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External Debt, Trade and FDI on Economic Growth of Least Developed Countries

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ABSTRACT

This study evaluates the impact of public external debt on long term economic growth of forty least developed countries (LDCs). Arellano-Bond SGMM method is used on unbalanced panel data spanning from 1975 to 2010. A comparative analysis based on different debt specifications and samples is provided. Overall, our findings suggest that high external debt depresses economic growth, regardless of the nature of the debt. Furthermore, debt relief initiatives are crucial as evidenced in the lower negative debt effects on growth in HIPCs sub-sample relative to non-HIPCs. Additionally, trade, initial values of FDI and ODA matter in economic growth of LDCs.

Key Words: LDCs, External Debt, Economic Growth, HIPCs

JEL code: F31, O47, O57

I. INTRODUCTION

Twelve percent of the world population lives in least developed countries (LDCs) and half of that population still face extreme poverty. These countries produce less than 2% of world gross domestic product (GDP) and account for less than 1% of global trade in goods. They are characterized by low levels of per capita income, high population growth rates, low domestic savings and investment and a limited and undiversified tax base (UN, 2011)¹. Of the 48 LDCs, 33 are in Africa, 14 in Asia and Pacific and one in Latin America. 29 of the LDCs are classified as heavily indebted poor countries (HIPCs), of which, all, with the exception of Afghanistan, are found in Africa.

The biggest constraint facing LDCs to achieve sustained and equitable economic growth and development is lack of domestic financial resources. As a result, many LDCs rely heavily on external capitals such as foreign direct investment, foreign aid, concessional lending and remittances. One consequence of this foreign capital dependency has been an accumulation of a high external debt. Despite the fact that 60% of the LDCs have either benefited or are working towards benefiting from the debt relief under the Heavily Indebted Poor Countries (HIPC) initiative and Multilateral Debt Relief Initiative (MDRI) and other bilateral donors, they are still struggling with high debt burdens. Specifically, debt servicing still continues to heavily constrain their already scarce budgetary resources, posing a big challenge in achieving the United Nation's 2011-2020 overarching goal of the Programme of Action² (UN, 2011).

Although there are substantial studies on debt-growth relationship, most of them have focused largely on advanced and emerging nations (Kumar and Woo, 2010; Reinhart and

Rogoff, 2010), with a few on low income and developing countries (Pattillo, Poirson and Ricci, 2011; Clements, Bhattacharya and Nguyen, 2003). Literature devoted specifically on least developed countries as a group is scant. Because of the differences in economic structure, policy formulation environment and access to capital markets between least developed countries and industrialized or emerging nations, the impact and the channel through which external debt affects economic growth may vary. Therefore, one has to be cautious when drawing inferences, especially on least developed countries using evidence based on emerging or industrialized nations studies.

This study contributes to the literature on external debt – growth nexus for least developed countries in three ways. First we evaluate the impact of public and publicly guaranteed (PPG) external debt on long term economic growth of least developed countries within the context of HIPC and MDR debt relief Initiatives. Theory and empirical studies suggest that external debt effects are transmitted to economic growth through capital accumulation and total factor productivity (Pattillo, Poirson and Ricci, 2004). The capital accumulation transmission mechanism is explained through the debt overhang hypothesis and has been the main focus of the studies on low income and developing countries. Accordingly, this study assesses the impact of external debt through the debt overhang hypothesis. Data used for empirical analysis spans from 1975 to 2010, providing sufficient time span to observe and empirically assess the impact of HIPC and MDR debt relief Initiatives in the beneficiary countries. Second, our empirical model, unlike other related studies (such as Clements et. al, 2003), controls for the effects of foreign capital (FDI and ODA), both of which are considered to be crucial in the long term economic

growth of least developed countries. Finally, we seek to stimulate the debate on the effectiveness of different forms of external debt on long term economic growth by using different specification of external debt stocks in addition to PPG, namely total and concessional debts.

Our empirical approach builds on the works of Kumar and Woo (2010) and Clements et.al (2003). We follow closely the findings of Sala-i-Martin, Doppelhofer and Miller (2004) in selecting the core sets of growth determinants that have been established to have higher posterior inclusion probability; however, the estimated model variables are constrained by the available data. We control for the effects of foreign capitals, domestic capital, human capital, population growth and fiscal volatility. Issues of endogeneity, simultaneity and reverse causality, measurement bias and nonlinearity are addressed. We employ Arellano-Bond system Generalized Methods of Moments (SGMM) as the primary estimation technique, however, we also report results based on fixed effects method for robust checks. Results from this study are crucial in shedding some light on whether the HIPC and MDR and other debt forgiveness initiatives from bilateral donors have had any impact on the recently observed positive growth rates in LDCs.

The rest of the paper is organized as follows; section II discusses the relevant literature, section III provides a descriptive analysis of trends in external debt, investment and macroeconomic performance, section IV, methodology and results and section V concludes.

II. LITERATURE REVIEW

A number of approaches have been explored in literature to explain the debt-growth linkage. Regardless of the approach used, the general consensus is that an increasing external debt is detrimental to economic growth. Furthermore, debt effects are transmitted (directly or indirectly) to economic growth through capital resources accumulation (physical and human capital). The major distinguishing factor among these approaches is how the debt affects are modeled in the growth equation. The most common ways are either debt stock or debt services.

There are two major approaches used in literature related to low income and developing countries. The “debt overhang hypothesis” and the “crowding out effects” [also referred to as Liquidity constraint in Moss and Chiang, 2003]. Krugman (1988) defined debt overhang as a situation in which a country’s expected repayment on external debt falls below the contractual value of the debt. Under this scenario, the expected debt service is likely to be an increasing function of the country’s gross domestic product. The presence of a debt overhang has a dampening effect on a country’s long term investment and factor productivity and hence economic growth. For example, if potential investors believe that the government with a large debt will engage in distortionary fiscal policy (tax increase or seigniorage tax) or other distortionary measures such as currency devaluation in order to service the debt, they will lower their expectations on return to their investments. As a result, they will cut back on investment spending and holdings of their savings in the local currency, slowing capital stock accumulation. Uncertainty literature argues that expectation of such distortionary practices cause (risk averse) investors to shy away from

high risk long term productive investments (such as foreign direct investment) in favor of short term unproductive investments (Serven, 1997). The debt overhang effects are usually measured using either the face value or the net present value of the debt stock, expressed either as a percentage of gross domestic product or exports.

A large external debt can also affect growth through the crowding out effect or by affecting the composition of private investment (Clements et.al, 2003). An increasing debt service may increase the government's interest bill and the budget deficit and consequently, cause the long term interest rate to rise or simply crowd out credit available for private investment (Gale and Orzag, 2003; Baldacci and Kumar, 2010). Also, as the debt service heightens, the government is likely to cut back its funding for public investment in infrastructure, human capital and research and innovations (Agenor and Montiel, 1996; Calvo, 1998). This has both direct and indirect effects on growth by lowering the quantity of public investment and factor productivity. Infrastructure, innovations and capital resources, in addition to sound institutions and good policies have been known historically as the key ingredients for long term economic growth. Therefore, anything that negatively affects these factors, negatively impacts a country's long term growth. Studies that have incorporated the crowding out effects in the growth equation have measured debt effects using external debt service as a share of exports.

Empirical evidence on both the debt overhang and crowding out effects are mixed. Table A summarizes the relevant studies. While there is relatively more evidence in support of the debt overhang hypothesis, evidence on crowding out effects is very limited.

Also, it is clear that there is limited evidence on the debt-growth link for least developed countries as a group. This study fills in that gap.

Table A about here

Other issues that have received attention on the debt-growth debate have been the non-linearity of the debt effects and the debt threshold levels. The debt threshold level determines the turning point, beyond which additional debt impacts economic growth negatively. Most recent studies on the debt-growth nexus have either by default specified the debt variable in a quadratic form or provided empirical rationale for the quadratic specification. Pattillo et.al (2011) for example, estimated a growth equation using both linear and non-linear specifications and found that in the linear case, the debt stock measure tended to be negative and significant. However, when a quadratic specification was used, they found evidence of inverted U-relationship, supporting the theoretical predications. Conceptually, reasonable levels of debt can be growth enhancing within the Keynesian framework. However, as the debt grows bigger, effects stemming from debt overhang and other channels can have long run deleterious impact on the economy.

Several studies have attempted to estimate the threshold levels or turning points. These turning points tend to vary across samples (based on income level) and within samples (depending on whether a group of countries have good or bad policies). Empirically estimated threshold levels (using debt stock as a share of GDP) have ranged from as low as 11% (in Pattillo et al., 2011) to as high as 97 % (in Elbadawi, Ndulu and Ndung'u, 1997). Cordella, Ricci and Ruiz-Arranz (2005) using data of 80 developing

countries (with 30 HIPCs) found that the marginal effects of debt become irrelevant at debt stock level of 70-80% of GDP. Nonetheless, as indicated in Pattillo et.al (2011), these turning point estimates are not robust to model specification, sample and estimation methodologies. In this study we do not attempt to estimate the threshold level values.

III. EXTERNAL DEBT INVESTMENT AND MACROECONOMIC PERFORMANCE

In this section we provide a descriptive analysis of external debt, Investment (domestic and foreign) and the macroeconomic performance of least developed countries (LDCs). As documented in the preceding section, a large external debt can negatively influence potential investors when determining both the location of their foreign investments and the type of investment. For example, if investors expect that a government with a large external debt will engage in distortionary and unpredictable fiscal policies in order to service their external debt, they will lower expectations of the returns on their investments. This in turn will limit the country's foreign direct investment (FDI) inflows, encourage non-productive short term investments and discourage existing firms from making new investments and/or engaging in research and innovations.

Consequently, in addition to analyzing the trends in the entire sample, we also compare the performance in the HIPCs and non-HIPCs sub-samples. The HIPCs sub-sample consists of 27 LDCs categorized by International Monetary fund as Heavily Indebted Poor Countries (HIPCs) and either have benefited or are working towards benefiting from the HIPCs and MDR debt relief initiatives. Non- HIPC sub-sample are the remaining 13 LDCs that do not fall in the IMF's HIPCs classification. Overall, based on our sample period, non-HIPCs tend

to have a lower debt stock, a higher share of FDI in GDP and relatively higher growth rates, almost 6 times that of HIPCs (table B).

Table B about here

3.1. Trends in External Debt

Eighty percent of LDCs total external debt is public and publicly guaranteed (PPG). Also approximately 79.6% of the total external debt is long term, implying that majority of LDCs debt is official and also tends to be long term in nature. With the exception of a few outliers³, the average external PPG debt across the countries in our sample lies between 50% and 150% of GDP (figure 1.A).

Figure 1.A about here

Relative to low income and sub-Saharan African countries (of which comparative data was available), LDCs have the highest overall PPG as a share of GDP. Time series trends however indicate that external debt stock as a share of GDP has been declining since 1994; across various income groups (figure 1.B) and debt categories (figure 1.C). Because majority of countries in the Low income category and in sub-Saharan Africa are also categorized as HIPCs, the observed decline might be due to the HIPCs and MDR debt relief initiatives.

Figure 1.B and 1.C about here

Figure 2 provides information on the disaggregated data between HIPCs and non-HIPCs sub-samples. As can be seen, a large proportion of the LDCs debt is due to the HIPCs sub-sample. Nonetheless, we observe a steady decline in the debt stock as a percentage of GDP in both groups since 1994 (this decline is also observed even when the debt stock is measured as a share of exports). Interestingly, these movements coincide with the onset of

the debt relief initiatives that were initiated in 1996 by International Monetary Fund and World Bank.

Figure 2 about here

3.2. Trends in Investment

In line with the declining external debt stock (as observed in the preceding section), we expect to observe an increasing share of investment (domestic and foreign) in LDCs' GDP for two reasons: (i) signaling investor's confidence in the improving fiscal policy environment as a result of the lower debt burden; (ii) due to improving private investment complementarities such as infrastructure and human capital. In particular, private investment is likely to increase if the government is channeling its additional budget resources towards for example, investment in infrastructure and human resources (Clements et.al, 2003).

Figure 3.A about here

Figure 3.A provides a summary of the trends in FDI and gross fixed capital formation (K) as shares of GDP in LDCs. It is evident that both K (proxy for domestic investment) and FDI have been on the upward trend since 1996, with K taking the largest proportion (above 20% of GDP since 2004). Furthermore, K's share in GDP has been consistently above that of overseas development assistance (ODA) since 1995.

Nonetheless, when the data is disaggregated, we notice that the rising LDCs' trends in K and FDI are stemming from both sub-samples (HIPCs and non-HIPCs) (figure 3.B). The gap between HIPCs and non-HIPCs in domestic investment (K) has been narrowing, leading to the observed convergence in 2009. Thanks to the downward trend in non-HIPCs (since 1996) and the upward trend in HIPCs (since 1997). Conversely, the share of FDI has

consistently fluctuated below 5% of GDP in both HIPCs and non-HIPCs and HIPCs, with an increasing trend in HIPCs since 1996.

Figure 3.B about here

Overall, the share of FDI inflows as a percentage of the world FDI flows averaged 0.8%, 0.6% and 0.9% in LDCs, low income countries and heavily indebted poor countries respectively, between 1975 and 2010. Moreover, there was a sharp decline in the flow of FDI in these three groups between 1976 and 1996, which recuperated in 1997 (figure 3.C). Relative to low income countries, heavily indebted poor countries and LDCs have been attracting more FDI, with the shares fluctuating between 0.5% and 1.5% of World FDI flows.

Figure 3.C about here

3.3. Trends in Macroeconomic Performance

LDCs are on average net importers. The share of trade in goods and services averaged 64% of GDP between 1975 and 2010 with the ten year averages indicating the increasing importance of trade in the domestic economy. Besides, the share of imports is almost two times that of exports (table C). Overseas development assistance (ODA), a major source of development funds in least developed countries ranges between 12% and 15% of GDP in these countries.

Table C about here

Economic growth on the other hand, has been growing at a modest rate since 1992, with the peak rates ranging between 3.5% and 3.6% (figure 4.A). Disaggregating the data into HIPCs and non-HIPCs sub-samples, provide interesting results. It is apparent that the

growth rate in the non-HIPCs sub-sample has been relatively higher, with pronounced volatilities, relative to the HIPCs sub-sample (figure 4.B).

Figure 4.A and 4.B about here

IV. METHODOLOGY AND EMPIRICAL RESULTS

4.1. Empirical Model

In the formal analysis, we investigate the effects of external debt on economic growth of forty least developed countries⁴ using unbalanced panel data for the period of 1975 to 2010. Primarily, we focus on external public and publicly guaranteed debt since it constitutes the bulk of LDCs external debt. Nonetheless, we also evaluate the effects of external total debt and concessional debt. In order to capture the debt overhang effects, the debt stocks are expressed as percentages of both GDP and exports. We follow closely the findings of Sala-i-Martin et al (2004) in selecting the core sets of growth determinants, however, the estimated model variables are constrained by the available data. Among the core set of variables included in this paper that were identified by Sala-i-Martin et al (2004) to have high marginal contribution to the explanatory power of the growth regression are human capital measure, trade openness, general government consumption share, population growth and regional dummies.

We employ some of the model specification approach used in Kumar and Woo (2010) and Clements et.al (2003). For example, in addition to the panel regressions based on the annual data, we also use 3-year averaged data of the dependent variable and initial values (at the beginning of each time period) of the independent variables (with the exception of

human capital and fiscal volatility measures, of which the 3-year average values are used). This gives us 12 non-overlapping periods from 1975 to 2010. Regressions based on the averaged dependent variable control for the effects of short run cyclical fluctuations and minimize the effects of outliers. Furthermore, by using initial level of debt, we are able to control for the reverse causality bias.

Some studies have suggested that there exists a Laffer-curve between debt and growth (Pattilo et.al, 2011; Reinhart, Rogoff and Savastano, 2003; Presbitero, 2008; Clements et.al, 2003; Cordella et.al, 2005), therefore, this study also explores the non-linearity effects. Needless to mention, empirical results on non-linear specification are not robust to model specification, estimation technique and sample used.

We also address a number of methodology issues. The endogeneity bias may arise due to the potential endogeneity of growth determinants, for example, debt, investment and human capital variables. On the other hand, there is a possibility that low growth may cause high debts, while high debts may cause low growth or that both debt and growth maybe jointly determined by a third variable. In such instances, the model will suffer from reverse causality and simultaneity bias. Other biases that may affect the consistency of the estimates include the heterogeneity (omitted variable) bias and the measurement error (in independent variables).

System GMM (SGMM) approach of Arellano and Bover (1995) and Blundell and Bond (1998) is used to control for the endogeneity bias, measurement bias, unobserved country fixed effects and other potentially omitted variables. Relative to the difference GMM, SGMM is robust to weak instrument bias. It uses suitable lagged levels and lagged first differences of the regressors as their instruments. For robust checks and minimizing the effects of

biases, we also report results based on fixed effects (FE) estimation technique. FE is used to control for the effects of omitted variable bias, which arises from the correlation between country specific effects and the regressors. Nevertheless, the consistency of the FE estimates is affected by endogeneity bias and measurement error.

In the empirical model we identify three categories of variables that affect economic growth in addition to external debt; 1) Global factors, 2) domestic factors and, 3) dummy variables. Each of the categories is discussed below.

Starting in the early 1980s, developing countries experienced a wave of macroeconomic policy shifts away from import protection, managed exchange rates and targeted subsidies towards trade, investment and financial market liberalization. The objectives of the policy shift were believed, among other factors, to positively affect a country's economic growth by increasing the competitiveness and efficiency of the export sector and overall improving the production efficiency in the domestic market. In addition, long term private international capital flows have been viewed as complementary and catalytic agents in building and strengthening domestic factor productivity with inherent tangible and intangible benefits such as contributing to export-led growth, technology and skill transfer and employment creation. Consequently we expect *global factors* such as trade openness and foreign direct investment (FDI) to positively enhance economic growth.

FDI is measured as a percentage of GDP. Because trade openness is a policy outcome, a better proxy would include a policy instrument such as data on tariff or other non-tariff barriers. However, we do not have comprehensive data on these policy instruments and therefore as proxies, we use policy outcome variables. Relative to the existing studies that use volume of trade as a measure of trade openness, we use net exports by entering

separately into our model imports and exports (as percentage of GDP). We are motivated to enter imports and exports as separate arguments for two reasons. First, by measuring the net exports, we are able to observe the effects of the global demand on economic growth. Second, as indicated in the preceding section, countries in our sample are net importers, with their export sector characterized by primary commodities and agriculture based light manufacturing, which are income inelastic and price elastic. It is expected for FDI to have a positive effect while net exports, negative effects.

Another *global factor* included in our model is the share of net official development assistance (ODA) in gross national income. The biggest constraint facing LDCs to achieving sustainable economic growth is mobilizing domestic financial resources for development. As a result, majority of them are faced with a big financing gap. Consequently, ODA remains the largest source of development funds in most LDCs and has been advocated by United Nations General Assembly as a necessary financial source to help these countries graduate from the LDC status. It has also been indicated in literature that debt overhang effects are exacerbated in the presences of low ODA flow (Pattillo, Poirson and Ricci, 2004). The sign for ODA is expected to be positive.

Sala-i-Martin et al (2004) identified human capital measure, population growth and government consumption expenditure as some of the variables that have high marginal contribution to explanatory power of the growth regression. These variables make up the *domestic factors* in addition to physical capital. According to UNFPA (2011), least developed countries have the highest population growth rate in the world, which is three times that of other developing countries. Population growth has also been used elsewhere as a proxy for the rate of growth of labor input in the production process. We expect

population growth rate variable to have negative effects on economic growth. Secondary school enrolment and the share of gross fixed capital formation in GDP are used as proxies for quality of human capital and physical capital respectively. According to Grossman and Helpman (1991), a country with high human capital is more likely to attract investors, have the capacity to absorb new ideas and engage in research and innovations. We expect both human capital and physical capital to have positive effects on growth.

As a fiscal policy instrument, government consumption expenditure can be used during economic downturns to stimulate aggregate demand and output through the Keynesian effect. However, if the spending is politically motivated or is as a result of corruption, it could have negative consequences on the medium and long run economic growth.

Accordingly, this study deviates from the conventional use of government consumption expenditure directly into the regression equation and use, instead, deviations of the share of general government consumption expenditure in GDP from its trend. This specification allows us to observe the potential negative effects of fiscal volatility on economic growth⁵.

In addition to the *global* and *domestic* variables, we include *dummy variables* for landlocked countries and Asian countries. To capture the effects of HIPC and MDR initiatives, we use a dummy variable for the HIPC and MDR initiatives beneficiaries in the baseline regression (however, we also use an interaction term between the HIPC dummy and the debt variable in the FE estimations). The lag of log per capita real GDP is included in line with the standard Barro (1991) growth model, to test for convergence across countries over time towards a common level of real per capita income.

Consequently, the baseline regression specification is based on equations (1) below.

$$RPYG_{it} = \beta_0 + \beta_1 RPY_{it-1} + \beta_2 PPG_{it} + \beta_3 PPG_{it}^2 + \beta_4 FDI_{it} + \beta_5 ODA_{it} + \beta_6 SS_{it} + \beta_7 Fiscal_{it} + \beta_8 K_{it} + \beta_9 Popg_{it} + \beta_{10} Integration_{it} + \beta_{11} dummies_{it} + \varepsilon_{it}$$

(1)

Where: $RPYG$ and RPY_{t-1} are the real per capita GDP growth and the lag of real per capita GDP (expressed in log) respectively, in country i at time t . β_0 is the common intercept and ε_{it} is the error term. PPG and PPG^2 is the external public and publicly guaranteed debt expressed as a percentage of both GDP and exports and its quadratic form (in other specifications, we use external total and concessional debts⁶). FDI is the net inflow of foreign direct investment as a percentage of GDP. ODA is the net overseas development assistance received as a percentage of gross national income. $Integration$ comprises those variables that capture the global economic integration; exports and imports as shares of GDP. SS is the secondary school enrolment (as percentage of gross). $Popg$ is population growth rate. $Fiscal$ is the fiscal volatility, which is measured as the deviation of the share of general government consumption expenditure in GDP from its trend. Dummies are the dummy variables for landlocked countries, Asia and HIPC⁷ (in FE estimations we use an interaction between the debt and the dummy variables).

4.2. Data and Econometric Results

All the data are downloaded from World Bank's World Development indicators (2012) website. Variable description and notation explanation is detailed in table D. Descriptive

Statistics and correlation matrix of all the variables used in our model are provided in Tables 1 and 2 respectively. A list of countries used in the sample can be found in table E.

In the baseline regression, we evaluate the effects of external public and publicly guaranteed debt on economic growth of 40 least developed countries. We use annual data for the period of 1975 to 2010. In order to further isolate the effects of HIPC and MDR debt relief initiatives, we disaggregate the data into two sub-samples: HIPC and non-HIPC. The HIPC sub-sample consists of those countries categorized by IMF as heavily indebted poor countries and have either benefited or are working towards benefiting from the debt relief initiatives. Non-HIPC sub-sample includes those LDCs that do not fall in the heavily indebted poor countries category. We report the results based on the full sample and sub-samples. Due to potential endogeneity bias and other biases mentioned above, we follow what has been used elsewhere in literature and use Arellano- Bond SGMM approach. In accordance with GMM estimation techniques, Sargan test of over-identifying restrictions and the Arellano-Bond test that the average autocovariance of residuals of order two is zero are also reported.

For robust checks and to control for reverse causality bias and short run cyclical fluctuations, we estimate equation (1) using 3-year averaged data of the dependent variable. Additionally, to ensure that our results are robust to estimation techniques, we report results based on fixed effects (FE) methodology. Table 3 (A and B) contains baseline regression results using SGMM. Table 4 (A and B) reports FE estimation output. Consistency check regressions using averaged data are reported in table 5.

The SGMM results pass the Sargan test for validity of the instruments and the Arellano bond test of average autocovariance of residuals. We also conduct the Hausman test, which

rejects the random effect in favor of fixed effects. Generally, the baseline estimations based on SGMM and FE (tables 3 and 4) provide consistent results for the debt variables and most of the other growth determinants. Table 3 and 4 reports results based on the full sample (40 LDCs) and the two sub-samples (HIPCs and non-HIPCs). We augment the public and publicly guaranteed external debt stock results with those using external total and concessional debt stocks.

In both tables 3 and 4, the conditional convergence variable is significant, with the right sign. We find evidence of non-linear relationship between external debt and economic growth. Specifically, we find a U-shaped relationship, which is robust across the different debt specifications, samples and in both SGMM and FE estimation techniques. Nevertheless, the positive marginal effects are diminishing. While these results are in line with the conclusion arrived in Cordella et.al (2005), they are contrary to other related studies (Pattillo et. al, 2011; Clements et.al, 2003) that found an inverted-U relationship between debt and economic growth. There are two plausible explanations to the findings in this study. First, studies that found an inverted-U relationship used initial debt stocks, which they regressed on either 3-year or 5-year averages of real per capita GDP growth. In this study however, our baseline regressions use annual panel data. Besides, we also find evidence in support of an inverted-U relationship when we regress initial debt values on 3-year averaged growth variable (see table 5). Second, the average total debt in our sample is 90% and 448% of GDP and exports respectively compared, for example in Pattillo et. al (2011), which is about 68.32% and 288.75% of GDP and exports respectively. Consequently, it is possible that LDCs' debt is relatively too high (above the "threshold level") such that, doubling the debt can only have positive marginal effects.

In evaluating the debt stock effects across the different samples, we notice that the negative effects are more pronounced in the non-HIPCs sub-sample relative to the HIPCs, regardless of the estimation technique and debt specification (table 3 and 4). Also we notice that the concessional debt has higher negative effects on economic growth relative to public and publicly guaranteed debt. The rest of the results analysis focuses on the estimations based on SGMM in table 3. In table 3A the debt stock is measured as a percentage of GDP, while in table 3B, as a percentage of exports.

In addition to the debt effects, we included other growth determinants, categorized as; *domestic, global* and *dummy* variables. The *domestic variables* include both human and physical capital, population growth and fiscal volatility measure. Overall, we find that population growth and domestic capital variables have the expected sign where significant. Human capital measure also tends to be significant with a positive sign. The positive effects are more pronounced in the HIPCs sub-sample. The fiscal volatility variable, which is measured as the deviations of general government consumption expenditure from its trend, is significant in the full sample, with the expected sign. When we disaggregate the data, we find that the negative effects are stemming from the non-HIPCs sub-sample (see table 3).

FDI, ODA and a measure of trade openness comprise the global variables. As seen in table 3, FDI has neutral effects on economic growth of LDCs. ODA on the other hand, has meaningful significant and positive effects in the non-HIPCs sub-sample but neutral in the full sample and HIPCs sub-sample. These findings are robust across all the debt specifications. In reference to growth effects from trade openness, we deviate from the norm and enter separately into our equation, exports and imports (as a % of GDP) rather

than use trade volume. This allows us to measure the effects of net exports (or global demand) on the domestic economic growth. Studies that have used trade as a share of GDP have found insignificant effects of trade openness. However, in this study we find that the effects of net exports tend to be significant and positive, across all samples and estimation techniques (including the 3-year averaged data). Moreover, these effects are more pronounced in the HIPCs sub-sample.

In the dummy variable category, we include a dummy for landlocked economies, Asia and HIPCs. The HIPCs dummy is intended to capture the effects of the IMF/World Bank debt relief initiatives. A dummy variable for Africa is not included since majority (85%) of the LDCs in Africa are also classified as HIPCs. Furthermore, when both the Africa and Asia dummies are included in the regression, one of them is dropped due to collinearity. The dummies for landlocked and Asia tend to be significant with a positive sign. The HIPC dummy is neutral in all cases with only one exception (where total debt is measured as a share of exports, table 3B).

Table 5 details the results of the effects of initial debt on the subsequent growth rates averaged over a 3-year period. Due to the overall sample size, we do not disaggregate this data into the two sub samples mentioned in the preceding analysis. However we supplement the results based on the public and publicly guaranteed external debt stock with those of total external debt stock and concessional debt stock. There are some interesting findings in this table worthy of attention. First these results support the Laffer curve relationship between initial debt and subsequent growth that has been observed in other related studies. Second, initial FDI flows have significant positive effects on subsequent growth, especially when debt is measured as a percentage of GDP. Third, ODA

has significant negative effects on growth in the presence of public and publicly guaranteed debt and concessional debt but neutral when total debt is used. Fourth, human capital measure is significant with a negative sign in all debt specifications. Lastly, we do not observe the conditional convergence that was observed in tables 3 and 4 and in other related studies (such as Pattillo et. al., 2011; Clements et. al., 2003).

V. CONCLUSION

This study evaluates the impact of public and publicly guaranteed (PPG) external debt on long term economic growth of forty least developed countries using the debt overhang hypothesis. In addition to the PPG debt effects, we also provide comparative results based on total external debt and concessional debt. Data used in this study spans from 1975 to 2010, providing sufficient time span to observe and empirically assess the impact of IMF/World Bank debt relief that was initiated in 1996 under the heavily indebted poor countries (HIPCs) and multilateral debt relief (MDR) initiatives. We control for the effects of foreign capitals, domestic capitals, fiscal volatility and other growth determinants established in Sala-i-Martin et. al (2004). Arellano-Bond SGMM estimation technique is used to control for endogeneity bias, measurement error bias, unobserved country fixed effects and other potential omitted variables bias. For robust checks, we also report results based on fixed effects estimation technique. Additionally, we report results based on two sub-samples; HIPCs and non-HIPCs. To net out the short run cyclical fluctuations and to control for reverse causality bias, regressions based on 3-year averaged real per capital growth data are also reported.

In summary, our findings suggest that high external debt depresses economic growth of least developed countries, regardless of the nature of the debt (public and publicly guaranteed debt, total or concessional). These effects are positive and diminishing when debt is doubled. Nonetheless, concessional debt has higher negative effects on economic growth of LDCs relative to public and publicly guaranteed debt. In the disaggregated data however, we learn that the negative debt effects are more pronounced in the non-HIPCs sub-sample relative to the HIPCs, suggesting potential beneficial effects from the debt relief initiatives.

When we examine the effects of trade openness using net exports, we find that trade is benefitting LDCs despite the fact that they are net importers. These beneficial effects are more pronounced in HIPCs sub-sample. For example, a 10 percentage point increase in net exports leads to approximately 2.77% increase in economic growth of HIPCs and only about 2.1% in non-HIPCs. FDI on the other hand does not have any apparent meaningful effects on economic growth of LDCs. Nonetheless, ODA has some meaningful growth enhancing effects only in the non-HIPCs sub-sample.

Domestic factors such as physical and human capitals also matter in economic growth of LDCs. They both tend to have growth enhancing effects. When data is disaggregated however, we find the observed positive effects of physical capital in the full sample are solely stemming from the non-HIPCs. An increase in population growth rate and fiscal volatility in these countries is detrimental on growth.

Overall, this study found that the Laffer curve relationship between debt and economic growth is apparent when initial debt is regressed on averaged growth data. When annual values are used, we found that there existed a U-shaped relationship. Furthermore the debt

relief initiatives are crucial as evidenced in the lower negative debt effects on growth in HIPCs sub-sample relative to the non-HIPCs. Additionally, initial values of FDI and ODA matter in economic growth of LDCs. Nonetheless further investigations are required to establish the effects of debt on FDI and domestic investment in HIPCs. This will shed some light on whether the negative effects of debt are transmitted to economic growth via these two forms of investment. Clements et al (2003) found that in low income countries, debt service depresses public investment and concluded that it is public investment and not private investment that matters to growth in those countries.

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Appendix I: Tables

Table A:

Table A: Summary of Related Studies

Study	Sample	Evidence in support of Debt overhang and/or Crowding out effects
Pattillo et.al (2011)	93 developing countries for the period of 1968-1998.	Found evidence supporting debt overhang. None on crowding out effects.
Clements et.al (2003)	55 low income countries	Results support debt overhang. Did not find direct effects of debt service (crowding out effects) on growth.
Chowdhury (2001)	35 HIPCs and 25 non-HIPCs. Sample period 1982-89	Found evidence supporting debt overhang.
Fosu (1999)	35 sub-Saharan African countries	Found evidence in support of the debt overhang but none on crowding out effects.
Elbadawi, Ndulu and Ndung'u (1997)	sub-Saharan African countries	Found evidence in support of the debt overhang and crowding out effects.
Deshpande (1997)	13 severely indebted countries.	Found evidence in support of debt overhang.

Table B:

Table B: Selected Summary Statistics for HIPCs and non-HIPCs subsamples, 1975 -2010

	LDCs - All	LDCs - HIPCs	LDCs-non-HIPCs
Real per capital GDP growth rate	0.841	0.379	2.312
FDI (% of GDP)	89.044	2.454	57.305
Total Debt (% of GNI)	2.860	98.321	3.777
PPG Debt (% of GDP)	71.462	77.733	49.641

Source: World Development Indicators, 2012.

Table C:

Table C: LDCs Share of Trade (Exports and Imports) as a % of GDP

	1975 - 2010	1975- 1984	1985- 1994	1995- 2004	2005- 2010
Trade	63.599	58.726	57.882	64.893	76.866
Imports	39.613	37.201	36.685	40.047	46.609
Exports	24.008	21.525	21.197	24.911	30.257

Source: World Development Indicators, 2012

Table D:

Table D: Variable Description and Notations

<i>Variable Description</i>	<i>Notation</i>
GDP per capita (constant 2000 US\$)	RPY
GDP per capita growth (annual %)	RPYG
External debt stocks, long-term public sector (DOD, current US\$) (% of GDP)	DEBTLY
External debt stocks, long-term public sector (DOD, current US\$) (% of EXPORTS)	DEBTLX
External debt stocks, public and publicly guaranteed (PPG) (DOD, current US\$) (% GDP)	PPGY
External debt stocks, public and publicly guaranteed (PPG) (DOD, current US\$) (% EXPORTS)	PPGX
External debt stocks, concessional (DOD, current US\$) (% of GDP)	DEBTCY
External debt stocks, concessional (DOD, current US\$) (% of EXPORTS)	DEBTCX
External debt stocks (% of exports of goods, services and income)	DEBTX
External debt stocks (% of GNI)	DEBTY
External debt stocks, short-term (DOD, current US\$) (% of GDP)	DEBTSY
External debt stocks, short-term (DOD, current US\$) (% of EXPORTS)	DEBTSX
General government final consumption expenditure (% of GDP)	G
Deviations of G from its trend	FISCAL
Gross fixed capital formation (% of GDP)	K
Imports of goods and services (% of GDP)	M
Net ODA received (% of GNI)	ODA
Exports of goods and services (% of GDP)	X
Foreign direct investment, net inflows (% of GDP)	FDI
Population growth (annual %)	popg
School enrollment, secondary (% gross)	SS
Trade (% of GDP)	Trade

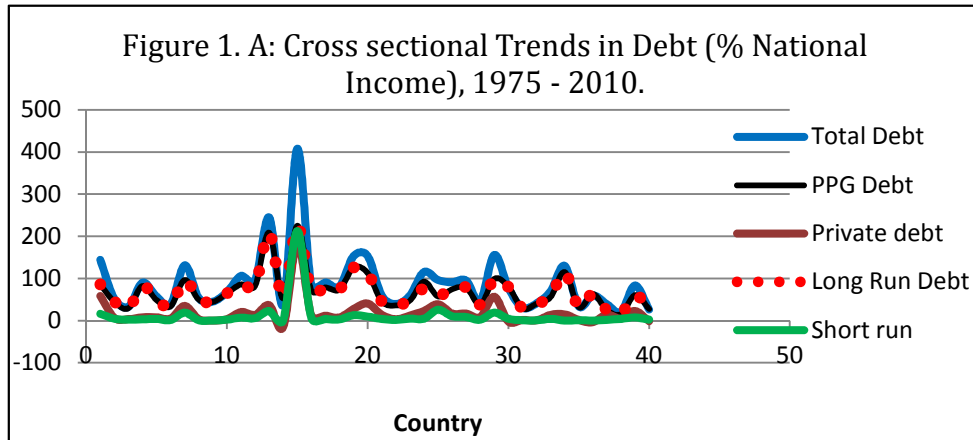
Table E:

Table E: Sample LDCs

HIPC (27)		Non-HIPC (13)	LDCs excluded in Sample (8)
Benin	Mauritania	Angola	Sao Tome and Principe
Burkina Faso	Mozambique	Djibouti	Afghanistan
Burundi	Niger	Gambia, The	Somalia
Central African Republic	Rwanda	Lesotho	Myanmar
Chad	Senegal	Bangladesh	Equatorial Guinea
Congo, Dem. Rep.	Sierra Leone	Bhutan	Kiribati
Eritrea	Sudan	Cambodia	Timor-Leste
Ethiopia	Tanzania	Lao PDR	Tuvalu
Guinea	Togo	Nepal	
Guinea-Bissau	Uganda	Samoa	
Liberia	Zambia	Solomon Islands	
Madagascar	Comoros	Vanuatu	
Malawi	Haiti	Yemen, Rep.	
Mali			

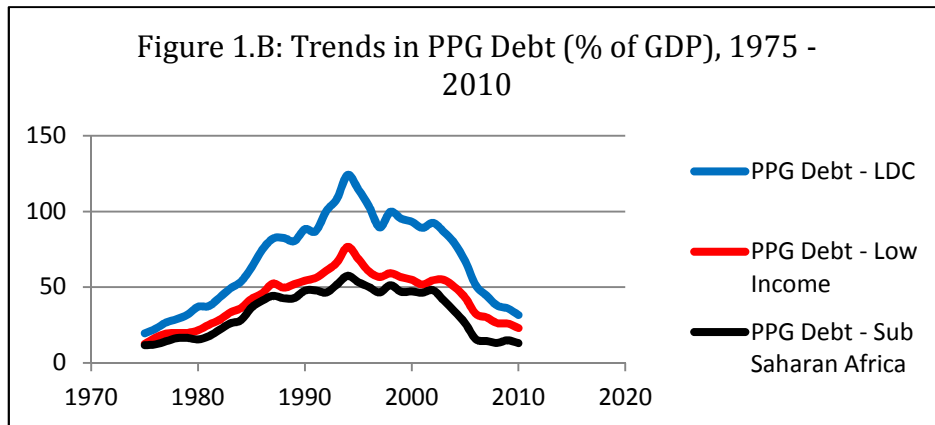
Appendix II: Figures

Figure 1.A



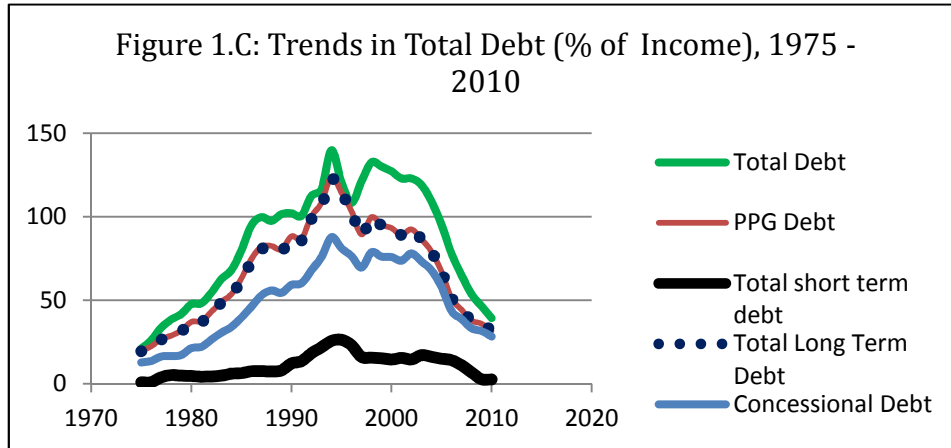
Source: World Development Indicators, 2012

Figure 1.B



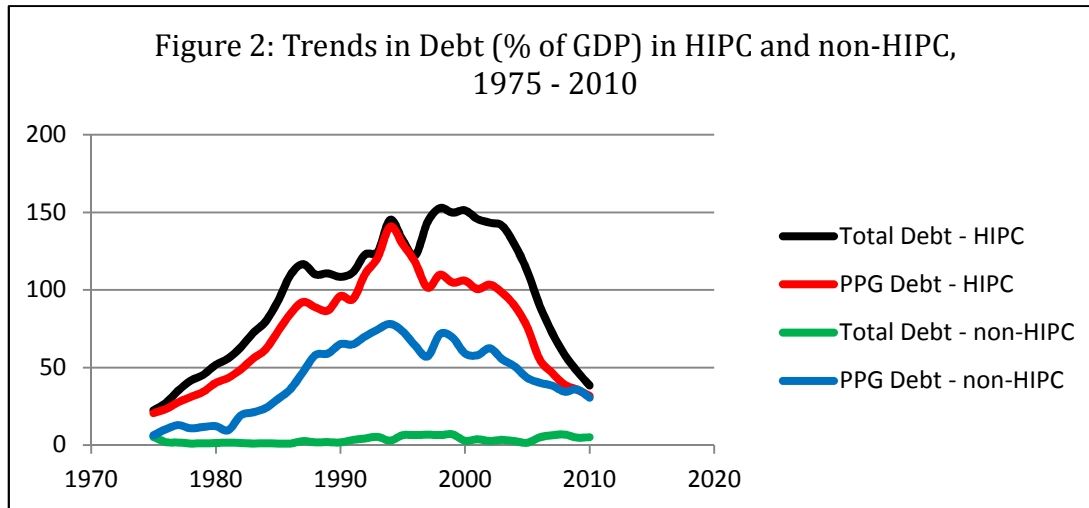
Source: World Development Indicators, 2012

Figure 1.C



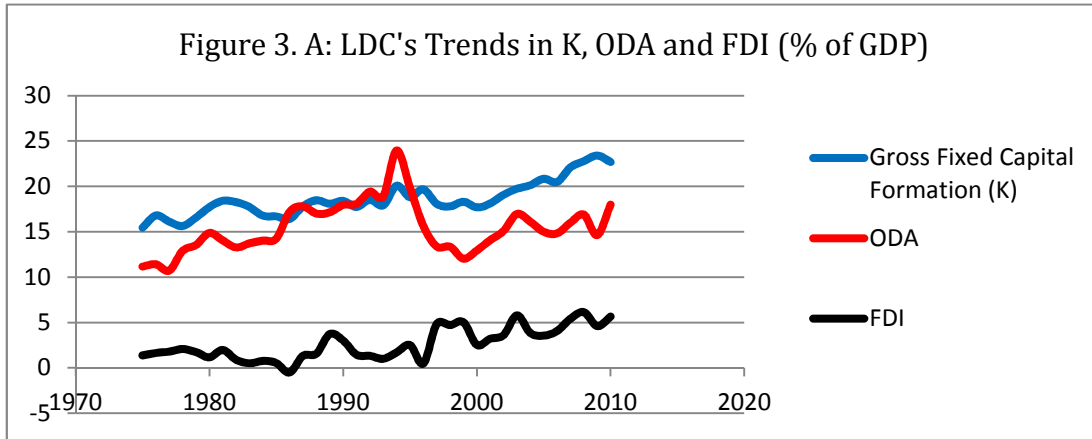
Source: World Development Indicators, 2012

Figure 2



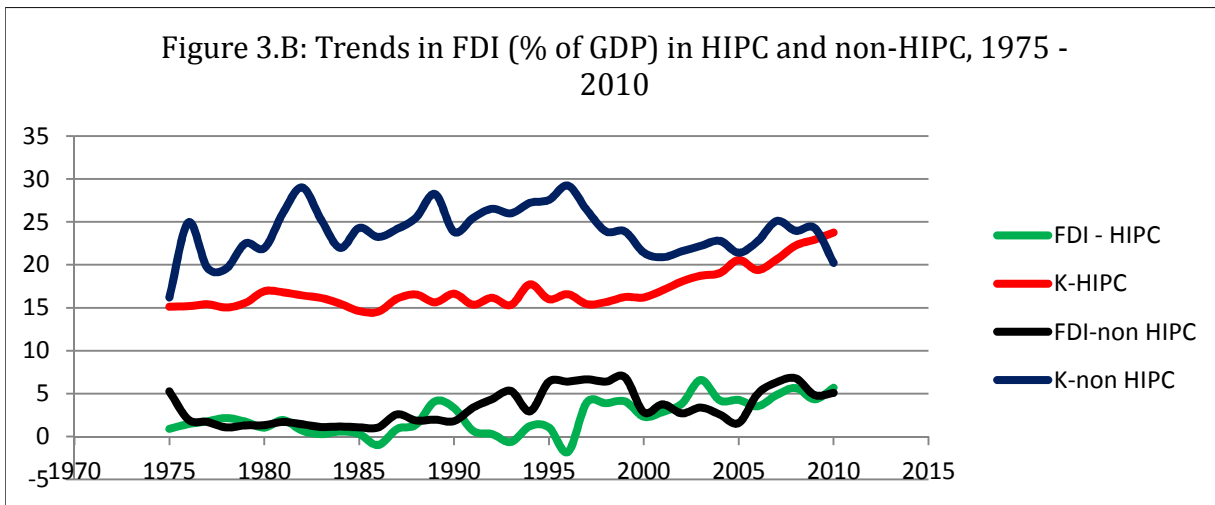
Source: World Development Indicators, 2012

Figure 3.A



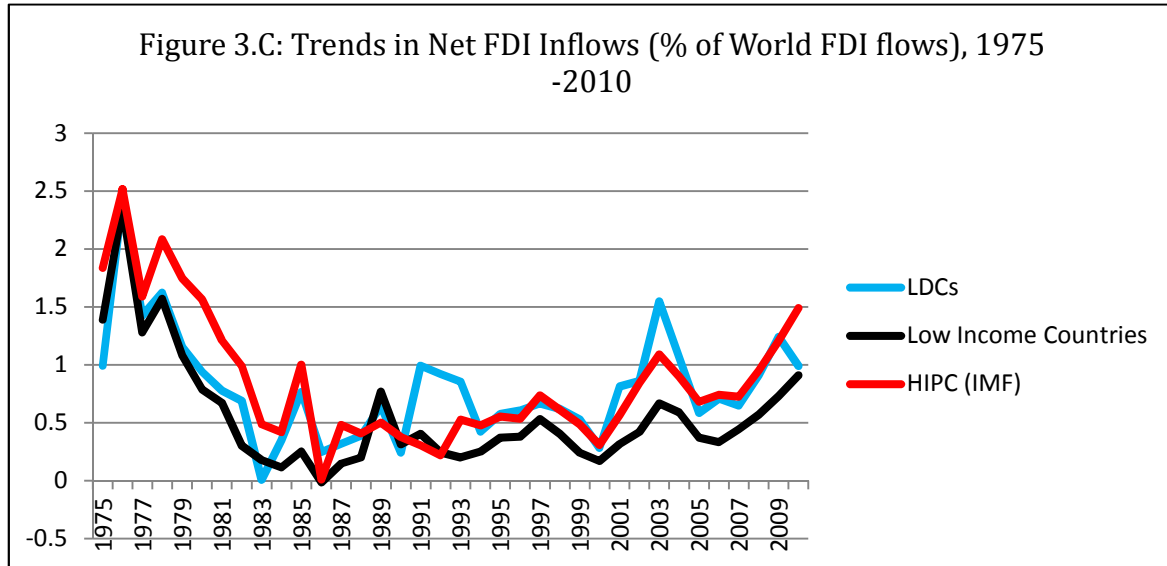
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Figure 3.B



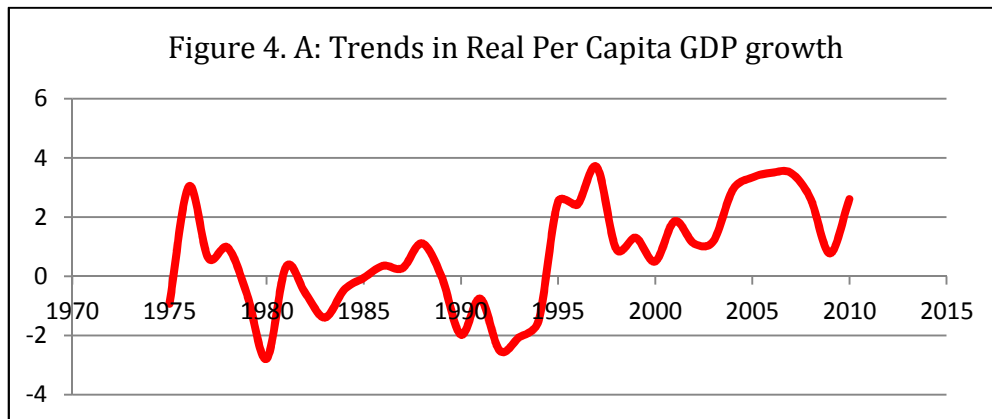
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Figure 3.C



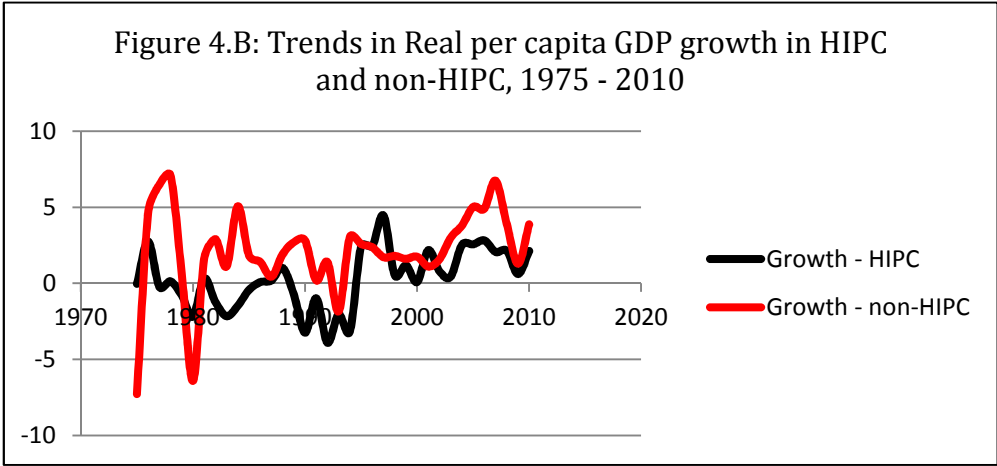
Source: World Development Indicators, 2012

Figure 4.A



Source: World Development Indicators, 2012

Figure 4.B



Source: World Development Indicators, 2012

Appendix II: Summary Tables

Table 1: Descriptive Statistics

Table 1: Descriptive Statistics

Variable	Mean	Std. dev.	Min	Max	Observations
Real GDP Per capita Growth	0.841	6.621	-50.29	92.586	1243
Log (GDP real GDP per capita)	5.726	0.620	4.057	7.540	1259
PPD Debt (% GDP)	71.462	70.067	0.238	862.108	1271
PPD Debt (% X)	417.497	518.519	1.442	6241.920	1207
Total Debt (% GNI)	89.044	100.475	0.280	1022.742	1253
Total Debt (% X)	454.240	560.921	7.653	4224.243	1090
Concessional Debt (% of GDP)	52.855	47.556	0.238	472.720	1271
Concessional Debt (% of X)	317.777	384.274	1.442	3958.324	1207
Exports (% GDP)	24.008	14.828	2.525	89.624	1213
Imports (% GDP)	39.613	22.544	6.341	190.864	1214
FDI (% of GDP)	2.860	7.727	-82.89	90.741	1193
ODA (% of GNI)	15.626	13.790	0.210	185.941	1269
K (% of GDP)	18.748	9.873	1.931	76.693	1052
Fiscal Volatility	0.000	9.819	-13.04	53.884	1133
Secondary Schooling	20.179	14.833	1.635	96.566	929
Pop Growth	2.585	1.211	-7.53	9.770	1440

Table 2: Correlation Matrix

Table 2: Correlation Matrix of Model Variables

	RPYG	log RPY	PPDY	PPDX	DEBTI	DEBTX	DEBTCY	DEBTCX	X	M	FDI	ODAI	K	FISCAL	SS	Pogp
RPYG	1															
log RPY	-0.06	1														
PPDY	-0.10	-0.17	1													
PPDX	-0.05	-0.42	0.64	1												
DEBTI	-0.10	-0.12	0.95	0.59	1											
DEBTX	-0.04	-0.36	0.61	0.94	0.61	1										
DEBTCY	-0.04	-0.25	0.88	0.57	0.76	0.53	1									
DEBTCX	-0.04	-0.48	0.57	0.93	0.48	0.86	0.65	1								
X	0.08	0.60	0.13	-0.42	0.15	-0.38	0.05	-0.46	1							
M	0.06	0.29	0.10	-0.22	0.002	-0.28	0.07	-0.24	0.53	1						
FDI	0.14	0.17	0.00	-0.17	-0.005	-0.17	-0.04	-0.17	0.32	0.40	1					
ODAI	-0.06	-0.24	0.59	0.47	0.55	0.42	0.57	0.45	-0.05	0.09	-0.08	1				
K	0.15	0.08	0.08	-0.06	-0.03	-0.12	0.07	-0.07	0.14	0.68	0.44	0.04	1			
FISCAL	-0.08	0.41	0.01	-0.16	-0.01	-0.19	-0.09	-0.17	0.45	0.52	0.28	0.07	0.23	1		
SS	0.15	0.36	-0.14	-0.29	-0.16	-0.27	-0.07	-0.26	0.32	0.24	0.20	-0.33	0.26	-0.004	1	
Pogp	-0.19	-0.06	0.04	-0.04	0.09	0.01	-0.01	-0.03	-0.01	-0.17	-0.09	0.14	-0.15	0.02	-0.26	1

Appendix IV: Results Tables

Table 3 A

Table 3A: Debt/ GDP effects on Real per Capita GDP growth (Baseline Regression - using SGMM)									
Explanatory Variables	Public and Publicly Guaranteed Debt			Total Debt			Concessional Debt		
	Full Sample	HIPC	Non-HIPC	Full Sample	HIPC	Non-HIPC	Full Sample	HIPC	Non-HIPC
logrpy _{t-1}	-32.580 (2.799)***	-33.016 (3.929)***	-24.758 (4.163)***	-30.885 (2.788)***	-31.083 (3.942)***	-24.44 (4.144)***	-33.563 (2.843)***	-34.756 (3.952)***	-26.107 (4.304)***
Debt/GDP	-0.142 (0.02)***	-0.117 (0.023)***	-0.147 (0.054)***	-0.09 (0.014)***	-0.07 (0.016)***	-0.151 (0.043)***	-0.202 (0.028)***	-0.176 (0.032)***	-0.194 (0.059)***
(Debt/GDP) ²	0.0004 (0.0001)***	0.0003 (0.0001)***	0.0004 (0.0003)	0.0002 (0.00004)***	0.0001 (0.00004)***	0.0003 (0.0001)***	0.001 (0.0002)***	0.001 (0.0002)***	0.001 (0.0004)**
Exports	0.243 (0.034)***	0.277 (0.047)***	0.153 (0.049)***	0.254 (0.034)***	0.287 (0.047)***	0.178 (0.048)***	0.228 (0.034)***	0.266 (0.047)***	0.141 (0.049)***
Imports	-0.061 (0.030)**	-0.032 (0.044)	-0.132 (0.044)***	-0.058 (0.031)**	-0.037 (0.044)	-0.145 (0.048)***	-0.056 (0.03)*	-0.031 (0.044)	-0.135 (0.045)***
FDI	0.048 (0.046)	0.093 (0.077)	-0.006 (0.056)	0.057 (0.046)	0.098 (0.077)	0.003 (0.055)	0.039 (0.046)	0.095 (0.076)	-0.022 (0.055)
ODA	0.017 (0.037)	0.03 (0.042)	0.192 (0.088)***	0.026 (0.037)	0.031 (0.042)	0.175 (0.088)**	0.031 (0.037)	0.046 (0.041)	0.195 (0.09)***
K	0.115 (0.036)***	0.089 (0.058)	0.167 (0.047)***	0.099 (0.036)***	0.099 (0.059)*	0.17 (0.049)***	0.112 (0.036)***	0.091 (0.058)	0.157 (0.046)***
Fiscal volatility	-0.101 (0.05)**	-0.073 (0.059)	-0.272 (0.099)***	-0.117 (0.051)***	-0.082 (0.059)	-0.29 (0.099)***	-0.113 (0.05)***	-0.07 (0.058)	-0.299 (0.099)***
SS	0.173 (0.069)***	0.213 (0.091)***	0.164 (0.094)*	0.194 (0.07)***	0.247 (0.091)***	0.123 (0.095)	0.133 (0.07)**	0.158 (0.092)*	0.167 (0.094)*
POP-growth	-1.124 (0.242)***	-1.088 (0.255)***	-2.507 (1.261)**	-1.065 (0.244)***	-1.07 (0.257)***	-1.948 (1.241)	-1.121 (0.242)***	-1.076 (0.254)***	-2.669 (1.269)***
D-Landlocked	0.228 (0.118)**			0.264 (0.12)***			0.211 (0.118)*		
D-HIPC	-0.095 (0.125)			-0.044 (0.126)			-0.134 (0.126)		
D-Asia	0.738 (0.197)***			0.773 (0.199)***			0.73 (0.198)***		
Constant	-0.115 (0.155)	-0.088 (0.093)	0.389 (0.166)***	-0.216 (0.155)	-0.132 (0.093)	0.451 (0.167)***	0.021 (0.159)	0.014 (0.096)	0.456 (0.17)***
N	527	416	129	527	416	129	527	416	129
Sargan (p>χ ²)	0.975	1.0	1.0	0.9542	1.0	1.0	0.9758	1.0	1.0
Autocorrelation (pr > z)	0.3236	0.1488	0.4248	0.374	0.1593	0.5136	0.3553	0.1697	0.5711

Table 3B:

Table 3B: Debt/ Exports effects on Real per Capita GDP growth (Baseline Regression - using SGMM)									
Explanatory Variables	Public and Publicly Guaranteed Debt			Total Debt			Concessional Debt		
	Full Sample	HIPC	Non-HIPC	Full Sample	HIPC	Non-HIPC	Full Sample	HIPC	Non-HIPC
logrpy _{t-1}	-31.94 (2.757)***	-32.86 (3.8)***	-23.586 (4.232)***	-33.014 (3.149)***	-36.542 (4.962)***	-25.942 (4.467)***	-32.044 (2.779)***	-33.204 (3.834)***	-24.442 (4.270)***
Debt/X	-0.017 (0.002)***	-0.015 (0.002)***	-0.027 (0.01)***	-0.016 (0.002)***	-0.017 (0.002)***	-0.032 (0.011)***	-0.019 (0.003)***	-0.017 (0.003)***	-0.032 (0.011)***
(Debt/X) ²	0.000005 (0.000001)***	0.000004 (0.000001)***	0.00002 (0.00001)	0.000004 (0.000001)***	0.000004 (0.000001)***	0.00002 (0.00002)	0.000005 (0.000001)***	0.000005 (0.000001)***	0.00003 (0.00002)*
Exports (x)	0.147 (0.036)***	0.177 (0.05)***	0.063 (0.055)	0.166 (0.043)***	0.064 (0.069)	0.118 (0.052)***	0.149 (0.036)***	0.175 (0.05)***	0.064 (0.055)
Imports	-0.053 (0.03)*	-0.029 (0.044)	-0.117 (0.045)***	-0.085 (0.036)***	0.024 (0.056)	-0.145 (0.045)***	-0.054 (0.03)*	-0.033 (0.044)	-0.116 (0.045)***
FDI	0.022 (0.046)	0.049 (0.077)	-0.031 (0.055)	-0.019 (0.051)	-0.109 (0.105)	-0.015 (0.055)	0.034 (0.046)	0.068 (0.076)	-0.042 (0.055)
ODA	0.013 (0.035)	0.019 (0.039)	0.188 (0.091)***	-0.007 (0.038)	-0.01 (0.042)	0.136 (0.093)	0.016 (0.036)	0.023 (0.04)	0.187 (0.09)***
K	0.091 (0.036)***	0.089 (0.058)	0.142 (0.045)***	0.063 (0.038)*	0.032 (0.063)	0.127 (0.044)***	0.079 (0.036)***	0.089 (0.058)	0.129 (0.044)***
Fiscal volatility	-0.117 (0.05)***	-0.082 (0.058)	-0.322 (0.101)***	-0.108 (0.056)**	-0.067 (0.065)	-0.356 (0.101)***	-0.116 (0.05)***	-0.082 (0.058)	-0.333 (0.1)***
SS	0.211 (0.069)***	0.215 (0.09)***	0.238 (0.097)***	0.24 (0.072)***	0.278 (0.102)***	0.232 (0.096)***	0.193 (0.069)***	0.19 (0.09)***	0.249 (0.096)***
POP-growth	-1.097 (0.242)***	-1.087 (0.253)***	-1.792 (1.271)	-1.26 (0.24)***	-1.181 (0.249)***	-1.377 (1.267)	-1.108 (0.242)***	-1.105 (0.253)***	-1.669 (1.26)
D-Landlocked	0.221 (0.118)**			0.058 (0.13)			0.167 (0.118)		
D-HIPC	-0.065 (0.124)			-0.296 (0.142)***			-0.062 (0.124)		
D-Asia	0.803 (0.197)***			0.708 (0.2)***			0.759 (0.197)***		
Constant	-0.126 (0.155)	-0.05 (0.093)	0.353 (0.162)***	0.162	-0.153 (0.099)	0.443 (0.17)***	-0.052 (0.156)	0.002 (0.094)	0.376 (0.162)***
N	527	416	129	465	356	127	527	416	129
Sargan ($p > \chi^2$)	0.98	1.0	1.0	1.0	1.0	1.0	0.9778	1.0	1.0
Autocorrelation (pr > z)	0.406	0.1845	0.4333	0.467	0.6473	0.9563	0.4417	0.1839	0.4921

Note Table 3A and 3B: Values in the parenthesis are standard errors. A single asterisk (*) denotes significance at the 10% level, two asterisks (**) at the 5% level, and three asterisks (***) at the 1% level. Sargan test is for over-identifying restrictions (Null: the instruments as a group are exogenous). Arellano-Bond test is that average autocovariance in residuals of order 2 is 0. (Null: no autocorrelation).

Table 4A

Table 4A: Debt/ GDP effects on Real per Capita GDP growth (Baseline Regression - using Fixed Effects)									
Explanatory Variables	Public and Publicly Guaranteed Debt			Total Debt			Concessional Debt		
	Full Sample	HIPC	Non-HIPC	Full Sample	HIPC	Non-HIPC	Full Sample	HIPC	Non-HIPC
logrpy _{t-1}	-8.437 (1.542)***	-6.18 (1.604)***	-15.107 (3.145)***	-8.059 (1.519)***	-5.888 (1.595)***	-14.687 (3.082)***	-7.317 (1.526)***	-5.649 (1.598)***	-12.839 (3.133)***
Debt/GDP	-0.124 (0.05)***	-0.041 (0.013)***	-0.118 (0.043)***	-0.154 (0.054)***	-0.034 (0.011)***	-0.098 (0.036)***	-0.168 (0.071)***	-0.04 (0.016)***	-0.107 (0.046)***
(Debt/GDP) ²	0.0001 (0.00005)***	0.00007 (0.00004)	0.0002 (0.0002)	0.0001 (0.00002)***	0.00005 (0.00002)***	0.0001 (0.0001)	0.0001 (0.0001)	0.00009 (0.00006)	0.0002 (0.0002)
Exports	0.184 (0.042)***	0.168 (0.059)***	0.237 (0.069)***	0.2 (0.044)***	0.17 (0.059)***	0.269 (0.073)***	0.176 (0.044)***	0.161 (0.06)***	0.238 (0.077)***
Imports	-0.102 (0.038)***	-0.082 (0.046)*	-0.126 (0.061)***	-0.117 (0.04)***	-0.086 (0.046)**	-0.12 (0.066)*	-0.099 (0.04)***	-0.084 (0.046)*	-0.147 (0.068)***
FDI	0.06 (0.046)	0.205 (0.073)***	-0.087 (0.057)	0.084 (0.047)*	0.216 (0.074)***	-0.067 (0.056)	0.055 (0.048)	0.22 (0.071)***	-0.152 (0.063)***
ODA	0.079 (0.037)***	0.06 (0.04)	0.212 (0.072)***	0.073 (0.039)**	0.053 (0.042)	0.222 (0.071)***	0.049 (0.037)	0.045 (0.04)	0.198 (0.073)***
K	0.139 (0.049)***	0.069 (0.06)	0.194 (0.056)***	0.141 (0.049)***	0.07 (0.061)	0.178 (0.058)***	0.141 (0.05)***	0.076 (0.061)	0.188 (0.065)***
Fiscal volatility	-0.045 (0.045)	-0.078 (0.053)	-0.042 (0.1)	-0.036 (0.046)	-0.074 (0.054)	-0.108 (0.101)	-0.035 (0.048)	-0.081 (0.054)	0.004 (0.105)
SS	0.085 (0.028)***	0.052 (0.031)*	0.221 (0.057)***	0.078 (0.028)***	0.048 (0.031)	0.194 (0.055)***	0.097 (0.03)***	0.064 (0.032)**	0.222 (0.06)***
POP-growth	-0.825 (0.267)***	-0.725 (0.276)***	-1.227 (0.945)	-0.834 (0.267)***	-0.72 (0.276)***	-1.319 (0.934)	-0.815 (0.268)***	-0.725 (0.277)***	-0.454 (1.049)
Dll*debt	0.005 (0.012)			-0.0001 (0.009)			-0.003 (0.015)		
Dhipc*debt	0.063 (0.048)			0.107 (0.054)**			0.122 (0.069)*		
Dasia*debt	0.072 (0.051)			0.12 (0.058)***			0.124 (0.07)*		
Constant	48.623 (8.895)***	34.982 (9.123)***	88.63 (18.564)***	46.779 (8.773)***	33.528 (9.102)***	85.765 (18.113)***	41.434 (8.778)***	31.435 (9.027)***	73.267 (18.284)***
N	657	521	160	657	521	160	658	521	160

Table 4B:

Table 4B: Debt/ Exports effects on Real per Capita GDP growth (Baseline Regression - using Fixed Effects)									
Explanatory Variables	Public and Publicly Guaranteed Debt			Total Debt			Concessional Debt		
	Full Sample	HIPC	Non-HIPC	Full Sample	HIPC	Non-HIPC	Full Sample	HIPC	Non-HIPC
logrpy _{t-1}	-8.564 (1.478)***	-6.698 (1.587)***	-12.879 (3.089)***	-13.284 (2.24)***	-12.3 (2.857)***	-12.836 (3.205)***	-7.554 (1.457)***	-5.89 (1.567)***	-12.262 (3.088)***
Debt/X	-0.014 (0.008)*	-0.007 (0.002)***	-0.013 (0.006)**	-0.029 (0.018)*	-0.006 (0.002)***	-0.016 (0.006)***	-0.013 (0.01)	-0.005 (0.002)***	-0.008 (0.005)
(Debt/X) ²	0.000002 (0.000001)***	0.000002 (0.000001)***	0.000003 (0.000003)	0.000001 (0.000004)***	0.000001 (0.000004)***	0.000004 (0.000003)	0.000002 (0.000001)*	0.000001 (0.000001)	0.000001 (0.000003)
Exports (x)	0.102 (0.046)***	0.102 (0.067)	0.169 (0.075)***	0.208 (0.055)***	0.207 (0.096)***	0.213 (0.079)***	0.116 (0.046)***	0.122 (0.065)**	0.195 (0.078)***
Imports	-0.08 (0.037)***	-0.078 (0.046)*	-0.131 (0.065)**	-0.129 (0.044)***	-0.107 (0.061)*	-0.161 (0.07)***	-0.075 (0.038)**	-0.084 (0.046)**	-0.138 (0.07)**
FDI	0.021 (0.047)	0.167 (0.075)***	-0.143 (0.062)***	-0.044 (0.052)	0.143 (0.093)	-0.122 (0.059)**	0.027 (0.048)	0.192 (0.069)***	-0.156 (0.063)***
ODA	0.044 (0.035)	0.038 (0.038)	0.165 (0.071)***	0.023 (0.039)	0.0001 (0.042)	0.16 (0.07)***	0.031 (0.036)	0.031 (0.038)	0.156 (0.073)***
K	0.11 (0.047)***	0.073 (0.061)	0.158 (0.062)***	0.133 (0.053)***	0.092 (0.072)	0.145 (0.063)***	0.11 (0.047)***	0.083 (0.06)	0.148 (0.066)***
Fiscal volatility	-0.037 (0.05)	-0.073 (0.054)	0.043 (0.097)	-0.002 (0.051)	-0.023 (0.056)	0.021 (0.103)	-0.044 (0.052)	-0.073 (0.055)	0.042 (0.102)
SS	0.083 (0.028)***	0.057 (0.031)**	0.183 (0.062)***	0.137 (0.038)***	0.118 (0.044)***	0.168 (0.063)***	0.085 (0.029)***	0.061 (0.031)**	0.182 (0.062)***
POP-growth	-0.749 (0.284)***	-0.717 (0.289)***	0.317 (1.126)	-0.724 (0.294)***	-0.697 (0.299)***	0.306 (1.087)	-0.747 (0.282)***	-0.744 (0.286)***	0.433 (1.176)
Dll*debt	-0.0003 (0.001)			-0.001 (0.001)			-0.001 (0.002)		
Dhipc*debt	0.005 (0.007)			0.023 (0.018)			0.007 (0.009)		
Dasia*debt	0.004 (0.007)			0.02 (0.018)			0.006 (0.009)		
Constant	50.686 (8.673)****	39.287 (9.167)***	73.843 (18.18)***	76.033 (12.503)	68.341 (15.461)***	74.839 (18.79)***	43.534 (8.495)***	33.595 (8.941)***	68.765 (17.926)***
N	527	521	160	465	521	160	658	521	160

Note (Table 4A and 4B): Values in the parenthesis are robust standard errors. A single asterisk (*) denotes significance at the 10% level, two asterisks (**) at the 5% level, and three asterisks (***) at the 1% level.

Table 5:

Table 5: Initial Debt on 3-year Averaged Real per capital GDP (Using SGMM)						
Explanatory Variables	Debt/GDP			Debt/Exports		
	Public and Publicly Guaranteed Debt	Total Debt	Concessional Debt	Public and Publicly Guaranteed Debt	Total Debt	Concessional Debt
logrpy _{t-1}	11.342 (1.691)***	14.765 (2.397)***	11.462 (1.642)***	10.839 (1.264)***	16.218 (1.523)***	12.818 (1.35)***
Debt(/GDP, X)	0.026 (0.006)***	0.02 (0.005)***	0.044 (0.006)***	0.0001 (0.001)	0.002 (0.0005)***	0.003 (0.001)***
[Debt (/GDP, X)] ²	-0.0001 (0.00002)***	-0.0001 (0.000004)***	-0.0002 (0.00001)***	-0.00000004 (0.0000001)	-0.0000005 (0.0000001)***	-0.000001 (0.0000002)***
Exports (x)	0.083 (0.022)***	0.078 (0.014)***	0.096 (0.023)***	0.081 (0.017)***	0.072 (0.016)***	0.088 (0.015)***
Imports	-0.025 (0.02)	-0.022 (0.013)*	-0.032 (0.018)*	-0.029 (0.017)*	-0.022 (0.017)	-0.017 (0.017)
FDI	0.025 (0.013)**	0.042 (0.01)***	0.031 (0.012)***	0.002 (0.013)	0.034 (0.016)***	0.016 (0.015)
ODA	-0.032 (0.016)**	-0.001 (0.015)	-0.051 (0.013)***	-0.042 (0.012)***	-0.006 (0.012)	-0.049 (0.012)***
K	0.063 (0.022)***	0.096 (0.014)***	0.069 (0.009)***	0.096 (0.017)***	0.07 (0.021)***	0.092 (0.015)***
Fiscal volatility	-0.172 (0.036)***	-0.233 (0.037)***	-0.173 (0.028)***	-0.179 (0.029)***	-0.078 (0.034)***	-0.182 (0.028)***
SS	-0.033 (0.01)***	-0.056 (0.01)***	-0.032 (0.011)***	-0.035 (0.009)***	-0.053 (0.011)***	-0.038 (0.009)***
POP-growth	-0.028 (0.058)	-0.153 (0.066)***	-0.045 (0.05)	-0.087 (0.051)*	0.002 (0.08)	-0.02 (0.054)
Constant	-0.031 (0.139)***	-0.047 (0.139)	-0.009 (0.166)	0.012 (0.079)	-0.047 (0.066)	-0.13 (0.06)***
N	265	244	265	265	218	265
Sargan ($p > \chi^2$)	0.995	0.9942	0.9982	0.9973	0.9995	0.9931
Autocorrelation ($pr > z$)	0.6641	0.6016	0.5454	0.5281	0.2985	0.517

Note: Values in the parenthesis are standard errors. A single asterisk (*) denotes significance at the 10% level, two asterisks (**) at the 5% level, and three asterisks (***) at the 1% level.

ENDNOTES

¹ United Nations, 2011. Report of the Fourth United Nations Conference on the Least Developed Countries. Istanbul, Turkey, 9-13 May, 2011. A/CONF.219/7

² The United Nations overarching goal of the Programme of Action for the decade 2011-2020 established during the 2011 United Nations conference on LDCs in Istanbul, Turkey is to overcome the structural challenges faced by the LDCs in order to eradicate poverty, achieve internationally agreed development goals and enable graduation from LDC category by 2020.

³ Guinea (12), Guinea-Bissau (13), Lesotho (14) and Liberia (15). These countries have debt levels above 150% of GDP.

⁴ 8 Countries were excluded due to inadequate data

⁵ We conducted regressions using the share of general government consumption expenditure in GDP (G), the coefficient of G was statistically significant with a negative sign. However, when we included both G and fiscal volatility in the equation, the coefficient on fiscal volatility was significant and negative but that on G was positive and insignificant. When we excluded G and ran the regressions with fiscal volatility alone, the model was unaffected and therefore, we do not included G in our final regressions.

⁶ We do not report results for long term and short term debts because: (i) long term external debt is approximately equals to PPG debt and consequently when we ran regressions using the long term debt we found that the results were similar to that of PPG. (ii) Most of the results for short term debt were statistically insignificant and thus we do not report them. These results are available upon request.

⁷ A dummy variable for Africa is excluded because most of the HIPC beneficiaries are Africa LDCs.