtedness is negatively related to life expectancy at birth. However, the system GMM results, where both real per capita GDP and the debt indicators are treated as endogenous, show a different picture. The coefficients on real per capita GDP remain positive and significant, but only the estimated coefficient on total debt service to exports ratio now appears significant, suggesting that, along with its impact through income, high indebtedness could also affect directly life expectancy notably through its liquidity effect on the budget. We find that a 20 percent increase in the debt-service-to-export ratio leads to a 1 percent decline in life expectancy at birth. The estimated coefficients on the other two debt indicators (NPV-to-exports and nominal debt-to-GDP ratios) are no longer statistically significant.<sup>15</sup>

One possible explanation is that these variables may be highly correlated with the unobserved country-specific effects. Another possible explanation is the presence of outliers. To ensure that our results are not driven by the presence of outliers, we estimate again the GMM system with a reduced sample where outliers are eliminated. The Wu-Hausman/Sargan test, as well as the test for serial correlation, does not indicate any problems. The results (Table 4, column 3) confirm that an increase in debt service as a proportion of exports will lead to a decline in life expectancy. However, the coefficient of nominal debt-to-GDP ratio becomes significant, suggesting that an increase in nominal debt-to-GDP ratio leads to a decline in life expectancy.

With regard to infant mortality rate, the OLS results (Table 4) of the basic model (without control variables) show that mortality rate is negatively correlated with real per capita GDP and positively correlated with the five debt indicators. The estimated coefficient of real per capita GDP is significant and negative irrespective of the debt indicator used. The income elasticity of the infant mortality is higher than the one reported by Moser and Ichida (2001). Our results show that less than 2 percent increase in real per capita GDP will lead to a 1 percent decline in mortality rate while they found that about 3 percent increase in real per capita is needed to have a 1 percent decline in infant mortality rate.

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<sup>12</sup> We also use the between-country estimator, and the instrumental variables estimator using two-stage least squares. The results are presented in Annex 2, Table 9.

<sup>13</sup> The study is based only on African countries (46 countries), covering the period 1972–97.

<sup>14</sup> These results do not change when we use two other debt indicators: NPV of debt to GDP and debt service to GDP ratios.

<sup>15</sup> The results are similar when we use NPV of debt to GDP and debt service to GDP ratios.

Table 4. Poverty and Indebtedness: Summary Test Results

	Life expectancy			Infant mortality rate			Primary gross enrolment rate		
	OLS (1)	SGMM (2)	SGMM without outliers (3)	OLS (1)	SGMM (2)	SGMM without outliers (3)	OLS (1)	SGMM (2)	SGMM without outliers (3)
per capita GDP	0.17***	0.24**	0.25***	-0.61***	-0.70***	-1.05***	0.13***	0.17***	0.37
Nominal debt to GDP	-0.02**	0.01	-0.06**	0.1***	0.06	0.33**	0.23	0.05	0.15
Observations	313	313	309	313	312	308	267	263	256
R-Squared	0.27			0.45			0.02		
WHSargan		43.78 (0.31)	40.2 (0.60)		52.83 (0.08)	47.19 (0.31)		43.21 (0.34)	41.39 (0.5)
per capita GDP	0.21***	0.21**	0.20**	-0.61***	-0.51**	-1.46***	0.10**	0.34***	0.58*
NPV of debt to exports	-0.01*	-0.01	-0.01	0.08**	0.04	0.13	-0.03	0.16	0.15
Observations	285	285	284	284	282	277	243	238	233
R-Squared	0.35			0.43			0.02		
WHSargan		48.06 (0.28)	45.99 (0.35)		51.65 (0.103)	42.31 (0.5)		39.85 (0.48)	43.06 (0.43)
per capita GDP	0.19***	0.24**	0.24***	-0.62***	-0.70**	-1.62***	0.13***	0.31***	0.42
Debt service to exports	-0.03***	-0.05**	-0.05**	0.09***	0.07	0.11	0.003	0.03	0.15
Observations	304	302	297	304	301	298	259	254	253
R-Squared	0.31			0.40			0.02		
WHSargan		38.12 (0.55)	39.89 (0.39)		51.40 (0.10)	46.20 (0.34)		47.92 (0.18)	45.82 (0.32)

All regressions are in logarithms and include time dummies. \* denotes significance at 10 percent level, \*\* significance at 5 percent level and \*\*\* significance at 1 percent level. WHSargan refers to Wu-Hausman /Sargan test. OLS: Ordinary Least Squares. The parameter estimates from the System GMM procedure are two-step estimates. Outliers are defined as observations that deviate from the mean by more than five times the standard deviation. Four observations for Uzbekistan, Tajikistan, Georgia, and Kyrgyzstan are outliers with respect to nominal debt to GDP ratio; One observation (Guinea Bissau) regarding NPV of debt to export; four observations (Eritrea, Cambodia) regarding total debt service to exports.



The results are consistent across the debt indicators. All the coefficients on debt indicators are significant and positive, suggesting that a decline in debt would lead to a decline in infant mortality rate. When correcting simultaneously for endogeneity and omitted variables, by using the system GMM, it turned out that external indebtedness does not affect directly infant mortality rate. Again, one possible explanation is that these variables may be highly correlated with the unobserved country-specific effects.

The OLS results (Table 5) of the basic model (without control variables) show that primary gross enrollment rate is positively correlated with real per capita GDP. The coefficients on nominal stock of debt-to-GDP, NPV stock of debt-to-exports, total debt service-to-exports are not significant.

In a second step, we estimate the GMM system using both nominal debt to GDP and debt service to exports ratios (Table 5). Regarding life expectancy, the coefficient of debt service to exports ratio remains negative and significant while the coefficient of nominal debt to GDP becomes insignificant, This suggests that the crowding-out effect of debt service payments on social spending is one of the main channels, through which external indebtedness affects negatively life expectancy. In contrast, for infant mortality rate, using both nominal debt to GDP and debt service to exports ratios does not change the results. The coefficient of nominal debt to GDP remains positive and significant and the coefficient of debt service to export remains insignificant, suggesting that for infant mortality rate, the effect through the level of investment in the health sector might dominate the crowding out effect of debt service payment.

Table 5. Results Including Both Stock and Flow Ratios  
(GMM System without outliers)

	Life expectancy	Mortality rate	Mortality rate
GDP per capita	0.28***	-1.18***	-0.90***
Nom. Debt / GDP	-0.02	0.35**	0.14
Debt service to export	-0.05**	-0.03	
Risk	---	---	0.02**
Observations	298	297	205
Sargan	50.39 (0.72)	52.72 (0.64)	32.22 (0.86)

\* denotes significance at 10 percent level, \*\* significance at 5 percent level and \*\*\* significance at 1 percent level

We next estimate the GMM system by adding the two control variables, plus risk, to the basic specification with debt service to exports in life expectancy regression and nominal debt to GDP in the regression related to infant mortality rate. Regarding life expectancy, it turns out that none of the control variables is significant. With regard to infant mortality rate, the result suggests that, a

reduction in the country risk indicator, will lead, as expected, to a decline in mortality rate. However, the coefficient of the debt indicator becomes insignificant (Table 5).

## VI. CONCLUSION AND POLICY IMPLICATIONS

The key objective of this paper was to establish whether external debt plays a crucial role in influencing poverty levels. A number of international NGOs have categorically stated that debt causes poverty. This paper seeks to contribute to this debate as well as to the literature on growth and external debt. There is an extensive and growing literature on the impact of growth on poverty, and on the relationship between external debt and growth. However, there is a paucity of studies directly linking external debt and poverty. The paper thus endeavors to bring together the two areas of study, while emphasizing the complex relationships.

External debt affects poverty not only through its negative impact on public investment and income growth but also through high debt service's crowding out of governments' social spending. High debt service directly reduces government budgetary allocations on health, education, social safety nets, and water and sanitation, in part because governments find it politically easier to cut back spending in such sectors because the poor are not usually organized to have a voice in such decisions.

In order to adequately examine the complex interlocking relationships in the external debt-growth-poverty nexus, the paper has used the GMM methodology, which allows us to simultaneously address both the problems of endogeneity and omitted-variable bias.

The main findings of the paper confirm that once the effect of income on poverty has been taken into consideration, high debt service and related external indebtedness indicators have an adverse, but limited impact on non-income poverty indicators, such as life expectancy, the infant mortality rate, and the education enrollment rate. The most statistically significant relationship is that between the debt service-to-exports ratio and life expectancy, where we find that a 20 percent increase in the debt-service ratio leads to a 1 percent decline in life expectancy at birth.

The main finding, while not contradicting other studies in the literature, such as Pattillo and others (2002) and Dollar and Kraay (2001), is that the impact of external debt on poverty is a relatively muted, albeit important, variable in the poverty-growth nexus.

From these results, in line with the findings of Abrego and Ross (2001), in order to reduce poverty, the key policy option is to focus on factors that impede growth, of which debt is but one. Focusing exclusively on external debt relief is probably not a very effective way to reduce poverty. In this context, a new consensus (as in the Monterrey Consensus and the Johannesburg Conference) is emerging among the members of the international community; the longer-term goal being focused on is accelerated poverty reduction, which needs to be supported by additional aid flows, which are increasingly being provided in the form of grants, combined with debt relief for countries that can demonstrate effective utilization of these resources and maximize the benefits to the poor.

**ANNEXES**

Annex 1. Correlation Matrix

	LE	PER	MR	Y	ND/GDP	NPV/X	TDS/X	Risk	Open	TOT
(LE)	1.00									
PER	0.23	1.00								
MR	-0.57	-0.08	1.00							
Y	0.55	0.06	-0.68	1.00						
ND/GDP	-0.19	-0.01	0.33	-0.21	1.00					
NPV/X	-0.240	-0.14	0.33	-0.37	0.670	1.00				
TDS/X	-0.168	-0.01	0.17	-0.07	0.318	0.550	1.00			
Risk	-0.01	0.15	-0.22	0.30	-0.09	-0.49	0.11	1.00		
Open	0.22	0.12	-0.36	0.33	0.10	-0.30	-0.20	0.27	1.00	
TOT	-0.08	-0.01	0.12	-0.14	0.20	0.28	0.06	-0.23	-0.11	1.00

All variables are in logs. LE: Life expectancy at birth; PER: Primary gross enrollment rate; MR: Infant mortality rate, y: real per capita GDP PPP; ND/GDP: ND: Nominal stock of debt; NPV: Net present value of stock of debt; GDP: Nominal Gross Domestic product; X: Exports of goods and services, TOT: terms of Trade; OPEN: Openness and Risk: Country risk indicator.

### Annex 2. Poverty and Debt Indicators (Figures 4–12)

Figure 4. Life Expectancy(lle) and Nominal Debt-to-GDP Ratio (Indgdp)

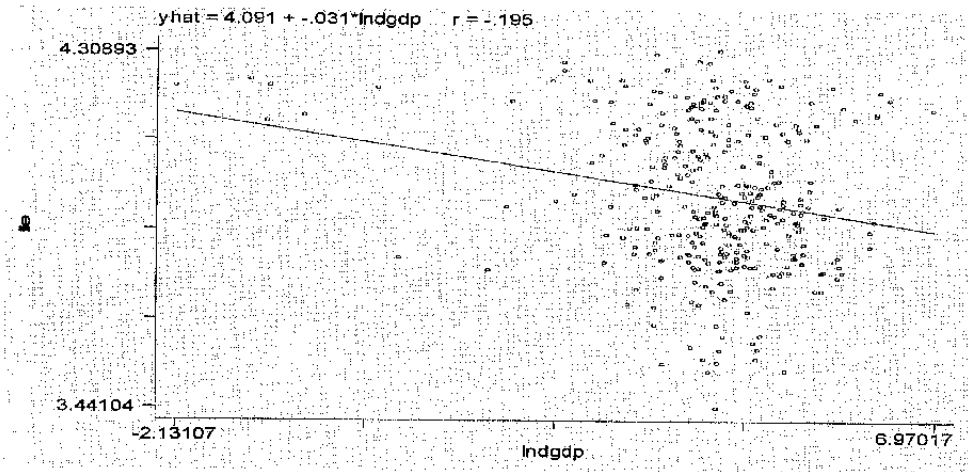


Figure 5. Life Expectancy (lle) and Net Present Value of Debt-to-Exports Ratio (Inpvx)

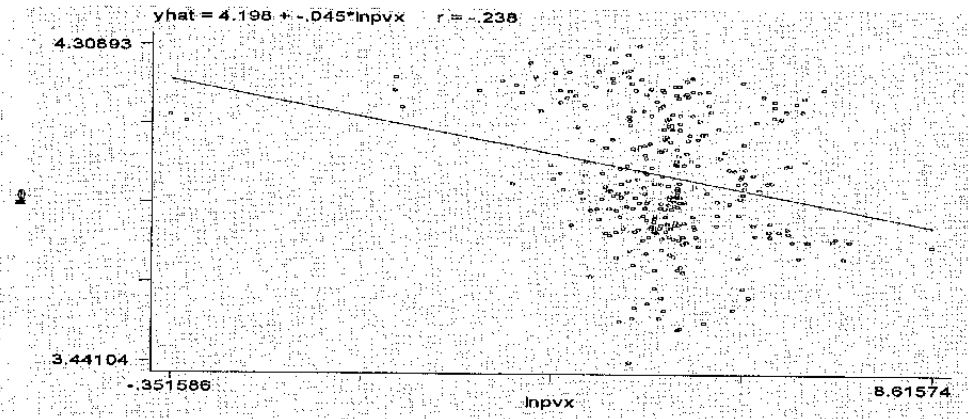


Figure 6. Life Expectancy (lle) and Total Debt Service-to-Exports Ratio (ltdsx)

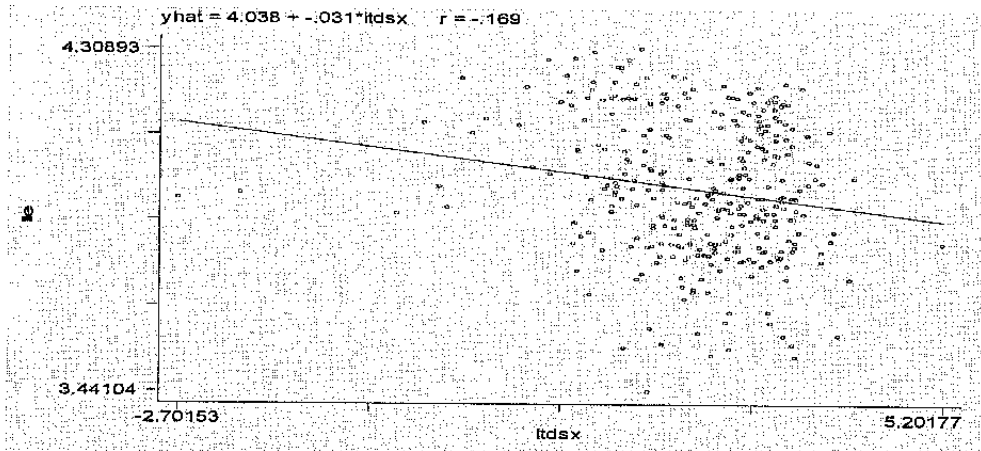


Figure 7. Infant Mortality Rate (lmr) and Nominal Debt-to-GDP Ratio (Indgdp)

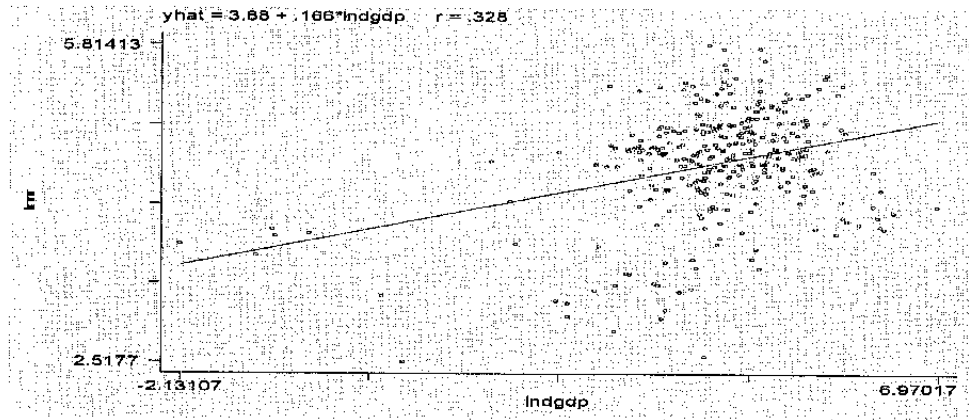


Figure 8. Infant Mortality Rate (lmr) and Net Present Value of Debt-to-Exports Ratio (lnpvx)

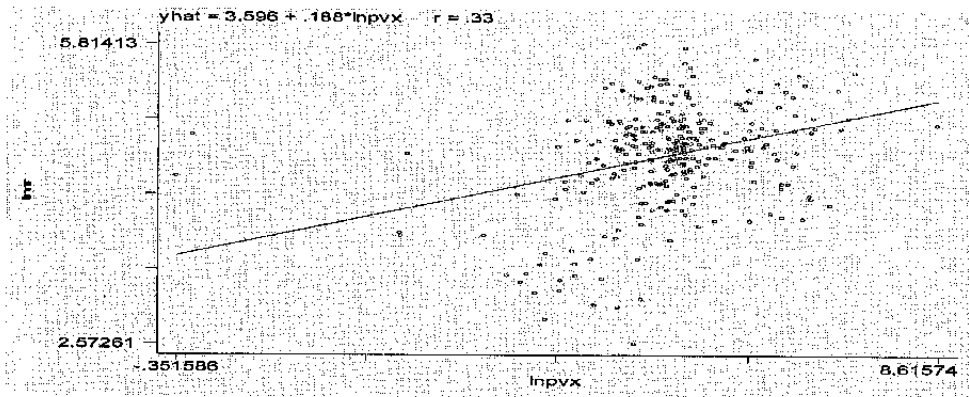


Figure 9. Infant Mortality Rate (lmr) and Total Debt Service-to-Exports Ratio (ltdsx)

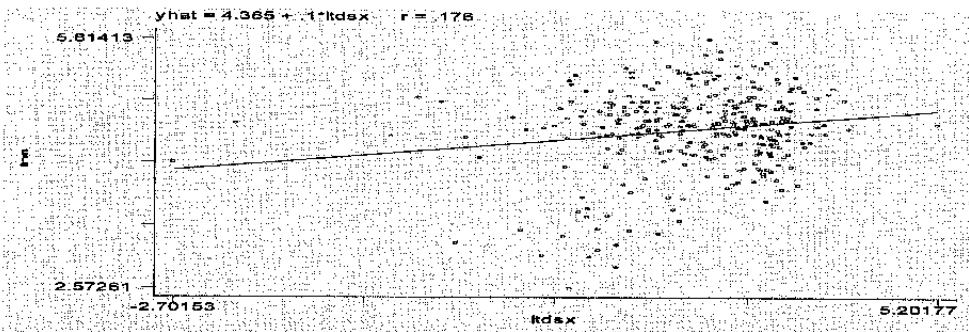


Figure 10. Primary Gross Enrollment Rate (lpper) and Nominal Debt-to-GDP Ratio (lndgdp)

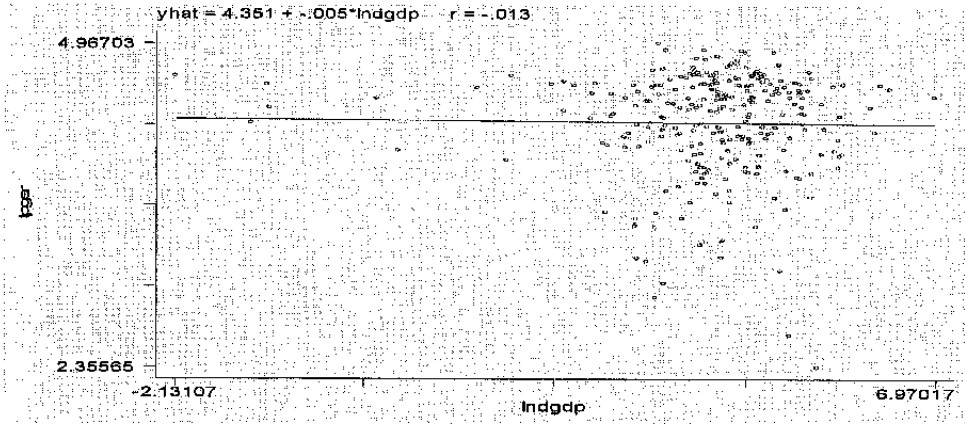


Figure 11. Primary Gross Enrollment Rate (lpper) and Net Present Value of Debt-to-Exports Ratio (lnpvx)

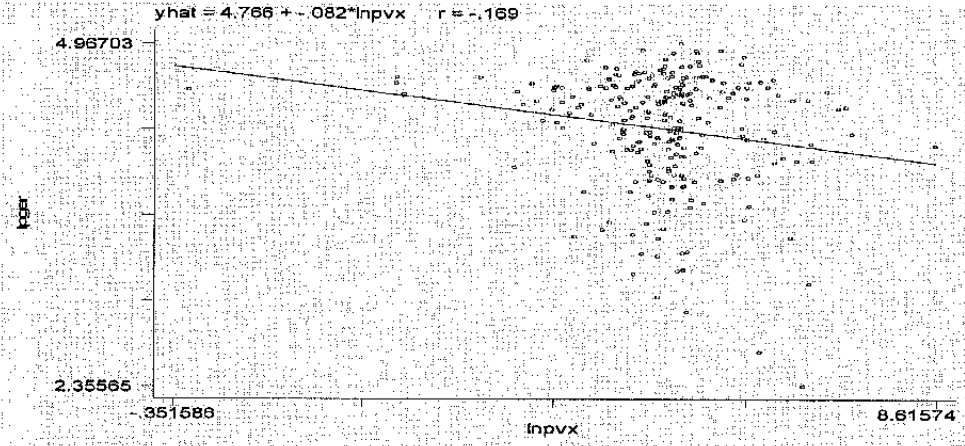
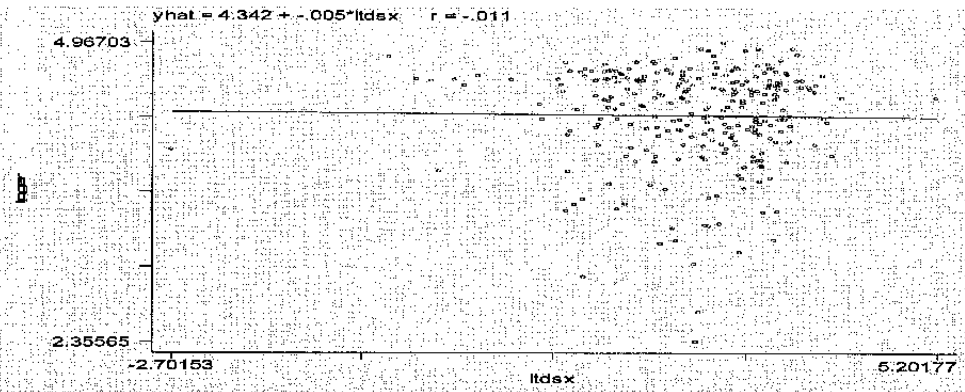


Figure 12. Primary Gross Enrollment Rate (lpper) and Total Debt Service-to-Exports Ratio (ltdsx)



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