Can Debt Relief Buy Growth?

Ralf Hepp †

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Abstract

The purpose of the paper is twofold. First, I investigate whether numerous debt initiatives during the 1980s and 1990s have had a significant effect on economic growth rates in developing countries in general. The major initiatives during that time period were negotiated as bilateral agreements under the guidance of the Paris Club of Creditors. These agreements were complemented later on by the Heavily Indebted Poor Countries (HIPC) debt relief initiative in 1996 and its "enhanced" version in 1999. I find that, on average, debt relief has no effect on growth rates of developing countries. The second question I address in this paper is whether the effect on growth rates was different for different subsets of developing countries. I find that countries that are not classified as HIPC have benefited significantly from debt relief, whereas the growth rates of HIPC countries have been unaffected.

† University of California, Santa Cruz. Email: ralfhepp@ucsc.edu. The author would like to thank Joshua Aizenman for providing data. Financial assistance from the Graduate Division is gratefully acknowledged. All remaining errors are mine.

1   Introduction

The purpose of the paper is twofold. First, I investigate whether numerous debt initiatives during the 1980s and 1990s have had a significant effect on economic growth rates in developing countries in general. The major initiatives during that time period were negotiated as bilateral agreements under the guidance of the Paris Club of Creditors. These agreements were complemented later on by the Heavily Indebted Poor Countries (HIPC) debt relief initiative in 1996 and its "enhanced" version in 1999. I find that, on average, debt relief has no effect on growth rates of developing countries. The second question I address in this paper is whether the effect on growth rates was different for different subsets of developing countries. I find that countries that are not classified as HIPC have benefited significantly from debt relief, whereas the growth rates of HIPC countries have been unaffected.

After decades of development assistance, researchers have shown a renewed interest in the issue of aid effectiveness. This literature focuses on the effects of aid inflows on growth rates, as well as determining which economic, political, and institutional factors undermine or amplify the effectiveness of development assistance with respect to growth. In my study I extend this literature in two ways. First, I explicitly consider the effects of *debt relief* (which can be interpreted as an indirect form of aid) on growth rates in developing countries. To the best of my knowledge, this is the first study to do so. Second, I compare the effects for developing countries that have qualified for the HIPC initiative and developing countries that are not part of the initiative. To address these questions, I use two different measures of debt relief: the first measure comes from the OECD International Development Statistics data set and is called "action related to debt". This measure is closer to capturing the idea of a reduction in net present value of debt stock. The second measure of debt relief is separated into debt stock and debt service relief using data from the World Bank's Global Development Finance data set. I argue that the debt service relief variable can be interpreted as working through providing additional (contemporaneous) resources, unlike the OECD variable which works through influencing long term incentives for investment decisions.

Looking at all developing countries together, I find is that *debt service relief* leaves growth rates unaffected independent of whether aid is assumed to have diminishing returns or not. Separately examining countries that are classified as Heavily Indebted Poor Countries (for short called "HIPCs") and those that aren't ("Non-HIPCs"), reveals that growth rates of HIPC countries are not affected. For Non-HIPCs, however, the effect on growth rates is unambiguous and robustly positive, particularly when diminishing returns to aid are assumed. *Debt stock relief*, on the other hand, has no influence on growth independent of the sample used. Using the alternative OECD measure of debt relief, I find that developing countries overall have benefited in terms of growth rates. Separately examining the two country groups, the results indicate that countries with access to private capital market may have suffered in terms of growth by receiving debt relief. This suggests that debt relief may have been interpreted as a signal for an unsustainable debt level making access to private capital much more difficult. This on the other hand leads to decreasing (private) domestic investment and – as a consequence – lower growth. For HIPC countries, however, there is a weakly positive relationship between debt relief and growth rates for HIPCs, but for Non-HIPCs, debt relief has a fairly robust negative effect on growth rates.

With respect to *aid* effectiveness – the main concern of the literature –, I find that throughout the analysis, aid does not have a robust link with growth. In fact, I hardly find any effects of aid on growth at all. This is true whether or not aid goes to a country with a good policy environment, thereby questioning the results of the seminal paper by Burnside and Dollar (2000) – as several other papers have done. Good policies by themselves, however, have positive effects on growth in non-HIPC countries. The policy environment in HIPC countries, on the other hand, does not seem to affect growth. I will proceed as follows: Section 2 covers some of the related research. In section 3, the estimation strategy is described; and section 4 describes the data sources and debt relief variables in detail. The estimation results are presented in section 5. Section 6 concludes.

2 Literature Review

There is a large and growing literature on the effectiveness of foreign aid in promoting economic growth. One of the most-cited recent papers in this literature is the Burnside and Dollar (2000) paper [henceforth BD], which finds that "aid has a positive impact on growth in developing countries with good fiscal, monetary, and trade policies, but has little effect in the presence of poor policies". The authors use a new database on foreign aid developed by Chang et al. (1999), in which foreign aid is termed *effective development assistance*. This new measure consists of the summation of the grant equivalents of all financial inflows.[1] The dependent variable is the annual growth rate of gross domestic product (GDP) per capita. The explanatory variables in their growth regression are aid as a percentage of GDP, initial GDP, ethnic fractionalization, number of assassinations, and interaction term of ethnicity and assassinations, the Knack and Keefer (1995) measure of institutional quality, M2/GDP to measure financial depth, and a policy index.[2] Their policy index includes the budget surplus, the inflation rate, and the Sachs and Werner (1995) dummy measure of trade openness. The weights attached to these three components are the coefficient estimates determined by running a regression for GDP growth including all the previously mentioned explanatory variables except aid; furthermore, the regression constant is added to form the index. In addition to Ordinary Least Squares (OLS) analysis, they use Two-stage Least Squares (2SLS) to control for potential endogeneity of aid. Foreign aid could be endogenous because donors may adjust their aid flows to the growth rate of the recipient country either by rewarding a fast growing country with additional aid or by helping a slow-growing recipient country stimulate growth with additional aid. Their results suggest first, that aid is only effective in promoting economic growth in a good policy environment, but not by itself; and second, that aid allocation seems to be independent of good policies, at least for

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[1] As defined by Chang et al. (1999), the "grant equivalent of a financial inflow is the amount that, at the time of its commitment, is not expected to be repaid, i.e., the amount subsidized through below-market terms at the time of commitment." (p.5)

[2] Knack and Keefer (1995) define *institutional quality* by simply summing index measures for the five variables *expropriation risk*, *rule of law*, *repudiation of contracts by government*, *corruption in government*, and *quality of bureaucracy* from the International Country Risk Guide data set.

bilateral donors. Overall, the BD result provides a strong argument to policymakers who insist on conditionality in the form of macroeconomic stabilization policies and structural reforms when giving aid. Additionally, it provides a better justification for politicians in donor countries to increase foreign aid, given the domestic budget pressures they are facing. Subsequent research shows, however, that the results of the BD study are sensitive to sample selection and may suffer from omitted variable bias. Hansen and Tarp (2000) include squared aid and aid-policy terms in the regressions to control for diminishing returns to aid.[3] Using an instrumental variables approach, they can replicate the BD results for their reduced sample, but if outliers removed by BD are included, the aid-policy-growth link becomes insignificant. Aid effectiveness is independent of policy. Hansen and Tarp (2001) are concerned about the presence of country-fixed effects and their persistent correlation with macroeconomic policy indicators, both of which would render the BD analysis invalid.[4] They suggest using the Arellano-Bond GMM estimator, which takes care of country fixed effects by first-differencing and includes lagged endogenous variables as instruments to deal with endogeneity. Using this estimator, the authors find that aid exhibits diminishing returns with respect to growth. Guillaumont and Chauvet (2001) argue that inclusion of shocks to exogenous factors like terms of trade and climate into the analysis of aid effectiveness is essential.[5] The omission of these factors in the BD analysis may have lead to overstating the importance of policy. The authors suggest that one of the motivations for giving aid is to smooth the effects of negative shocks (for example, a drought) in the recipient country. In their 2SLS specification, the authors find that policy doesn't influence the aid effectiveness, whereas aid is significantly more effective in countries more vulnerable to shocks. Furthermore, growth rates in countries less vulnerable to shocks are generally higher. Contrastingly, Collier and Dehn (2001) lend support to the BD result by showing that the inclusion of export price shocks into the regression makes their results more robust. Additionally, they find that an aid increase in the presence of a negative export price shock

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[3] See Lensink and White (1999), Hadjimichael et al. (1995), and Durbarry et al. (1998) for different theoretical arguments for the non-linear effect of aid on growth.

[4] See Easterly and Levine (1997) and Temple (1998).

[5] The external factors included are trends in terms of trade, stability of agricultural value added and of real value of exports.

leads to a higher growth rate. Easterly et al. (2003) extend the original BD data set and show that their regression result of aid effectiveness in a good policy environment is sensitive to sample period and sample countries, the inclusion of outliers, and alternative definitions of aid and good policies. In another variation of aid-growth regressions, Dalgaard et al. (2004) include the exogenous factor climate represented by the fraction of land in the tropics as well as an interaction term for aid and climate. They argue that this variable picks up differences in productivity and it also exerts influence on the evolution of institutions. Using OLS and 2SLS as well as Arellano-Bond and Blundell-Bond GMM estimators, the authors find that, in general, aid is effective in promoting growth, but it is less effective the larger the fraction of land in tropical climate is.[6] Unlike the aid-climate interaction term, the significance of the aid-policy interaction term is not robust to specification choice. A recent paper by Rajan and Subramanian (2005a) re-examine the cross-country evidence of the effects of aid on growth. The authors find little evidence of a link between the amount of aid inflows and subsequent economic growth, whether negative or positive. They test the robustness of the aid-growth relationship using different lags of aid, different time frames, multi- and bilateral aid, types of aid, short- and long-term impact of aid, different samples, and cross-section and panel specifications. The evidence of aid effectiveness is described as weak, whether the aid variable is interacted with a policy variable or not. The overall conclusion from this literature is that several aspects of the aid-growth relationship need to be further investigated to reach conclusive results. First, a better theoretical understanding of the determinants of aid allocation and its links to growth will help in deciding on specification and which explanatory variables to include in regression analysis. Second, the channels through which aid influences growth have to be more closely examined. For example, Rajan and Subramanian (2005b) offer an explanation how aid can hurt growth instead of improving it. Increased aid inflows can lead to overvalued exchange rates, which then lead to a loss of competitiveness in the traded sector of a developing nation. As a consequence, this loss of competitiveness retards growth in the overall economy, since the (more innovative) traded-goods sector is the main driving force of growth in the economy. Their empirical evidence supports this hypothesis. In this context, aid dependence is also an

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[6] See Arellano and Bond (1991) and Blundell and Bond (1998) for a detailed description of the estimation technique.

under-researched area. Huge aid inflows create disincentives for developing country governments in terms of revenue collection. This will undermine otherwise sound macroeconomic policies in the long run.

One promising way to ameliorate the distortions created by aid dependence – at least in the case of severely indebted countries – is to think about debt and the consequences of debt relief. This brings us to a much related strand of literature that focuses on the link between debt and growth. A prominent example in this area is the *debt overhang* theory. The concept of debt overhang is defined as the "presence of an existing 'inherited' debt sufficiently large that creditors do not expect with confidence to be fully repaid".[7] Krugman (1988) and Sachs (1986) argue that in this situation the high stock of debt acts like a high marginal tax on investment. They suggest that the incentives for domestic firms or the debtor government to invest at home are distorted since any positive returns from investment projects are used for debt payments. Hence, the net present value of repayments increases. Anticipating this, however, economically sensible investment projects will be forgone, thus harming the long-term economic growth rate of the debtor country. Conceptually this idea is incorporated into the *debt Laffer curve*, which is represented by an "inverted U" relationship between the level of debt stock and expected net present value (NPV) of debt service payments. Debt overhang in this context means that a country is to the right of the peak of this curve. In this scenario, a decrease in debt stock (through debt relief) increases the expected NPV of repayments. Hence, from a creditor country's perspective, this theory provides an economic rationale for debt relief if the debtor suffers from debt overhang.[8]

In an empirical study, Pattillo et al. (2002) find evidence of debt overhang. Using a panel data set comprised of 93 developing countries for the period 1969-1998, they suggest that at a debt stock of 35-40 percent of GDP, the average effect of debt on per capita growth becomes negative. Clements et al. (2003) confirm their results of a debt overhang. Furthermore, they find that debt service has a "crowding out" effect on public investment,

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[7] See Krugman (1988), p.254.

[8] Other justifications include the concept of odious debt, humanitarian concerns, political considerations (Iraq debt relief), and many others.

thereby lowering the overall growth rate of a developing country. They argue that if resources freed up by debt service relief can be directed towards public investment, growth rates in some HIPC countries would increase by half a percentage point annually. Similarly, Chowdhury (2001) finds evidence for debt overhang in his sample. He uses extreme bounds analysis to compare HIPC countries with other moderately to severely indebted countries. The main focus of his paper is whether the set of countries eligible for HIPC debt relief should be extended. He finds that debt stock and debt service have a negative effect on growth rates in both country groups; this suggests that debt overhang is present and that debt relief could potentially beneficial consequences for countries currently excluded from the HIPC initiative.

However, there is disagreement about the existence or importance of debt overhang and the debt Laffer curve. For example, Bird and Milne (2003) question the presence of a debt overhang problem in low-income countries. Official resource transfers to highly indebted countries often exceed their debt service payments. Hence, incentives for domestic investment may not be distorted for after all. Furthermore, they caution that providing (unconditional) debt relief to highly indebted countries may simply redistribute resources to countries with a history of unsound macroeconomic policies. Hence, "bad policies" in the past would be rewarded ex-post by providing debt relief. In the theoretical literature, there are several papers questioning the conventionally held view that an excessive level of sovereign debt has distortionary incentive effects on the behavior of economic agents in the indebted country [Bulow and Rogoff (1988, 1989), Cordella et al. (2002), Kletzer and Wright (2000)]. For example, Kletzer and Wright (2000) make the point that a renegotiation proof constrained efficient perfect equilibrium implies irrelevance of debt overhang. Debt up to a country's maximum "willingness to pay" is relevant; however, debt beyond that point, i.e., the classical debt overhang, is irrelevant. An important point directly relevant for this paper is made by Cordella et al. (2002). In contrast to the conventional theoretical literature, where only the *present value* of debt (stock) matters, the authors argue that only debt *service* matters. In their model, debt service relief can raise welfare whereas debt stock does not.

Another (altruistic) rationale for debt relief – particularly in the context of the HIPC debt initiative – is to provide a debtor country with additional resources for poverty reduction. Funds otherwise used for debt service payments are "freed up" by providing debt relief and

can then be used for education or public health expenditures. A concern that naturally arises in this context is *aid fungibility*, i.e., are the resources freed by debt relief (which may be considered as an indirect form of aid) used as intended by the creditor/donor. A detailed discussion of this issue is beyond the scope of this paper, however. Let me now turn to the empirical model used in the present analysis of the relationship between debt relief, aid, and growth.

3   Empirical Model

Before going into details about the setup of my regression analysis, let me give a brief overview of the issues addressed in the empirical exercise. The main question being addressed in this empirical analysis is whether debt relief measures in the last two decades positively influenced growth rates of gross domestic product (GDP) per capita. First, I investigate the impact of debt relief on growth rates for low-income and lower and upper middle-income countries. Second, I divide the sample into two groups: The first group includes only countries classified as Heavily Indebted Poor Countries; the second group consists of the remaining developing countries in the sample. As we saw in the previous section, there are numerous studies investigating the link between aid, policies, and growth rates. This study is – to the best of my knowledge – the first one that incorporates debt relief into the aid effectiveness framework and explicitly compares HIPC and non-HIPC countries in terms of aid and debt relief effectiveness. Essential to this empirical analysis is the definition of the debt relief variable(s). I use two different sets of variables to represent debt relief. The debt relief variables – derived from World Bank data – are called *debt service relief* and *debt stock relief.* The alternative definition of debt relief (*OECD debt relief*) used in the analysis – derived from the OECD's International Development Statistics data set – is somewhat problematic due to different reporting practices among creditor countries.[9] Neither alternative precisely captures the definition of debt relief in the theoretical literature,

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[9] A more detailed description and discussion of the debt relief variables can be found in the next section.

where debt (stock or service) relief is defined as the change in net present value of debt (stock or service, respectively). However, the variables derived from World Bank data come closer to the theoretical measure(s) and are therefore preferred.

To empirically address debt relief and aid effectiveness with respect to growth, I use a specification that is fairly standard in the literature:

$$y_{it} = \alpha_0 + X_{it}'\beta_x + Z_{it}'\gamma_z + \alpha_i + \phi_t + \varepsilon_{it}$$

where y_{it} is the growth rate of GDP per capita; X_{it} is a vector of the variables of interest, Z_{it} is a vector of control variables; α_i is a country fixed effect; ϕ_t is a year dummy; and ε_{it} is an i.i.d. error term.

The variables of interest included in X_{it} are *aid*, *squared aid*, *debt stock*, *debt service*, interacted variables $aid * policy$, $aid^2 * policy$, and – the main variable(s) of interest – *debt relief*. The inclusion of debt relief into this framework is – a mention before – the main innovation of this paper. There are main two channels through which debt relief may be enhancing growth: either by providing additional resources for public investment or – if debt relief is substantial enough – by removing the distortion caused by a debt overhang.

The other variables of interest included in the regression have previously been used in the literature. Like debt relief, foreign aid is assumed to be growth enhancing by providing additional resources for public investments that would otherwise not be undertaken due to a lack thereof. The squared aid term is included to control for diminishing returns to aid. As previously mentioned, diminishing returns can be a consequence of aid dependence, i.e., a government may relax its efforts for revenue collection in the presents of persistent and large aid inflows. Debt stock and debt service – at least when they are at very high levels – may hinder growth through distortions of private and public investment incentives. The *policy* term in the interacted aid-policy terms is similar to Burnside and Dollar (2000). Unlike in BD and some other papers, the policy term is constructed as an *equally* weighted average of the inflation rate, the budget balance, and of trade openness which is measured as exports

as a percentage of GDP.[10] The coefficient estimates for the interacted aid-policy terms tell us whether aid is more effect in a good policy environment – the main result of BD.

Following the literature, I include a set of control variables (Z_{it}) into the regressions. The *lagged value of per capita GDP* is included to control for conditional convergence of growth rates. *M2/GDP*, lagged one period, is used as a proxy for financial depth. Following Easterly and Levine (1997), I also include *ethno-linguistic fractionalization* as a proxy to account for cross-country differences in public policies; for example, insufficient infrastructure in areas inhabited by ethnic minorities. The measure for *institutional quality* is similar to that of Knack and Keefer (1995) and consists of the sum of three equally weighted measures - bureaucratic quality, rule of law, and corruption – where a higher value indicates better institutional quality. *Political stability* is derived from two index variables measuring internal and external conflict. Again, a higher index indicates a more stable country. The variable *restrictions on freedom* is the sum of indices measuring political rights and civil liberties where a higher index means a lower degree of freedom. This variable is used as a proxy for the political system and the degree of a democratic process. Following Dalgaard et al. (2004), I include a variable called tropics, which measures the percentage of the land area in tropical climate. This variable is meant to capture differences in productivity and in the evolution of institutions.

Unlike most of the previous literature, which averages data with 3 to 5 year averages for a more balanced panel, I am using yearly data. Information contained in the annual data will be lost by averaging, especially when we have dramatic changes in the variables of interest over short time periods. It is also not clear whether averaging data over a particular time span will appropriately deal with the issue of business cycles in a large panel data set; the length of business cycles may vary widely across countries as well as over time. The regression analysis is performed initially using Ordinary Least Squares with year dummies and country fixed effects. As pointed out by Dalgaard et al. (2004) among others, there is a problem of biased estimates when using OLS. This bias is caused by the endogeneity of aid and policy with respect to growth. For example, donor countries may be rewarding a country with a high level of GDP growth with more foreign aid, or they may want to help slow-

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[10] Burnside and Dollar (2000), and other, use the Sachs and Werner (1995) trade openness dummy. I use exports (as % of GDP) as a proxy for trade openness due to better data availability.

growing low-income countries with additional aid resources. When policy is defined as a combination of budget surplus, inflation, and trade openness, all of these components can potentially be correlated with the growth rate. To deal with the endogeneity of aid and policy, I use the "first-difference" and the "system" GMM estimator (Arellano and Bond (1995), and Blundell and Bond (1998), respectively). Particularly in more recent papers of the aid effectiveness literature [Dalgaard et al. (2004), Rajan and Subramanian (2005a)], use of these estimators is fairly standard for dynamic panel data sets. Apart from dealing with endogeneity, the two GMM estimators also take care of country fixed effects which makes them comparable to the fixed effects OLS regression. The Arellano-Bond GMM estimator deals with a potential omitted variable bias (and country fixed effects) by first-differencing the original regression equations. The first-differenced endogenous variables aid and policy are then instrumented with lags of their own *levels*. Since lagged levels are often poor instruments for first differences, Blundell and Bond (1998) suggest including the original equations to the system, and instrumenting the levels of endogenous variables with lags of their own *first differences*. Additionally, aid is instrumented with population, since the aid allocation literature suggests that there is a small-country bias of aid.

4   Data

The entire sample contains data on 122 developing countries that are classified as low-income, lower middle-income, and upper middle-income countries for the time period 1970-2001. As mentioned previously, to address the question of whether there are different effects of debt relief on different country groups, the entire sample will also be divided into two groups: 39 HIPC countries, and 83 Non-HIPC countries.

Since my main interest lies in the effect of debt relief on growth rates, a clear description of my debt relief variable(s) is necessary. Two alternative approaches are taken. In one approach, I use debt relief variables derived or taken from the Global Development Finance

(GDF) 2005 data set. The first variable I take from the data is called *debt stock relief*.[11] A potential economic effect of debt stock relief will be on perceptions of the future. In the presence of debt overhang, economically meaningful debt stock relief will bring a debtor country back to a sustainable growth path; or in other words, it will remove the disincentives for investment created by the debt overhang. Economic agents will increase their investments in the debtor country and therefore increase economic growth, since they are confident that their return on the investment will not be entirely taxed away to service government debt. Focusing on a different aspect of high indebtedness, namely the debt service burden, I derive a second variable from the GDF 2005 data set by adding the variables *principal forgiven* and *interest forgiven* and call it *debt service relief*.[12] Especially in developing countries, debt service can act as a "burden" in the sense of using government revenue for debt repayment rather than for necessary investments in infrastructure, basic education, health care, water and sanitation, to name just a few. For example, one of the main ideas behind the HIPC initiative – additionality – is addressing exactly this issue. A Poverty Reduction Strategy Paper (PRSP) put together by the debtor government specifies exactly how resources that are 'freed up' by the HIPC initiative are to be used for investments in the sectors described above. Debt service relief should therefore positively affect the growth rate: Directly by increasing public investment activity, and indirectly by increasing human capital (at least in the long term).

In the second approach, I use an alternative measure called *OECD debt relief* taken from the OECD International Development Statistics 2004 data set.[13] As has been pointed out by Powell (2003), this debt relief variable is not ideal, however. It is reported to the OECD by the creditor countries as their 'cost' of providing debt relief. The main problem is that reporting practices among donors differ significantly. OECD DAC guidelines allow

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[11] This variable corresponds to the variable *"Debt forgiveness or reduction"* in World Bank (2005a) and is defined as follows: "*Debt forgiveness or reduction* shows the <u>change in debt stock</u> due to debt forgiveness or reduction. It is derived by subtracting debt forgiven and debt stock reduction from debt buyback."

[12] These variables are described in the data definitions of World Bank (2005a): "*Principal forgiven* (*interest forgiven*) is the amount of principal (interest) due or in arrears that was written off or forgiven in any given year."

[13] In the documentation of OECD (2004), this variable is called *action related to debt* and defined as "debt forgiveness, rescheduling, refinancing, etc".

members to choose between two options for reporting debt cancellation: The first option is to report the commitment and disbursement cancelled in a lump sum; or – as a second option – to report the commitment in a lump sum and the disbursements year-by-year, i.e. in the year in which payments would have fallen due. Most donors report the total amount of debt relief granted in the year the agreement is reached. A few countries spread the cost of debt relief over the lifetime of the loan, instead.[14] The OECD variable may therefore be more appropriate in investigating long-term effects on growth. Also, the data cannot be divided into a debt service and debt stock component. Empirical results reached with this variable therefore have to be interpreted with caution. To summarize, neither variable set for debt relief is ideal with respect to capturing the conventional theoretical meaning of debt relief as a change in net present value terms. The correlations between the alternative debt relief variables are very low: OECD debt relief and debt service relief have a correlation coefficient of only 0.24; OECD debt relief and debt stock relief have a correlation of 0.40. This leads to the conclusion that the variables actually measure quite different things. If the argument in Cordella et al. (2002) is correct in arguing that the net present value is irrelevant and that flow debt relief can raise the welfare of the poor, the World Bank measures are clearly preferable to the OECD data.

Data on *per capita GDP*, the *growth rate of per capita GDP*, the *inflation* rate, *M2*, and *population* are taken from the World Development Indicators (WDI) 2005. *Debt stock*, *debt service*, and *exports* (all three as percentages of GDP) are data are from GDF 2005. The *aid* variable used in this paper is net official development assistance (net ODA) from the OECD International Development Statistics (IDS) 2004 data set. Burnside and Dollar (2000) use *effective development assistance*, a data set derive by Chang et al. (1998); Easterly (2003) finds that this measure and *net ODA* are highly correlated, however. Hence, the choice of aid variable in this case should only have little influence on the results. The *policy* variable is constructed as an average of trade openness (measured as exports as a percentage of GDP), the inflation rate, and the budget balance. Data on the budget balance – which is used for the construction of the policy variable – is taken from the International Financial Statistics (May 2005).

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[14] See Annex 3 in OECD (2000) for the reporting practices adopted by OECD countries.

Data on *ethno-linguistic homogeneity* is the same as the fractionalization variable used in Easterly and Levine (1997), and is downloadable from William Easterly's webpage, originally collected in the 1960s by the Soviet Union. Its values are between 0 and 1, where a higher value implies *less* ethnic diversity. The measure for *institutional quality* is similar to that of Knack and Keefer (1995) and consists of the sum of three equally weighted measures - bureaucratic quality, rule of law, and corruption – all taken from the *International Country Risk Guide*. The measure for *political stability* is taken from the same data set, and consists of the sum internal and external conflict, an index going from 2 to 14. The variable *freedom* is the average of the measures for political rights and civil liberties from the *Freedom House World Country Ratings 2004*. Finally, the variable describing the percentage of land area in the tropics is from Strahler and Strahler (1992).

Before discussing the regression results in the next section, I should note that debt relief data from the World Bank ("Debt Stock Relief" and "Debt Service Relief") are only available from 1990 to 2001. Debt relief data from the OECD is available from 1973 onwards; the regressions, however, will only use data from 1984 onwards, since one of the control variables – institutional quality – is not available before that date.

5   Empirical Analysis

In this section I briefly comment on the descriptive statistics reported in tables 1a and 1b. Furthermore, I describe and interpret the results of the regression analysis. In particular, I focus on the main question of interest here: Has debt relief had a positive effect on the GDP growth rates of developing countries? The regression results are reported in tables 2a to 3c.

5.1   Descriptive Statistics

We will first focus on the descriptive statistics reported in tables 1a and 1b for HIPC and non-HIPC countries, respectively, to get a better idea about the differences between HIPC and non-HIPC countries, . The data covers the time period 1984 to 2001. It is obvious from

a casual comparison that similarities are rare and differences quite stark. Starting with gross domestic product, we see that HIPC countries have very low average income levels (about 380 dollar per capita) compared to non-HIPC countries (about 2,500 dollar per capita). The same is true for average per capita growth rates. We see that HIPC countries grew much slower in the sample period, 0.5 vs. 2.4 percent annual growth. As we would expect, the average debt stock for HIPCs was twice as high (with a maximum level of about 740 percent of GDP for Nicaragua in 1995, compared to about 230 percent for Jordan in the same year). Somewhat surprisingly, the debt service burden is very similar for the two sets of countries as a percentage of GDP. This gives little support to the argument that debt service is a major inhibitor of social expenditure in HIPC countries. A point that has also been noted in earlier studies is the very significant amount of aid received by HIPCs: more than 10 percent of GDP! In line with our expectations, HIPCs received significantly more debt relief (independent of which measure we focus on). A very interesting observation about the components of the *policy* variable – budget balance, inflation, and trade openness – is that HIPC and non-HIPCs differ significantly only with respect to their trade openness with non-HIPCs having much greater export volumes. Financial depth as proxied by M2 is significantly higher in non-HIPCs, which are also more ethnically diverse and have less area in the tropics.

5.2   Measuring Debt Relief with Data from the World Bank

Before discussing the empirical results, let me mention that all the panel data sets that follow are unbalanced due to sometimes severe limitations on data availability. Many studies in the aid effectiveness literature have tried to fill gaps in the data by extrapolation, averaging, etc.; my preferred strategy, however, is to work with an unbalanced panel data since the estimation methods used work also for unbalanced panels

Let me begin with presenting the regression results for debt relief variables derived from World Bank data. For reasons discussed in section 4, these debt relief variables are closer to the theoretical definition of debt relief. The empirical results in this part can therefore be interpreted more confidently in terms of addressing the research question of this paper. The time period considered here is 1990 to 2001 and results for the complete sample of 122

developing countries are reported in table 2a. First of all, the *debt relief variables* for *debt stock* and *debt service* do not significantly influence growth rates when using the undivided sample. Of the other main variables of interest, only *debt service* has a fairly robust negative effect on growth across specifications, particularly when we control for diminishing returns to aid by including the squared aid term. A one percent increase in debt service leads to a drop in the average annual per capita growth rate of GDP of 0.19 to 0.26 percent depending on the specification. In other words, debt service does indeed act as a burden and lowers the growth rate possibly by crowding out public investments. The debt stock only shows a highly significant effect in the OLS fixed effects regressions, which may be biased, however, due to unaccounted for endogeneity of aid and policies. However, the estimates in the other specifications do have the expected negative sign. The policy variable is positive and significant at the one percent level across all specifications, implying that good policies lead to higher growth rates. However, in contrast to Burnside and Dollar (2000), but in line with some subsequent studies, my results indicate, that aid effectiveness is independent of the policy environment, particularly when I control for diminishing returns of aid [columns (4) to (6) in table 2a].[15] Furthermore, foreign aid by itself does not seem to have any significant influence on the growth rate of the economy in any specification. Among the control variables, the coefficient on *political stability* is significantly positive in the OLS fixed effects and Arellano-Bond regressions. This is expected as a higher indicator for political stability implies more stability, which then leads to a higher growth rate of the economy. The coefficient of the *lagged level of GDP* is negative as expected, suggesting conditional convergence of growth rates. The coefficient estimate of institutional quality is insignificant, which can mean one of two things. Either we have already controlled for the most important factors determining institutional quality and hence, institutional quality may still matter; or – the more straightforward, but less convincing conclusion – that institutional quality doesn't matter. Lastly, less democratic countries – indicated by a higher index number of *restrictions on freedom*, grow somewhat slower, but the result is not robust.

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[15] Recalling the Burnside and Dollar results, good policies make aid only more effective when squared aid terms are **not** included. This has been pointed out earlier, for example, by Dalgaard et al. (2004).

As pointed out earlier, the differences in economic indicators between HIPC and non-HIPC countries are fairly substantial. We will see that this is also reflected in the significant differences of my regression results. Turning our attention to HIPC countries first [table 2b], a fairly bleak picture emerges particularly with respect to the effectiveness of debt relief initiatives in promoting growth in the last decade. Neither *debt service* nor *debt stock relief* has any significant effect on growth rates in this sub-sample of countries. This is disappointing from a political perspective since many of the initiatives in the 1990s have focused on these very indebted and poor countries. Furthermore, neither the *aid* terms nor the interacted aid terms are statistically significantly different from zero irrespective of estimation method or specification. *Policies* by themselves also do not seem to matter, either. When comparing the results on *debt service* with those for the whole sample, coefficient estimates turn out to be in the same ballpark, but significance is much less robust for HIPC countries. In fact, only when using the system GMM approach, significant estimates result. Among the control variables, the coefficient estimates for *restrictions of freedom* and for *political stability* have the correct signs are at least weakly significant for most specifications. Even growth rates do not seem to converge for HIPC country data. Overall, these results beg the question: What *are* the determinants on growth in heavily indebted poor countries? Future research will have to address this question.

Finally, the focus turns to countries that are not classified as HIPC. Table 2c reports the results of the empirical analysis. Given the extent of debt relief provided to HIPC countries compared to non-HIPCs, it is quite surprising to see that debt service relief effectively improved growth rates in non-HIPC countries. This may indicate that the additional resources were used for socially worthwhile investments rather than being diverted to consumption expenditure. A one percent increase in *debt service relief* leads to a 0.2 % increase in the GDP growth rate in the specification including a squared aid term [columns (4)-(6)]. Hence, non-HIPC countries have benefited unambiguously in terms of higher growth from debt relief and rescheduling initiatives in the 1990s. *Debt stock relief*, on the other hand, had no statistically significant effect on growth. These results lends support to Cordella et al. (2002) who suggest that only *debt service relief* matters, whereas *debt stock relief* is irrelevant. Increasing *debt stock* and *debt service* both lower economic growth – with debt service having a bigger effect; the coefficient estimates are highly significant. A one percent increase in debt service leads to a 0.4 percent drop in growth, while a one percent increase in debt stock

reduces growth by "only" 0.025 to 0.090 percent. For non-HIPC countries, policy matters. Good policy by itself increases growth as well as enhancing aid effectiveness, thus lending some support to the BD results. The coefficient estimates for *policy* are robust and highly significant independent of estimation method and specification. *Aid* by itself, however, does not seem to be beneficial in terms of growth; if anything, aid seems to have a detrimental effect on growth rates. One possible explanation could be that increased aid inflows are interpreted as a negative signal by private investors, who then decrease their investments while public investments are not able to compensate for the decline completely. The coefficient estimates for lagged GDP per capita provide empirical support for the conditional convergence hypothesis of growth rates among non-HIPC countries. Finally, financial depth has a fairly robust positive influence on growth rates.

5.3   Measuring Debt Relief with Data from the OECD

In this sub-section, I report and discuss the empirical results of the regression specifications using debt relief data from the OECD. As discussed in section 4, this measure of debt relief is somewhat problematic because of differing reporting practices by creditor countries. Furthermore, there is no distinction between debt service and debt stock relief. The measure appears to be closer to debt stock than debt service relief, though. The sample covers the time period 1984 to 2001.

Regression results for the complete sample are reported in table 3a. Coefficient estimates for *OECD debt relief* – the main variable of interest – are significant at the 5 percent level and positive for the fixed effects OLS and the Arellano-Bond GMM estimation, indicating that debt relief increased growth rates. In the Blundell-Bond GMM estimation, which deals most effectively with endogeneity and is therefore more reliable than the other two methodologies, the coefficient estimates for *OECD debt relief* are markedly smaller and insignificant. Debt service and debt stock have the expected negative signs for Blundell-Bond GMM estimation; the coefficient estimate for debt stock is economically insignificant. Interestingly, the aid-policy interaction term is mostly negative (!), but insignificant. Among the variables of interest, only *policy* is fairly robust and positive. Good policy – say a 3 percent

decrease in the budget deficit - increases the growth rate by up to a tenth of a percent.[16] The coefficient estimates of *restrictions on freedom* have the expected sign, suggesting that more democratic countries grow faster. Lagged GDP per capita, on the other hand, does not have consistent signs. They are negative for OLS and Arellano-Bond, and positive for Blundell-Bond, not giving a conclusive result for conditional convergence of growth rates.

Restricting the sample to HIPC countries, the estimation results with the OECD debt relief variable are very similar to those using the World Bank definition, i.e., mostly disappointing from a policy standpoint. *OECD debt relief* is significant in a few specifications, but not robustly so. All the other variables of interest are insignificant. Particularly disturbing is the fact, that neither aid nor policy nor the interaction between the two seems to matter for growth. Furthermore, there is no consistent pattern in the significance of the control variables except maybe for lagged GDP per capita. All the coefficient estimates are negative, but only significant in half of the specifications.

Finally, estimation results for countries not classified as HIPC are reported in table 3c. The coefficient estimates for *OECD debt relief* are puzzling. The estimates are significant at the 5 or 1 percent significance and negative. A one percent increase in debt relief, decrease the growth rate by about 0.3 percent. Considering the set of countries we are investigating, the explanation for the unexpected sign of the debt relief variable may have to do with their access to private capital markets.[17] Receiving debt relief may hamper access to private capital, since the debt level of the recipient country may be interpreted as unsustainable. Hence, access to private capital will be denied due to doubts about a country's ability for repayment. Focusing next on the *debt service* burden the estimates indicate that it significantly inhibits growth in non-HIPC countries, whereas the effect of debt stock is mostly negative but not robustly significant. Furthermore, a good *policy* environment is growth enhancing; however, its effect on aid effectiveness is not clear – when significant, most estimates are positive, in specification (5), however, good policy affects aid effectiveness negatively. The coefficient estimates on aid are insignificant throughout, suggesting that aid does not have positive

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[16] Remember that *policy* is an equally weighted average of budget balance, inflation, and trade openness. Hence, a 3 percent change in budget balance, ceteris paribus, increases the policy index variable by 1 percent.

[17] HIPC countries tend to have only very limited or no access to private capital markets.

effects on growth rates in non-HIPC countries. Among the controls, only lagged GDP has fairly robust coefficients indicating growth rate convergence.

Interpreting *OECD debt relief* as a signal for the economic situation in a country rather than as a direct determinant of growth, debt relief may have significantly improved long-term prospects of a HIPC country by removing disincentives on private investment caused by a possible debt overhang. On the other hand, debt relief for non-HIPC countries may have had negative effects on access to private capital by working as a signal for an unsustainable debt situation. Due to the interpretation problems of the exact meaning of OECD debt relief, these conclusions should be regarded as very tentative. Further research into this issue is required.

6   Conclusion

In this paper, I investigated the effects of debt relief as well as other factors like foreign aid and economic policies on growth rates. My sample includes 122 low-income, lower middle-income, and upper middle-income developing countries. Contrary to the Burnside and Dollar (2000) study, I find that aid effectiveness is independent of the policy environment, which seems to be particularly true for HIPC countries. This may be indicative of possible aid dependence in HIPC countries, where aid amounts to around 10 percent of GDP on average. My main variable of interest, however, is debt relief. Debt relief is measured with two different variables, one from World Bank data, and one from OECD data. To investigate the effects of debt relief on different groups of countries, I analyze the effects for HIPC and non-HIPC countries separately. Using the World Bank debt relief variables, I find that debt *service* relief for non-HIPC countries had a positive effect on growth. In contrast, debt *service* relief had no effect on the growth rates of HIPC countries. This suggests that *increasing* debt relief has potential to be growth enhancing thereby lift poor countries out of poverty. We need to investigate further which factors are responsible for its ineffectiveness in HIPC countries. Using the alternative OECD definition of debt relief, I find debt relief had positive effects on growth in the complete sample and for HIPC countries separately. For non-HIPC countries, however, debt relief appears to have a detrimental effect on

growth rates. The OECD debt relief measure overstates the amount of actual debt relief (in terms of contemporaneous debt service relief) received by a country and may rather be considered a proxy for the change in net present value of debt stock.[18] Further research is needed to develop better measures for debt relief, but the results of this paper tentatively suggest that debt relief is one way to increase growth rates in poor countries.

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[18] This point is discussed in detail in section 4.

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{to be sorted and completed}

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Tables

Table 1a   Descriptive Statistics, Heavily Indebted Poor Countries (HIPCs)

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
GDP per capita	474	376.87	286.55	74.74	1,339.84
GDP Growth per capita	501	0.52	5.70	-28.20	25.16
Debt Stock*	486	82.81	77.77	0.90	738.26
Debt Service*	486	4.33	4.00	0.03	35.57
Debt Stock Relief*	220	2.12	6.75	0.00	73.02
Debt Service Relief*	220	1.30	7.58	0.00	92.47
Aid*	486	11.37	9.59	0.58	95.00
OECD Debt Relief*	310	1.14	4.22	0.00	67.65
Trade Openness	513	20.87	13.14	0.42	80.31
Budget Balance*	526	-3.74	4.46	-41.22	5.76
Inflation Rate	464	19.00	45.78	-13.99	547.53
Financial Depth*	498	19.93	8.76	0.46	48.23
Ethnolinguistic Heterogeneity	509	0.59	0.29	0.04	0.90
Land Area in Tropics	526	0.56	0.34	0.00	1.00

Notes: * = in % of GDP.
Trade openness is measured as "exports as a percentage of GDP". *Ethnolinguistic Heterogeneity* is the probability that two people in a country picked at random belong to the same ethnic group. *Financial Depth* is measured as M2/GDP.

Table 1b   **Descriptive Statistics, non-HIPC developing countries**

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
GDP per capita	1468	2,510.69	2,365.11	138.97	12,068.38
GDP Growth per capita	1461	2.37	5.23	-19.06	34.77
Debt Stock*	1336	43.09	29.70	0.00	231.50
Debt Service*	1336	5.08	3.82	0.00	26.45
Debt Stock Relief*	579	0.20	1.50	0.00	30.35
Debt Service Relief*	581	0.26	1.23	0.00	12.18
Aid*	1357	3.94	5.64	-0.45	43.30
OECD Debt Relief*	481	0.20	0.84	0.00	14.49
Trade Openness	1437	33.10	20.67	2.90	121.31
Budget Balance*	1500	-3.35	4.72	-31.63	22.63
Inflation Rate	1414	16.91	33.16	-12.43	432.83
Financial Depth*	1361	37.43	25.27	3.56	181.09
Ethnolinguistic Heterogeneity	1182	0.36	0.27	0.01	0.89
Land Area in Tropics	1298	0.40	0.44	0.00	1.00

Notes: * = in % of GDP.
Trade openness is measured as "exports as a percentage of GDP". *Ethnolinguistic Heterogeneity* is the probability that two people in a country picked at random belong to the same ethnic group. *Financial Depth* is measured as M2/GDP.

Table 2a   All developing countries, World Bank debt relief variables

	(1) Fixed Effects	(2) Arellano-Bond GMM	(3) Blundell-Bond GMM	(4) Fixed Effects	(5) Arellano-Bond GMM	(6) Blundell-Bond GMM
Debt Service Relief	0.034 (0.044)	-0.022 (0.083)	-0.007 (0.051)	0.036 (0.044)	0.048 (0.030)	0.027 (0.028)
Debt Stock Relief	-0.011 (0.041)	0.025 (0.027)	0.028 (0.034)	-0.014 (0.041)	-0.01 (0.019)	0.029 (0.025)
Debt Service	-0.228*** (0.082)	-0.216 (0.142)	-0.189* (0.105)	-0.237*** (0.084)	-0.244* (0.132)	-0.259*** (0.073)
Debt Stock	-0.016*** (0.006)	-0.007 (0.011)	-0.008* (0.004)	-0.017*** (0.006)	-0.011 (0.007)	-0.006 (0.004)
Aid	-0.022 (0.064)	0.042 (0.088)	0.018 (0.062)	-0.175 (0.145)	-0.227 (0.243)	-0.139 (0.175)
Aid squared				0.004 (0.004)	0.004 (0.006)	0.004 (0.004)
Aid * Policy	-0.003*** (0.001)	-0.004 (0.005)	0.011* (0.006)	0.005 (0.006)	-0.001 (0.010)	0.011 (0.007)
Aid squared * Policy				0 (0.000)	0 (0.000)	0 (0.000)
Policy Index	0.083*** (0.015)	0.123*** (0.042)	0.058*** (0.013)	0.069*** (0.018)	0.089*** (0.023)	0.062*** (0.012)
Institutional Quality	0.378 (0.450)	-0.647 (1.128)	0.185 (0.658)	0.3 (0.452)	-0.105 (0.786)	-0.277 (0.580)
Financial Depth, t-1	0.004 (0.033)	0.177** (0.076)	0.01 (0.019)	0.008 (0.033)	0.095* (0.051)	0.01 (0.013)
GDP per capita, t-1	-14.618*** (1.815)	-31.995*** (10.243)	-0.154 (0.470)	-14.065*** (1.842)	-22.225*** (6.605)	-0.14 (0.637)
Restrictions on Freedom	-0.438 (0.288)	-0.367 (0.444)	-0.567** (0.229)	-0.452 (0.288)	-0.347 (0.303)	-0.564*** (0.205)
Political Stability	0.251*** (0.082)	0.379** (0.163)	0.242 (0.158)	0.242*** (0.082)	0.280** (0.138)	0.171 (0.118)
Land Area in Tropics			1.702 (1.183)			0.119 (0.752)
Ethnolinguistic Homogeneity			0.991 (1.896)			0.78 (1.630)
Observations	538	486	538	538	486	538
R-squared	0.25			0.25		
p values for **Hansen Test of overid. Restrictions** **Arellano-Bond AR(1) in first differences** **Arellano-Bond AR(2) in first differences**		1.000 0.014 0.430	1.000 0.001 0.540		1.000 0.006 0.411	1.000 0.001 0.439

Notes:

* significant at 10%; ** significant at 5%; *** significant at 1%.
The dependent variable in all regressions is the annual growth rate of per capita GDP. All regressions include year dummies and a constant term. Heteroskedasticity-robust standard errors are reported in parenthesis. All debt and all aid terms are expressed in percent of gross domestic product. Financial depth is defined as M2/GDP. *GDP per capita* is the natural logarithm of GDP per capita.
In the GMM regressions, *policy*, *aid*, and *aid squared* are instrumented with 10 lags of their own levels, and additionally with 10 lags of their first-differences in (3) and (6). Additionally, aid is instrumented by the natural logarithm of population.

Table 2b HIPC countries, World Bank debt relief variables

	(1) Fixed Effects	(2) Arellano-Bond GMM	(3) Blundell-Bond GMM	(4) Fixed Effects	(5) Arellano-Bond GMM	(6) Blundell-Bond GMM
Debt Service Relief	0.017 (0.058)	0.013 (0.038)	-0.002 (0.043)	0.018 (0.059)	0.015 (0.038)	-0.006 (0.045)
Debt Stock Relief	-0.03 (0.053)	-0.031 (0.027)	-0.019 (0.027)	-0.032 (0.054)	-0.033 (0.027)	-0.013 (0.028)
Debt Service	-0.193 (0.160)	-0.151 (0.139)	-0.246** (0.112)	-0.194 (0.167)	-0.16 (0.122)	-0.281** (0.105)
Debt Stock	-0.002 (0.009)	-0.003 (0.006)	-0.006 (0.004)	-0.003 (0.009)	-0.004 (0.006)	-0.007 (0.004)
Aid	0.107 (0.102)	0.097 (0.082)	0.183** (0.063)	0.005 (0.252)	-0.036 (0.244)	0.126 (0.219)
Aid squared				0.003 (0.006)	0.003 (0.006)	0.001 (0.005)
Aid * Policy	0 (0.001)	0 (0.001)	-0.001 (0.001)	0.003 (0.015)	0.01 (0.015)	0.016 (0.012)
Aid squared * Policy				0 (0.000)	0 (0.000)	0 (0.000)
Policy Index	0.029 (0.037)	0.027 (0.018)	0.066** (0.027)	0.015 (0.072)	-0.018 (0.063)	-0.002 (0.054)
Institutional Quality	-0.963 (1.294)	-0.942 (1.526)	0.262 (0.789)	-1.034 (1.321)	-1.093 (1.598)	0.475 (0.849)
Financial Depth, t-1	0.032 (0.103)	0.033 (0.074)	0.017 (0.042)	0.029 (0.106)	0.024 (0.075)	0.013 (0.039)
GDP per capita, t-1	-6.719* (3.673)	-5.754 (5.442)	0.866 (0.824)	-6.105 (3.961)	-5.165 (6.335)	0.707 (0.668)
Restrictions on Freedom	-1.167* (0.654)	-1.169 (1.160)	-1.004** (0.444)	-1.176* (0.664)	-1.181 (1.153)	-1.095** (0.493)
Political Stability	0.294* (0.174)	0.287* (0.137)	0.171 (0.128)	0.294* (0.176)	0.286* (0.135)	0.12 (0.127)
Land Area in Tropics			1.021 (1.555)			1.702 (1.405)
Ethnolinguistic Homogeneity			2.274 (1.520)			2.333 (1.551)
Observations	156	139	156	156	139	156
R-squared	0.24			0.24		
p values for **Hansen Test of overid. Restrictions**		1.000	1.000		1.000	1.000
Arellano-Bond AR(1) in first differences		0.032	0.035		0.032	0.033
Arellano-Bond AR(2) in first differences		0.953	0.945		0.939	0.989

Notes:

* significant at 10%; ** significant at 5%; *** significant at 1%.
The dependent variable in all regressions is the annual growth rate of per capita GDP. All regressions include year dummies and a constant term. Heteroskedasticity-robust standard errors are reported in parenthesis. All debt and all aid terms are expressed in percent of gross domestic product. Financial depth is defined as M2/GDP. *GDP per capita* is the natural logarithm of GDP per capita.
In the GMM regressions, *policy*, *aid*, and *aid squared* are instrumented with 10 lags of their own levels, and additionally with 10 lags of their first-differences in (3) and (6). Additionally, aid is instrumented by the natural logarithm of population.

Table 2c   Non-HIPC developing countries, World Bank debt relief variables

	(1) Fixed Effects	(2) Arellano-Bond GMM	(3) Blundell-Bond GMM	(4) Fixed Effects	(5) Arellano-Bond GMM	(6) Blundell-Bond GMM
Debt Service Relief	0.203*	0.124	0.098	0.200*	0.200***	0.158***
	(0.104)	(0.077)	(0.083)	(0.106)	(0.058)	(0.036)
Debt Stock Relief	0.198	0.327*	0.244	0.194	0.203	0.257
	(0.136)	(0.182)	(0.247)	(0.137)	(0.147)	(0.181)
Debt Service	-0.368***	-0.481**	-0.238*	-0.370***	-0.397***	-0.238***
	(0.102)	(0.223)	(0.120)	(0.103)	(0.142)	(0.079)
Debt Stock	-0.073***	-0.090***	-0.025**	-0.073***	-0.075***	-0.028***
	(0.015)	(0.032)	(0.012)	(0.016)	(0.018)	(0.010)
Aid	-0.241**	-0.219	-0.317***	-0.217	-0.193	-0.233
	(0.102)	(0.147)	(0.067)	(0.270)	(0.384)	(0.196)
Aid squared				-0.001	-0.002	-0.004
				(0.010)	(0.011)	(0.007)
Aid * Policy	0.026***	0.025**	0.019**	0.030*	0.026	0.031**
	(0.008)	(0.012)	(0.007)	(0.016)	(0.025)	(0.012)
Aid squared * Policy				0	0	-0.001
				(0.001)	(0.001)	(0.000)
Policy Index	0.056***	0.056**	0.066***	0.053***	0.057**	0.064***
	(0.016)	(0.025)	(0.014)	(0.020)	(0.024)	(0.012)
Institutional Quality	-0.106	-0.831	-0.079	-0.127	-0.113	0.768*
	(0.458)	(0.591)	(0.529)	(0.464)	(0.435)	(0.404)
Financial Depth, t-1	0.081**	0.113**	0.011	0.082**	0.074*	0.006
	(0.036)	(0.051)	(0.014)	(0.037)	(0.043)	(0.009)
GDP per capita, t-1	-17.800***	-29.152***	-0.432	-17.673***	-18.479***	-0.21
	(2.354)	(6.831)	(0.469)	(2.408)	(3.396)	(0.474)
Restrictions on Freedom	-0.395	-0.62	-0.2	-0.387	-0.404	0.055
	(0.323)	(0.400)	(0.254)	(0.324)	(0.282)	(0.203)
Political Stability	0.149	0.282	0	0.149	0.161	-0.001
	(0.093)	(0.172)	(0.125)	(0.094)	(0.114)	(0.098)
Land Area in Tropics			-0.264			0.161
			(0.522)			(0.505)
Ethnolinguistic Homogeneity			-0.118			0.268
			(1.143)			(0.920)
Observations	382	347	382	382	347	382
R-squared	0.42			0.42		
p values for						
Hansen Test of overid. Restrictions		1.000	1.000		1.000	1.000
Arellano-Bond AR(1) in first differences		0.009	0.004		0.004	0.004
Arellano-Bond AR(2) in first differences		0.768	0.666		0.838	0.743

Notes:

* significant at 10%; ** significant at 5%; *** significant at 1%.
The dependent variable in all regressions is the annual growth rate of per capita GDP. All regressions include year dummies and a constant term. Heteroskedasticity-robust standard errors are reported in parenthesis. All debt and all aid terms are expressed in percent of gross domestic product. Financial depth is defined as M2/GDP. *GDP per capita* is the natural logarithm of GDP per capita.
In the GMM regressions, *policy*, *aid*, and *aid squared* are instrumented with 10 lags of their own levels, and additionally with 10 lags of their first-differences in (3) and (6). Additionally, aid is instrumented by the natural logarithm of population.

Table 3a   All developing countries, OECD debt relief variable

	(1) Fixed Effects	(2) Arellano-Bond GMM	(3) Blundell-Bond GMM	(4) Fixed Effects	(5) Arellano-Bond GMM	(6) Blundell-Bond GMM
OECD Debt Relief	0.140**	0.133***	0.074	0.135**	0.107**	0.054
	(0.057)	(0.039)	(0.047)	(0.058)	(0.042)	(0.046)
Debt Service	-0.159	0.104	-0.167*	-0.157	0.002	-0.198***
	(0.108)	(0.187)	(0.091)	(0.108)	(0.188)	(0.070)
Debt Stock	-0.01	-0.006	-0.007**	-0.01	-0.007	-0.008**
	(0.007)	(0.006)	(0.003)	(0.007)	(0.005)	(0.003)
Aid	0.075	0.126	0.168***	0.089	0.241	0.098
	(0.067)	(0.078)	(0.039)	(0.151)	(0.180)	(0.108)
Aid squared				0	-0.004	0
				(0.004)	(0.005)	(0.003)
Aid * Policy	-0.002**	0	0	-0.008	-0.028	-0.006
	(0.001)	(0.008)	(0.004)	(0.005)	(0.017)	(0.005)
Aid squared * Policy				0	0.001*	0
				(0.000)	(0.001)	(0.000)
Policy Index	0.077***	0.055	0.064***	0.096***	0.159**	0.084***
	(0.017)	(0.044)	(0.020)	(0.023)	(0.068)	(0.020)
Institutional Quality	0.755	1.577	0.283	0.8	0.981	0.358
	(0.508)	(0.990)	(0.361)	(0.512)	(0.941)	(0.390)
Financial Depth, t-1	-0.016	0.025	0.016	-0.008	0.035	0.01
	(0.035)	(0.080)	(0.014)	(0.036)	(0.069)	(0.010)
GDP per capita, t-1	-7.853***	-21.438***	0.932***	-8.138***	-18.935***	0.668
	(1.671)	(6.464)	(0.335)	(1.704)	(6.614)	(0.440)
Restrictions on Freedom	-0.599**	-0.125	-0.404**	-0.599**	-0.167	-0.475**
	(0.292)	(0.403)	(0.195)	(0.293)	(0.374)	(0.189)
Political Stability	0.168**	-0.14	0.027	0.165**	-0.067	-0.011
	(0.083)	(0.148)	(0.090)	(0.083)	(0.137)	(0.081)
Land Area in Tropics			-0.107			0.159
			(1.111)			(0.833)
Ethnolinguistic Homogeneity			0.494			0.244
			(1.535)			(1.175)
Observations	444	329	444	444	329	444
R-squared	0.2			0.2		
***p* values for**						
Hansen Test of overid. Restrictions		1.000	1.000		1.000	1.000
Arellano-Bond AR(1) in first differences		0.011	0.013		0.010	0.012
Arellano-Bond AR(2) in first differences		0.883	0.834		0.721	0.912

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.
The dependent variable in all regressions is the annual growth rate of per capita GDP. All regressions include year dummies and a constant term. Heteroskedasticity-robust standard errors are reported in parenthesis. All debt and all aid terms are expressed in percent of gross domestic product. Financial depth is defined as M2/GDP. *GDP per capita* is the natural logarithm of GDP per capita.
In the GMM regressions, *policy*, *aid*, and *aid squared* are instrumented with 10 lags of their own levels, and additionally with 10 lags of their first-differences in (3) and (6). Additionally, aid is instrumented by the natural logarithm of population.

Table 3b   HIPC countries, OECD debt relief variable

	(1) Fixed Effects	(2) Arellano-Bond GMM	(3) Blundell-Bond GMM	(4) Fixed Effects	(5) Arellano-Bond GMM	(6) Blundell-Bond GMM
OECD Debt Relief	0.133* (0.075)	0.110*** (0.037)	0.065 (0.044)	0.122 (0.076)	0.098** (0.039)	0.06 (0.050)
Debt Service	0.053 (0.172)	0.342*** (0.097)	0.04 (0.075)	0.103 (0.175)	0.372*** (0.111)	0.052 (0.078)
Debt Stock	0 (0.010)	-0.003 (0.009)	-0.005 (0.005)	0.001 (0.010)	-0.004 (0.008)	-0.005 (0.005)
Aid	0.052 (0.098)	0.087 (0.100)	0.075 (0.060)	0.136 (0.234)	0.401 (0.292)	0.158 (0.227)
Aid squared				-0.002 (0.006)	-0.008 (0.006)	-0.002 (0.006)
Aid * Policy	0.001 (0.001)	0.001 (0.005)	0 (0.001)	-0.018 (0.013)	-0.014 (0.030)	-0.002 (0.007)
Aid squared * Policy				0 0.000	0.001 (0.001)	0 (0.000)
Policy Index	0.015 (0.032)	0.022 (0.042)	0.042 (0.025)	0.116 (0.077)	0.085 (0.138)	0.051 (0.040)
Institutional Quality	1.058 (1.005)	1.501 (1.478)	0.952 (0.593)	1.107 (1.006)	1.323 (1.487)	0.855 (0.600)
Financial Depth, t-1	0.037 (0.071)	-0.018 (0.057)	0.032 (0.040)	0.064 (0.074)	-0.019 (0.045)	0.034 (0.038)
GDP per capita, t-1	-5.623 (3.554)	-16.880*** (5.585)	-0.446 (0.905)	-7.271* (3.897)	-18.275** (6.706)	-0.429 (0.899)
Restrictions on Freedom	-0.747 (0.623)	0.21 (0.786)	-0.881** (0.319)	-0.744 (0.623)	0.223 (0.702)	-0.856** (0.339)
Political Stability	0.055 (0.161)	-0.319 (0.200)	-0.066 (0.112)	0.068 (0.161)	-0.322 (0.206)	-0.059 (0.109)
Land Area in Tropics			-0.326 (1.694)			-0.203 (1.862)
Ethnolinguistic Homogeneity			2.190* (1.084)			2.157* (1.067)
Observations	176	146	176	176	146	176
R-squared	0.22			0.23		
***p* values for**						
Hansen Test of overid. Restrictions		1.000	1.000		1.000	1.000
Arellano-Bond AR(1) in first differences		0.034	0.052		0.027	0.052
Arellano-Bond AR(2) in first differences		0.664	0.712		0.847	0.731

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.
The dependent variable in all regressions is the annual growth rate of per capita GDP. All regressions include year dummies and a constant term. Heteroskedasticity-robust standard errors are reported in parenthesis. All debt and all aid terms are expressed in percent of gross domestic product. Financial depth is defined as M2/GDP. *GDP per capita* is the natural logarithm of GDP per capita.
In the GMM regressions, *policy*, *aid*, and *aid squared* are instrumented with 10 lags of their own levels, and additionally with 10 lags of their first-differences in (3) and (6). Additionally, aid is instrumented by the natural logarithm of population.

Table 3c Non-HIPC developing countries, OECD debt relief variable

	(1) **Fixed Effects**	(2) **Arellano-Bond GMM**	(3) **Blundell-Bond GMM**	(4) **Fixed Effects**	(5) **Arellano-Bond GMM**	(6) **Blundell-Bond GMM**
OECD Debt Relief	-0.232	-0.341***	-0.322***	-0.332	-0.273**	-0.363***
	(0.240)	(0.116)	(0.085)	(0.254)	(0.103)	(0.105)
Debt Service	-0.439***	-0.431**	-0.499***	-0.474***	-0.350**	-0.448***
	(0.160)	(0.164)	(0.115)	(0.164)	(0.163)	(0.113)
Debt Stock	-0.029*	-0.053*	0.011	-0.022	-0.055**	0.015
	(0.015)	(0.026)	(0.017)	(0.016)	(0.024)	(0.018)
Aid	-0.043	0.21	0.079	-0.262	-0.357	-0.338
	(0.177)	(0.206)	(0.092)	(0.422)	(0.503)	(0.264)
Aid squared				0.025	0.031	0.032
				(0.031)	(0.025)	(0.020)
Aid * Policy	0.019*	-0.009	-0.002	0.043**	-0.062*	0.048***
	(0.010)	(0.019)	(0.006)	(0.022)	(0.034)	(0.011)
Aid squared * Policy				-0.002	0.002	-0.003***
				(0.002)	(0.002)	(0.001)
Policy Index	0.094***	0.128**	0.097***	0.079***	0.188***	0.067***
	(0.022)	(0.046)	(0.023)	(0.024)	(0.062)	(0.019)
Institutional Quality	0.102	-0.215	1.055*	-0.033	0.116	1.013**
	(0.591)	(0.652)	(0.598)	(0.616)	(0.559)	(0.477)
Financial Depth, t-1	0.025	0.207**	-0.001	0.028	0.207***	-0.028
	(0.042)	(0.080)	(0.031)	(0.043)	(0.073)	(0.019)
GDP per capita, t-1	-8.073***	-29.976***	0.76	-7.635***	-31.035***	-0.024
	(2.051)	(7.183)	(0.722)	(2.101)	(6.690)	(0.670)
Restrictions on Freedom	-0.880**	-0.711	0.188	-0.849**	-0.734	0.267
	(0.340)	(0.479)	(0.337)	(0.344)	(0.453)	(0.285)
Political Stability	0.092	0.086	0.066	0.106	0.047	0.108
	(0.101)	(0.122)	(0.081)	(0.102)	(0.113)	(0.086)
Land Area in Tropics			1.102			0.662
			(1.140)			(0.834)
Ethnolinguistic Homogeneity			0.226			-1.431
			(1.866)			(1.480)
Observations	268	183	268	268	183	268
R-squared	0.37			0.38		
p values for						
Hansen Test of overid. Restrictions		1.000	1.000		1.000	1.000
Arellano-Bond AR(1) in first differences		0.002	0.006		0.001	0.004
Arellano-Bond AR(2) in first differences		0.009	0.015		0.012	0.053

Notes:
* significant at 10%; ** significant at 5%; *** significant at 1%.
The dependent variable in all regressions is the annual growth rate of per capita GDP. All regressions
include year dummies and a constant term. Heteroskedasticity-robust standard errors are reported
in parenthesis. All debt and all aid terms are expressed in percent of gross domestic product. Financial
depth is defined as M2/GDP. *GDP per capita* is the natural logarithm of GDP per capita.
In the GMM regressions, *policy*, *aid*, and *aid squared* are instrumented with 10 lags of their own levels,
and additionally with 10 lags of their first-differences in (3) and (6). Additionally, aid is instrumented by
the natural logarithm of population.