



The Impact of Aid and External Debt on Growth and Investment

by

Henrik Hansen

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The Author

Henrik Hansen is Associate Professor at the Institute of Economics, University of Copenhagen and Research Fellow at the Development Economics Research Group (DERG), and an External Fellow of CREDIT.

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Abstract

What happens if HIPC debt relief resources are not additional? We seek to answer this question by quantifying the impact of debt service payments and aid flows in cross-country growth and investment regressions. Based on the regressions we assess the likely impact of debt relief with and without changes in the aid flows. The result is that one-for-one changes in debt service payments and official aid flows leaves the growth rate unchanged, i.e., there seems to be no growth without additionality. When we use a measure of effective aid developed by the World Bank staff we find that if decreases in debt service payments are accompanied by falling grant levels, there may even be a negative impact on growth.

Outline

1. Introduction
2. A Comparison of some Macroeconomic Trends in HIC, HIPC and Other Developing Countries 1974-93
3. Econometric Results
4. Discussion

1. INTRODUCTION

Additionality, in the sense that debt relief should supplement, not replace, the flow of development aid is a key concept underlying the HIPC Initiative. But assessing the additionality of HIPC debt relief is extremely difficult, if not outright impossible. Some writers, e.g., Birdsall and Williamson (2002), expect only modest additionality from bilateral donors while they doubt that debt relief from the World Bank can be additional. This leaves the IMF as the main contributor of additional resources.

If additionality is unlikely, it becomes relevant to look into the question of what happens to growth and investment when both debt service and aid flows decrease? In the present study we make a first pass at answering this question. That is, we wish to assess the possible outcome of HIPC debt relief without additionality.

At first sight, the question is rather naïve. If the net flow is unchanged, there seems little scope for improvements in growth performance. However, looking at the two strands of literature one dealing with aid effectiveness and the other with the impact of debt problems the question becomes more pertinent. For more than 30 years there have been intensive discussions about the macroeconomic impact of development aid and, even today, many scholars and politicians are convinced that, on average, aid is wasted if not downright harmful to economic growth. In contrast, the analyses of the impact of debt problems following the 1980s Latin American debt crisis seldom discussed *if* external debt had negative effects on investment and growth. A negative impact was taken for granted which is why focus was instead on the specific link from external debt to investment. Usually, the debt overhang theory of Krugman (1988) and Sachs (1989) was held up against the pure crowding-out theory advocated by Cohen (1993).

Based on the discussions of aid effectiveness and debt problems one is inclined to conclude that if there is a large (overhang) effect of external debt on investment and economic policies while aid is wasted, it seems as if debt relief along the lines of the HIPC Initiative can be beneficial for growth even without additionality. Birdsall and Williamson condense this idea in the assumption that “an assured dollar of debt relief is probably more efficient in generating development than a promise of a dollar of new aid.” (Birdsall and Williamson, 2002, p. 72).

But the aid effectiveness debate is still open, and the World Bank perception that aid is only effective in a good policy and institutional environment is far from universal. In addition, the disincentive effect of the debt overhang may be modest in many HIPC countries because they, in contrast to the heavily indebted countries of the 1980s, have official instead of private debt and net inflows of funds. Taken together, this means that there is another scenario, in which debt relief without additionality has little or no impact on growth and investment.

Assessing the possible outcome of non-additional debt relief may be of more than academic interest. “Aid fatigue”—a term now present in every politicians glossary—which is to a large extent generated by unfulfilled expectations may be replaced by “Debt relief weariness” if the HIPC Initiative fails to live up to the high hopes in terms of increased growth and poverty alleviation. To avoid new disappointments, and never-ending discussions of what went wrong and who to blame, it is important to be realistic with respect to the projected results of the HIPC Initiative.

In the present study we look at the recent past in 50 developing countries. The idea is to quantify the joint impact of debt service payments and aid flows on growth and investment. The sample of 50 countries includes some of the HIPC-countries and a large group of non-HIPCs. The main reason for looking at many non-HIPC countries is that if we concentrate on the HIPCs there is a serious risk that our predictions will be biased because of endogenous sample selection with respect to debt performance. This is also the reason why we have chosen to look at a period before the HIPC Initiative was launched in 1996. Needless to say, using both HIPC and non-HIPC countries to assess the importance of debt service and aid flows implies strong assumptions of (conditional) similarity and linearity. But these are underlying assumptions in all cross-country studies.

The main result of the analysis is that decreasing debt service payments have a (small) positive impact on growth and investment. But decreasing debt service payments in combination with decreasing aid flows have no significant growth effects while there may even be a negative impact on investment. This means that additionality appears to be important for a successful outcome of the debt relief initiative. In the analysis, we

concentrate on the impact of debt service payments and aid flows, conditional on macroeconomic policies. Therefore, if the main channel of HIPC-generated growth is through improvements in policies and institutions there may well be a positive result of non-additional debt relief. But in this case successful debt relief arrangements are in some sense results of successful conditionality and selectivity more than results of debt forgiveness.

We begin with a brief description of some macroeconomic trends in the 50 countries in our sample (section 0). The main purpose is to compare the trends across the heavily indebted countries (HICs) of the 1980s, the HIPC countries of the 1990s and countries that are neither HIC nor HIPC (non-HI(P)C). Section 0 resumes our econometric results. First we look at debt service payments, aid flows and growth (section 0) followed by an analysis of the impact on investment (section 0). In section 0 we try to assess the likeliness of simultaneous changes in debt service and aid flows, concentrating on the experience in the HIC countries. Interestingly, we find that while the official assistance is only weakly related to debt service payments, the composition of loans in terms of the size of the grant element did respond to changes in debt service payments, in the sense that the grant element decreased after debt service payments dropped. This means that there is a (recent) historical record of non-additionality in relation to debt relief, but this non-additionality cannot be found directly in the official statistics. We discuss this issue and some limitations of the present study in relation to assessing the possible success or failure of the HIPC Initiative in the concluding section 0.

2. A COMPARISON OF SOME MACROECONOMIC TRENDS IN HIC, HIPC AND OTHER DEVELOPING COUNTRIES 1974-93

In this section we briefly present the patterns of some macroeconomic indicators that have attracted attention in studies of external debt problems and aid-effectiveness. Data for 50 developing countries is analyzed in the present study (see Table 1). The country sample includes 15 of the “Baker 17” heavily indebted middle-income countries (HIC) and 17 of the current HIPCs.¹ In the time series dimension the sample covers the years 1974 to 1993, whereby the analysis is based on observations prior to the HIPC Initiative, while the 1980s debt crisis is included.

¹ Bolivia is classified both as HIC and HIPC.

Table 1

Sample countries (50)

Argentina*	Ethiopia**	Malawi**	Sri Lanka
Bolivia**(**)	Gabon	Malaysia	Syrian Arab Republic
Botswana	Gambia, The**	Mexico*	Thailand
Brazil*	Ghana**	Morocco*	Togo**
Cameroon**	Guatemala	Niger**	Trinidad and Tobago
Chile*	Guyana**	Nigeria*	Tunisia
Colombia*	Haiti	Pakistan	Turkey
Congo, Dem. Rep.**	Honduras**	Paraguay	Uruguay*
Costa Rica*	India	Peru*	Venezuela*
Dominican Republic	Indonesia	Philippines*	Zambia**
Ecuador*	Jamaica*	Senegal**	Zimbabwe
Egypt, Arab Rep.	Kenya**	Sierra Leone**	
El Salvador	Madagascar**	Somalia**	

* Countries classified as heavily indebted countries (HIC).

** Countries classified as heavily indebted poor countries (HIPC)

Following common practice in cross-country growth studies, we transform the annual observations into period averages of the flow variables and initial observations of the stock variables. In the present study four-year epochs are used whereby the time series dimension is reduced to 5 periods.² Table 2 reports the development over time of the macroeconomic indicators, the levels of external debt, debt service payments and aid flows. Data sources are given in Appendix A. The data presented are median levels in each of the 5 periods for the 19 non-HI(P)Cs, the 15 HICs and the 17 HIPCs, respectively.

Table 2

Median levels of major economic indicators, 1974-1993

		Periods				
		1974-77	1978-81	1982-85	1986-89	1990-93
Real per capita GDP growth (Percent)	Non-HI(P)C	4.25	4.02	1.77	1.08	2.46
	HIC	2.49	1.22	-2.16	1.00	1.40
	HIPC	0.34	-0.90	-1.98	-0.55	-1.09
Gross domestic investment (Percent of GDP)	Non-HI(P)C	23.32	26.10	23.96	22.29	23.50
	HIC	24.35	25.06	19.60	21.71	19.15
	HIPC	20.78	26.44	15.35	15.78	16.12
Institutional quality	Non-HI(P)C	4.42	4.42	4.42	4.42	4.42
	HIC	5.12	5.12	5.12	5.12	5.12
	HIPC	4.35	4.35	4.35	4.35	4.35
Budget surplus (Percent of GDP)	Non-HI(P)C	-2.73	-3.69	-5.30	-2.97	-2.14
	HIC	-2.56	-2.02	-5.22	-2.46	-1.14
	HIPC	-3.57	-6.53	-6.68	-4.05	-3.71
Inflation (Percent)	Non-HI(P)C	11.48	11.33	9.36	9.46	12.76
	HIC	18.89	21.57	26.60	33.95	24.73
	HIPC	13.87	11.82	13.60	18.36	15.36
Sachs-Warner openness	Non-HI(P)C	0.00	0.00	0.00	0.00	0.75
	HIC	0.00	0.00	0.00	0.25	1.00
	HIPC	0.00	0.00	0.00	0.00	0.25
External debt (Percent of GDP)	Non-HI(P)C	15.54	24.10	29.11	45.12	51.10
	HIC	20.95	35.70	45.32	67.00	70.76
	HIPC	24.50	42.48	63.45	87.01	92.70
NPV of debt (Percent of GDP)	Non-HI(P)C	14.84	18.02	27.05	43.41	48.99
	HIC	17.96	31.70	39.96	59.18	65.41
	HIPC	21.91	38.87	54.31	63.29	72.10
Debt service (TDS/GDP, percent)	Non-HI(P)C	2.15	2.80	5.32	6.05	5.12
	HIC	3.35	6.73	9.25	8.52	7.25
	HIPC	2.65	5.20	6.88	8.27	6.76
Official development assistance (ODA/GDP, percent)	Non-HI(P)C	1.70	1.41	2.09	2.83	2.09
	HIC	0.55	0.26	0.22	0.45	0.77
	HIPC	3.67	7.21	6.73	9.62	13.25
Effective development assistance (Real EDA/GDP, percent)	Non-HI(P)C	0.42	0.68	0.78	0.83	0.61
	HIC	0.24	0.13	0.12	0.13	0.17
	HIPC	2.15	2.93	2.96	3.30	3.40
Average grant element (Percent)	Non-HI(P)C	49.33	48.58	54.35	48.62	43.99
	HIC	23.20	25.71	28.83	17.67	25.25
	HIPC	72.05	69.73	69.69	76.00	83.43
ODA - Debt service (Percent of GDP)	Non-HI(P)C	-0.12	-0.37	-2.29	-1.91	-2.53
	HIC	-2.88	-5.85	-8.12	-7.52	-5.91

2 The epochs are: 1974-77; 1978-81; 1982-85; 1986-89 and 1990-93. Initial income and the debt stock variables are observations for the years 1973, 1977, 1981, 1985 and 1989.

	Periods				
	1974-77	1978-81	1982-85	1986-89	1990-93
HIPC	0.37	0.80	0.95	2.94	4.88

The median growth rates in real per capita GDP varies substantially across time and between the country groups, however the worldwide decrease in growth rates after 1975 is evident. The mid 1970s were characterized by relatively high growth rates in most of the countries. During the late 1970s growth rates declined, turning negative in the early and mid 1980s in most HIC and HIPC countries. In the late 1980s and early 1990s most HIC countries returned to positive growth rates but, in general, they did not return to the levels of the early 1970s. Throughout the 1970s and 1980s there is a clear ranking of the country groups as the median growth rate in the HIPCs is far below the median growth rates in the non-HI(P)C and HIC groups (with the exception of the period 1982-85). As seen, the growth rates in most of the HIPCs in the sample were not only low, but also negative already from the late 1970s and onwards.

Gross domestic investment as a share of GDP was more or less constant for the non-HI(P)C group (with a peak in the late 1970s, though) while it declined in most HIC and HIPC countries from the early 1970s to the early 1990s. A rather sharp break occurred in the mid 1980s with typical investment ratios falling to new levels, just below 20 percent in the HIC-group, and not exceeding 15-16 percent in most of the HIPCs.

Variations in cross-country growth and investment performance are frequently explained by differences in institutions and macroeconomic policies. In Table 2 we list four measures of institutions and macroeconomic policy outcomes. The first is a measure of institutional quality constructed by Knack and Keefer (1995). Although institutional quality is not independent of per capita income or growth (see Chong and Calderón, 2000) differences in this measure are often used to explain variations in growth rates across countries. Here, the measure of institutional quality is constant over time (and actually based on data for 1982 or later), but the variation across the country groupings is informative; the median HIC-country has better institutions than the median non-HI(P)C, while most HIPC-countries have institutions of (slightly) poorer quality.

Fiscal balance has also been stressed as a growth-enhancing factor in many studies. Looking at the time trends in Table 2 it is clear that the median budget surpluses dropped sharply from the 1970s to the early 1980s, followed by gradual improvements. In fact, most of the countries in the non-HI(P)C and the HIC groups had better fiscal balances in the 1990-93 period compared to the mid 1970s. Again, there is a clear ordering across the country groupings. The median HIPC-country has consistently a larger budget deficit relative to GDP than the median non-HI(P)C country whereas the median HIC-country has a lower deficit.

Looking at the pattern of inflation rates, the cross-country variation is rather different compared to the fiscal balance, with extreme inflation rates being a relatively common problem in Latin America. Inflation rates in most HIPC countries are actually close to the median non-HI(P)C inflation rate in the early periods, whereas most countries in the HIC group have inflation rates which by far exceed the median rate in the two other country groups. Hence, part of the relatively good record for fiscal balance in the HIC group may be explained by inflation taxes.

Openness to trade is another recurrent theme in growth and development discussions. In the present study we make use of the indicator for openness constructed by Sachs and Warner (1995).³ Table 2 reveals that most of the 50 countries in the sample were closed until the early 1990s according to the Sachs-Warner indicator. The typical HIC-country changed to more open trade policies just around 1990 and in the last period in the sample most of the HIC-countries had completed the change in trade policies. This is not so for the non-HI(P)C and the HIPC groups, in which most countries were closed until the early 1990s. (The value 0.25 for openness indicates that the median HIPC-country was open in the last year of the final period).

Next, turning to external debt, we report three measures. The total external debt as a percentage of GDP is given both in nominal and net present value terms.⁴ The medians of both measures show a sharply rising trend over the sample period. In 1974-77 the

³ Sachs and Warner define a country as having a closed trade policy if it has (at least) one of four characteristics:

- (i) Nontariff barriers covering 40 percent or more of trade;
- (ii) a black market exchange rate that is depreciated by 20 percent or more relative to the official exchange rate;
- (iii) a socialist economic system or
- (iv) a state monopoly on major exports.

median of the nominal debt-to-GDP was just above 15 percent in the non-HI(P)C group with the net present value debt-to-GDP being only slightly lower. In 1990-93 the median debt level in this group had exploded to 50 percent (just above in nominal terms and just below in NPV terms). The rather constant difference between the nominal and the NPV ratios implies that a large fraction of the loans to these countries was no-concessional. For the HIC and in particular the HIPC countries the gap between the nominal and the NPV ratios was widening over the period. This means that an increasing fraction of the loans was on (increasingly) concessional terms. The difference between the nominal and NPV ratios was around 20 percentage points in the last period for the median HIPC country, while it was a modest 5 percentage points for the median HIC-country. Still, the median HIPC-country had the highest debt-to-GDP ratios throughout, closely followed by the median HIC-country. However, as is well known, a direct comparison of the debt-to-GDP levels across the country groups is not relevant because of the marked differences in the composition of the debt. This difference is in part reflected in the levels of debt service payments. Debt service payments as a percentage of GDP are consistently higher for the median HIC-country compared to the median HIPC-country. Yet, at the end of the sample period median debt service payments were substantial in all three country groups and the share of debt service payments to GDP were of the same order of magnitude in the HIC and HIPC groups.

The measurement of aid flows has been discussed recently as part of the analytical background for the World Bank Report “Assessing Aid” (World Bank, 1998). In particular, Chang, Fernandez and Serven (1998) discuss several methodological shortcomings of the DAC statistic “Official Development Assistance” (ODA) and they propose a new measure denoted “Effective Development assistance” (EDA).⁵ There are several important differences between the two statistics. First of all, the EDA measure includes only the sum of grants and grant equivalents of official loans, where the grant equivalents are based on all official loans regardless of the level of the grant component. (In contrast ODA includes all loans with a grant component above 25 percent). Moreover, grant components of loans are based on donor and time varying discount

4 The data for NPV of external debt is from Easterly (2001).

5 Renard and Cassimon (2001) provide another methodological discussion of aid measurements and discuss the relative merits of ODA and EDA.

rates. The second important difference is that the EDA measure excludes technical assistance and debt forgiveness.⁶

In the present study we look at both aid measures as percentages of GDP. Official development assistance is given as the current US\$ inflow to current US\$ GDP. In contrast, effective development assistance is given as real effective aid flows to real PPP-adjusted GDP (see Burnside and Dollar, 2000). Official aid flows as a percentage of GDP to the non-HI(P)C countries increased slightly from the 1970s and onwards. Yet a simple rule of thumb seems to be that the typical non-HI(P)C country received transfers around 2 percent of GDP. Effective aid to this group also increased over the sample period, but effective aid was always well below 1 percent of real GDP. Official aid to the HIC group was quite low and appears to have undergone a cyclical movement over the sample period. The median of effective aid to the HIC group was more constant, fluctuating around 0.12-0.13 percent of GDP in the three middle periods increasing to 0.17 percent in the last period. Finally, the median HIPC country received increasing inflows using both measures of aid. However the two aid measures also diverge for this group. The increase in the median of ODA flows from the first to the last period is almost 10 percentage points; in contrast the increase in the median EDA is only 1.25 percentage points.

The discrepancy between the time paths of ODA and EDA can to a large extent be explained by the treatment of debt forgiveness and by variations in the grant elements of the official loans. To illustrate the latter point Table 2 reports medians of the average grant elements in EDA loans. As seen, the average grant elements fluctuate over time, and for the median non-HI(P)C-country the grant element is actually lower at the end of the sample compared to the beginning. Once more, there is a marked difference between the country groups, as the grant element has a somewhat cyclical pattern for the median non-HI(P)C and median HIC country while it is trending upwards for the median HIPC country. The time pattern for the two first groups is interesting, as there appears to be a peak around the debt-crisis years followed by a sharp decline in the succeeding period. This is worth a thought in relation to the HIPC Initiative because it shows that ODA

⁶ Prior to 1989 debt forgiveness was negligible, but in the period 1990-93 a total of \$7.4 billion was classified as debt forgiveness by DAC.

transfers may increase while at the same time aid—in terms of grant elements—actually decrease.

The last rows of Table 2 report the median difference between ODA inflows and debt service payments. Most countries had debt service payments in excess of ODA inflows throughout the sample period. But this is not the case for the HIPC countries for which most had larger ODA inflows than debt service outflows. The fact that ODA inflows exceeded debt service payments has led Birdsall, Claessens and Diwan (2002), among others, to question if the debt-overhang theory by Krugman and Sachs is relevant for the HIPC countries. Sachs et al. (1999), however, argue that the debt burden falls heavily on the budget, while grants frequently finance extra-budgetary activities established by the donors, resulting in deinstitutionalization of public activities. The latter effect may induce poorer policies and this may be interpreted as a debt-overhang effect.

Summing up, it is evident that most of the HIPC countries (in this sample) had significantly lower growth rates and investment ratios; poorer institutions; higher budget deficits; slower movement towards open trade policies and higher aid inflows compared to the HIC countries in Latin America and other developing countries in our sample. They also had higher debt-to-GDP ratios (both in nominal and NPV terms), but they did not, in general, have high debt service payments compared to the HIC countries and, throughout, the official development assistance exceeded debt service payments in most of the countries in this group.

In what follows we focus on the impact of debt service payments and aid flows on growth and investment, conditional on the policy variables discussed above. The central question is if reducing debt service payments is beneficial growth at constant or decreasing levels of aid inflows.

3. ECONOMETRIC RESULTS

In this section we look at cross-country regressions to assess the statistical significance and economic impact of external debt and aid. In section 0 we present results of growth regressions, while turning to investment regressions in section 0. Last, in section 0 we make an attempt of assessing if debt service payments and aid flows are correlated (both in good times and in bad times). Throughout, debt service payments and aid flows are

included as endogenous regressors.⁷ There are several reasons why we consider debt service payments to be endogenously determined. First of all, a country may be forced, or choose, to postpone debt service, either formally through negotiations or de facto as arrears. In any event postponing debt service is in all likelihood a function of the growth rate. One particular link, noted by Easterly (2001), is that GDP growth interacted with the debt-to-GDP ratio is a good predictor of debt servicing problems if these problems arise because of insolvent public sectors. Second, endogeneity of aid implies endogeneity of debt service because part of the debt service, which is actually paid, may have been financed through new loans or grants. Finally, we wish to focus on the predictable part of the debt service payments, as this is what governments and investors include in development plans and projects.⁸

In all regressions we condition on the macroeconomic policy and institutional variables discussed in section 0. In addition to these controls we also include time dummies to capture the worldwide changes in growth rates and a dummy for Sub-Saharan Africa.

3.1 Growth regressions

Table 3 presents results of cross-country growth regressions using the 50 countries given in Table 1. To take account of the endogeneity of debt service payments and aid flows, all results in which these variables are used as regressors are based on instrumental variable GMM regressions (see e.g., Hayashi, 2000, chapter 3).

Regression (1) is the baseline formulation that only includes the control variables. The results of the baseline regression are in accordance with other studies. The impact of a budget surplus appears positive, but highly imprecisely determined. Inflation has a significantly negative impact on growth, yet the impact on growth appears modest. If the median HIC country had experienced an annual inflation rate of roughly 15 percent in the 1990-93 period instead of 25 percent the result would have been an increase of less than 0.2 percentage points in the growth rate. However, the extreme inflation rates

⁷ Endogeneity of aid has been discussed in depth elsewhere therefore we do not pursue this issue here. See, e.g., Papanek (1972), Burnside and Dollar (2000) and Hansen and Tarp (2001).

⁸ The importance of uncertainty in aid flows and debt service payments has been analyzed elsewhere. See Lensink and Morrissey (2000) on aid flows, Claessens et al. (1997) for a survey of results about the debt burden and uncertainty and Dijkstra and Hermes (2001) for an analysis of growth and uncertainty in debt service payments.

experienced in some of the countries in the sample do seem to have a measurable impact on growth. (Decreasing inflation by one standard deviation, 36 percentage points, leads to about 0.6 percentage point increase in growth). An open trade policy does seem to have both statistically and economically significant impact on growth. Closed economies (say, Malawi, Nigeria and Pakistan) give up 2 percentage points of annual growth compared to open economies (say, Bolivia, Ghana and Indonesia), so the movement towards more open trade policies should have resulted in increased growth—everything else equal. Institutional quality is also both statistically significant and economically important. If the median HIPC country was able to change the institutional quality rating to achieve the rating of the median HIC country this would, according to the regression results, lead to just above 0.4 percentage point increase in annual growth. Finally, it appears that the 18 Sub-Saharan African countries in the sample on average have more than 1.5 percentage points lower growth rates than the countries outside this region—conditional on policies and institutions.

Table 3

Growth regressions

Dependent variable	Growth rate in real GDP per capita (percent)					
Sample	50 countries, 5 periods (1974-77 to 1990-93)					
Regression	(1)	(2) ^a	(3) ^b	(4) ^c	(5) ^d	(6) ^e
Budget surplus (percent of GDP)	0.040 (1.17)	0.003 (0.09)	0.075** (2.56)	0.072** (2.38)	0.027 (0.73)	0.014 (0.38)
Inflation	-0.017** (4.15)	-0.018** (4.37)	-0.014** (3.27)	-0.014** (3.32)	-0.016** (3.65)	-0.015** (3.62)
Sachs-Warner openness	2.085** (4.40)	2.221** (4.83)	1.899** (4.12)	1.791** (4.03)	2.267** (4.83)	2.256** (4.96)
Institutional quality	0.573** (3.67)	0.606** (4.12)	0.660** (4.34)	0.618** (4.14)	0.666** (4.40)	0.653** (4.35)
Sub-Saharan Africa	-1.549** (3.21)	-1.598** (3.42)	-2.131** (3.94)	-2.137** (3.94)	-2.476** (4.18)	-2.777** (4.25)
Debt service (TDS/GDP, percent)		-0.092 (1.15)			-0.145* (1.98)	-0.161** (2.28)
Official aid (ODA/GDP, percent)			0.115** (2.93)		0.140** (2.73)	
Effective aid (real EDA/GDP, percent)				0.281** (2.60)		0.440** (2.84)
Observations	226	226	226	226	226	226
RMSE	2.92	2.84	2.91	2.87	2.87	2.83
Hansen J-test		0.14	0.17	0.28	0.31	0.50

Time dummies are included in all regressions. Robust t-statistics in parentheses. * Significant at 10%, ** significant at 5%.

Regression (1) is an OLS regression; regressions (2)-(6) are 2-step GMM regressions.

Instruments common to regressions (2)-(6): Initial real GDP per capita, Initial external debt, initial external debt squared.

^a Additional instruments: Lagged debt service and lagged debt service squared.

^b Additional instruments: Lagged official aid and lagged official aid squared.

^c Additional instruments: Lagged effective aid and lagged official aid squared.

^d Additional instruments: Instruments in regressions (2) and (3)

^e Additional instruments: Instruments in regressions (2) and (4)

Regressions (2), (3) and (4) in Table 3 append debt service payments, official aid and effective aid to the baseline regression one at a time. The results are that debt service payments have a negative, but quite insignificant, impact on growth while aid has a significantly positive impact regardless of the aid measure. The insignificance of debt service payments is slightly surprising in light of other recent empirical analysis of debt and growth. In particular, Chowdhury (2001) explores the impact of debt service payments on growth using the modified extreme bounds analysis of Levine and Renelt (1992). Chowdhury finds debt service payments to have a robust negative impact on

growth both in a sample only including HIPC countries and a sample only including non-HIPC countries.⁹

Regressions (5) and (6) give the central results of our analysis. In these regressions debt service payments and aid inflows are added jointly to the baseline regression.¹⁰ In both regressions debt service payments and aid are statistically significant, so we may address the question: what is the average impact on growth if both debt service payments and aid flows are reduced? In regression (5) the positive impact of official aid and the negative impact of debt service payments are of the same order of magnitude, and the sum of the coefficients is not significantly different from zero. Hence, if debt service payments are reduced while official aid is kept constant (one form of additionality) there will be a positive impact on growth, amounting to roughly 15 basis points for each one percentage point decrease in debt service payments to GDP. According to IMF and IDA (2002) the 26 countries that have reached their decision points under HIPC II the decline in average annual debt service to GDP during 2001-05 is expected to be 1.3 percentage points lower compared to 1998-99. Using regression (5) this will lead to an increase in annual growth of just below 0.2-percentage point. For comparison we may note that the effect corresponds to a 12-percentage point decrease in annual inflation or one-tenth of the drop in average growth rates from 1974-78 to the later periods. But note that if official aid is reduced one for one with the debt service payments, there will be no gain in terms of growth. Hence, according to the regression results, the small positive effect of debt relief disappears if there is no additionality—unless there is an indirect effect working through policies.

Comparing regressions (5) and (6) we find that effective aid has a much larger impact compared to official aid, as the coefficient on effective aid is more than three times larger than the coefficient on official aid. Yet, this corresponds well to the ratio of official aid to effective aid in the sample. The overall average ratio is 4, with a sharp

⁹ There are many possible explanations for the different results: country coverage, time periods and estimation methods. With respect to the last point we may note that when regression (2) is estimated using OLS with a standard co-variance estimator, the impact of debt service payments is significant.

¹⁰ In other studies we have advocated for decreasing returns to aid in the form of adding aid squared to the regressions (Dalgaard and Hansen, 2001; Hansen and Tarp, 2000, 2001). For the sake of completeness we may add that squared terms of aid and debt service payments are statistically insignificant in regressions (5) and (6).

increase in the final period—probably because of debt forgiveness; the median ratio is 3 throughout. The interesting difference is that official aid may be constant and even increase slightly while effective aid decrease. Recall, from Table 2, that official aid to the median HIC country doubled from 1982-85 to 1986-89 while at the same time effective aid was constant.¹¹ There was also an increase in official aid to the median HIPC country of more than 3.5 percentage points from 1986-89 to 1990-93 while effective aid was roughly constant.¹² If the HIPC Initiative goes together with a decrease in effective aid the HIPC countries may well experience a negative effect on growth even though there is additionality in the form of constant official aid.

When official and effective aid are included jointly in the growth regression the result is a significant impact of effective aid while the impact of official aid becomes insignificant.¹³ This implies that regression (6) i.e., using effective aid, seems to be preferred when the two aid flows are compared. Interestingly this points towards the importance of the level of grants, not the level of official aid flows, in the discussion of additionality.

At this point it must be stressed that the results are partial. In the regressions we condition on macroeconomic policies and institutional quality. If the removal of the debt overhang and the (increased) donor pressure leads to changing policies and institutions this will counteract the direct impact of changes in debt service payments and aid flows. The result may be an overall positive impact on growth following non-additional debt relief.

11 A more concrete observation is that effective aid to Argentina was halved (0.03 to 0.015 percent of real GDP) while official aid more than tripled (0.04 to 0.14 percent of current GDP) from 1982-85 to 1986-89.

12 Here the example could be Sierra Leone for which official aid almost doubled (9 to 17 percent of GDP) from 1986-89 to 1990-93 while effective aid remained constant (2.3 percent of real GDP).

13 A regression including both official and effective aid makes no sense in terms of economics; therefore we do not report the regression results in Table 3. But such a regression is the artificial model nesting regressions (5) and (6) in Table 3. See Atkinson (1970) for the original idea for this kind of nesting and Gourieroux and Monfort (1994) for a survey of testing non-nested hypotheses.

3.2 Investment regressions

Most of the recent studies on debt problems and aid effectiveness concentrate on the impact on growth. But in the early and mid 1990s the interest was centered on investment rates because the debt overhang theory was linked directly to investment. (See e.g., Greene and Villanueva, 1991; Savides, 1992; Warner, 1992; Cohen, 1993; Serven and Solimano, 1993 and Oshikoya, 1994). With the exception of Warner, all studies conclude that debt (either the debt stock or debt service payments, or both) had a negative impact on investment rates. In order to complete our analysis of debt service payments and aid we follow these authors and estimate investment regressions. We make no attempt in the direction of formulating a structural investment relation; instead we condition on the initial level of real GDP per capita and the policy controls used in the growth regressions. However, in contrast to the growth regressions, we apply an estimator that takes account of unobserved country specific effects. This is quite common in cross-country investment regressions.¹⁴ Using a fixed effects estimator implies that we may drop time constant regressors. Hence, the measure of institutional quality and the Sub-Saharan Africa dummy are left out from the investment regressions in Table 4.

¹⁴ We have chosen to apply the orthogonal deviation transformation proposed by Arellano and Bover (1995).

Table 4

Investment regressions

Dependent variable	Gross domestic investment (percent of GDP)					
Sample	50 countries, 5 periods (1974-77 to 1990-93)					
Regression	(1)	(2) ^a	(3) ^b	(4) ^c	(5) ^d	(6) ^e
Initial real GDP per capita (log)*100	0.108** (3.54)	0.112** (3.49)	0.171** (4.68)	0.182** (4.72)	0.175** (4.40)	0.202** (4.83)
Budget surplus (percent of GDP)	-0.179 (1.54)	-0.175 (1.49)	-0.215** (1.99)	-0.240** (2.13)	-0.233** (2.30)	-0.282** (2.75)
Inflation	-0.028** (2.37)	-0.027* (1.92)	-0.028* (1.69)	-0.026* (1.70)	-0.031** (2.62)	-0.030** (2.63)
Sachs-Warner openness	2.034 (1.49)	1.917 (1.45)	2.123* (1.69)	1.586 (1.24)	2.425* (1.91)	1.807 (1.32)
Debt service (TDS/GDP, percent)		0.161 (0.96)			-0.389* (1.94)	-0.583** (2.42)
Official aid (ODA/GDP, percent)			0.668** (3.05)		0.817** (2.99)	
Effective aid (real EDA/GDP, percent)				2.252** (2.64)		3.265** (3.49)
Observations	176	176	176	176	176	176
RMSE	4.13	4.16	4.21	4.30	4.24	4.44
Hansen J-test		0.99	0.10	0.21	0.44	0.21

All regressions are based on orthogonal deviations. (See Arellano and Bover, 1995). Time dummies are included in all regressions. Robust t statistics in parentheses. * Significant at 10%; ** significant at 5%. Regression (1) is an OLS regression; regressions (2)-(6) are 2SLS regressions.

Instruments common to regressions (2)-(6): Initial external debt, initial external debt squared.

^a Additional instruments: Lagged debt service and lagged debt service squared.

^b Additional instruments: Lagged official aid and lagged official aid squared.

^c Additional instruments: Lagged effective aid and lagged official aid squared.

^d Additional instruments: Instruments in regressions (2) and (3)

^e Additional instruments: Instruments in regressions (2) and (4)

Regression (1) in Table 4 is the baseline regression. The following regressions (2)-(4) append debt service payments and the two aid variables one by one. Finally, regressions (5) and (6) jointly include debt service payments and each of the aid variables.

Looking first at the control variables we find, not surprisingly, that the initial level of GDP per capita has a strong positive impact on investment in all regressions. The elasticity of the investment ratio with respect to initial GDP per capita evaluated at the

mean varies between 0.5 (regression (1)) and 0.9 (regression (6)). We record a negative effect of the budget surplus in all regressions, although it is not always statistically significant. The negative impact of improvements in the fiscal balance may seem surprising in light of the importance of reductions in budget deficits in many of the structural adjustment programs in the sample period. However, this result is nicely explained in Serven and Solimano (1993) and Easterly (1999); fiscal adjustment (frequently forced) is often implemented by cutting public investment. Unless this reduction in public investment is counteracted by an increase in private investment, gross domestic investment will decrease, and Serven and Solimano (among others) actually find complementarity between public and private investment leading to an even larger drop in gross domestic investment. Inflation has also a negative impact on investment, which is a more anticipated result. A 10-percentage point increase in inflation appears to lead to a drop in the investment ratio in the neighborhood of 0.3 percentage points. Finally, open trade policies have a positive impact, but in our regressions the effect is not well determined. This may be due to the binary nature of the Sachs-Warner openness variable in combination with the fixed effects estimator.

Turning to the variables of primary interest, we find no significant effect of debt service payments when this variable is added separately. In contrast both aid measures are statistically significant and the impact of effective aid is roughly 3 times higher than the impact of official aid. This corresponds to the results of the growth regressions. When debt service payments and the aid variables are included jointly we find significant effects of both flows with opposite signs. If official aid is kept constant while debt service payments increase by one percentage point there will be a decrease in the investment rate of just above 1/3 of a percentage point. Interpreting this experiment as a change in net outflows we find the result to correspond well with the finding in Cohen (1993) given the differences in data and analytical methods. Yet, in regression (5) it is possible to look at a counteracting change in official aid flows that keeps net flows unchanged, and we find that this experiment leads to a significant increase in the investment ratio by roughly 0.4 percentage points. Given the HIPC Initiative, the experiment should be reversed, i.e., lack of additionality in the form of equally reduced debt service payments and aid inflows seem to have a negative impact on investment. This result is somewhat stronger than the result for growth where equal changes in official aid and debt service payments exactly balance.

The results in regression (6) also support the corresponding growth regression, as the impact of effective aid is four times larger than the impact of official aid. Moreover, also for investments we find effective aid to be significant and official aid insignificant in a regression including both variables. Again, a probable conclusion is that debt relief accompanied by changes in the composition of aid flows leading to constant official aid and decreasing effective aid has a negative impact on both growth and investment—unless policy changes counteract the effect.

3.3 Co-movements in debt service payments and aid

Having looked at the possible effect of (non-) additionality the question remains if it is a valid experiment to decrease debt service payments and aid simultaneously.¹⁵ There is little doubt that the increasing debt in Sub-Saharan Africa (of which 34 countries are HIPC) was accompanied by increasing aid flows. Sachs et al. (1999), Kanbur (2000) and Birdsall, Claessens and Diwan (2002) all stress this point.¹⁶ But this does not necessarily imply that decreasing debt service payments go along with decreasing aid flows. Going beyond Sub-Saharan Africa by looking at the three country groups introduced in section 0 we may give a partial answer to the question by looking at the correlations between debt service payments and the two aid statistics. Another, perhaps more interesting, partial answer can be given by looking at reduced form relations for debt service and aid flows to the HIC countries.

Table 5 presents the correlations between contemporaneous debt service payments and aid flows. The relationship between debt service and aid is positive and quite strong when we focus on the HIC countries, and for this group of countries the correlations with the two aid measures are practically identical (0.39 vs. 0.38). The HIPC group has a lower correlation between debt service payments and official aid compared to the HIC group, whereas the correlation with effective aid is higher. The correlations between debt service payments and the aid variables are statistically significant for both of the

15 The examples of deviations between official aid and effective aid in Table 2 are illuminating but they do not “prove” a systematic tendency, which is what we need in assessing the historical validity of the experiment.

16 UNCTAD (2000) extend the country coverage slightly as they find a close correlation between gross official disbursements and debt service in the 48 least developed countries in 1997 and 1998. Eighteen of the LDCs are outside Africa.

two aforementioned groups. This is not the case when we focus on the non-HI(P)C countries. The correlations are negative for these countries, but highly insignificant.

Table 5

Correlations between debt service payments and aid

	Debt service and official aid			Debt service and effective aid		
	HIC	HIPC	Non-HI(P)C	HIC	HIPC	Non-HI(P)C
Raw data	0.39	0.30	-0.11	0.38	0.44	-0.11
Conditional on time dummies	0.43	0.21	-0.08	0.41	0.37	-0.13

One problem with the simple correlations is that the average increases over time in debt service payments and aid inflows in particular in the HIPC countries may result in spurious correlations. Therefore we also report conditional correlations between debt service payments and aid in which time effects are partialled out by regression on time dummies. There is no significant impact on the HIC and non-HI(P)C group correlations while the HIPC correlations decrease as expected. However the latter correlations are still high and significant in particular between debt service payments and effective aid.

Overall, the correlations show that debt service payments and aid flows did not vary independently in the HIC and HIPC countries, but on the other hand there is no evidence of tight co-movements. Needless to say, there are many factors causing debt services and aid flows, hence, the conclusion from the correlations is just that there is a historical record of simultaneous changes in debt service and aid.

In order to dig a bit deeper into the question of co-movements between debt service and aid flows we look at reduced form regressions for aid and debt service flows focusing on the HIC country group. The HIC countries are interesting because all 15 countries have experienced both increasing and decreasing debt service payments as percentage of GDP in the sample period.

Table 6 reports results for three pairs of regressions, each pair being a system of debt service payments and a measure of aid. The three systems only include lagged regressors in order to avoid endogeneity issues. This means that the regressions should not be interpreted as structural in any way, but more as simple forecast models. The systems

share a very limited set of control variables, as only time dummies, the lagged growth rate, and the initial value of real GDP per capita are included in the regressions.¹⁷

Table 6

Reduced form regressions for aid and debt service in the HIC countries

Dependent variable	Official aid	Debt service	Effective aid	Debt service	Average grant element	Debt service
Regression	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Lagged real per capita GDP growth	-0.134** (2.00)	-0.087 (0.93)	-0.044** (2.31)	-0.087 (0.93)	-1.180* (1.88)	-0.018 (0.17)
Initial real GDP per capita (log)	-0.497 (1.64)	- (1.96)	0.569** (1.44)	-0.139 (1.79)	-0.550* (1.85)	-5.850* (2.17)
Lagged debt service	0.045 (1.42)	0.746** (11.5)	0.031** (2.96)	0.738** (12.65)	1.044** (2.04)	0.745** (7.29)
Lagged official aid	0.962** (5.86)	0.123 (0.83)				
Lagged effective aid			0.898** (7.58)	0.466 (0.88)		
Lagged avg. grant element					0.692** (7.48)	0.003 (0.15)
Observations	75	75	75	75	60	60
R ²	0.84	0.69	0.83	0.69	0.68	0.63
Residual correlation		0.01		-0.09		-0.16

Time dummies are included in all regressions. Robust t-statistics in parentheses.

* Significant at 10%, ** significant at 5%.

Looking first at the system of official aid and debt service payments in regressions (1a)-(1b) it appears that the model for official aid is really about the changes in aid flows. The coefficient to lagged aid is 0.96 and not significantly different from one. The only other significant variable in the regression for official aid is the lagged growth rate, which has a negative impact on the changes in aid. In other words, countries with a history of relatively high growth rates have decreasing levels of official aid to GDP. Conditional on lagged aid and growth there is no significant link from lagged debt service payments to official aid.¹⁸ Moreover, the residual correlation given in the last row of Table 6

17 This means that we are actually looking at a trivariate auto regression in (log) real per capita GDP, aid and debt service. However, the GDP regressions are not of interest in the present context, which is why they are not reported.

18 The insignificance of lagged debt service payments is driven by one observation; Jamaica 1990-93. If this observation is excluded (or all observations for Jamaica) there is a significant positive impact from debt

reveals that, conditional on the past, there is no contemporaneous relationship between debt service and official aid flows. The regression for debt service (1b) has also only two significant regressors. But here it is the lagged debt service and the initial level of real per capita GDP. This means that there was no (robust) direct link between debt service payments and official aid flows in the HIC countries in the 1980s and early 1990s. However, in Table 3 it is established that official aid and debt service payments both had an impact on growth, which means that there was an indirect link.

The picture is different for effective aid and debt service payments reported in regressions (2a)-(2b). The two debt service regressions (1b) and (2b) are practically identical, in particular neither official aid nor effective aid have any impact on the debt service flows, once lagged debt service and initial income is conditioned upon. But, there is a link from debt service payments to effective aid. As the coefficient is positive we find that periods with relatively high debt service payments are followed by periods with relatively high effective aid inflows—and vice versa—which is the important observation in the present context: decreasing debt service is followed by decreasing effective aid. The impact of debt service seems quite low, but this is because effective aid as a percentage of GDP is low in the HIC countries (see Table 2). In fact, the elasticity of effective aid with respect to lagged debt service is exactly one when evaluated at the HIC-group median. Thus, a one percent decrease in debt service payments is followed by a one percent decrease in effective aid flows.¹⁹ Since the model is dynamic, with a high coefficient to lagged aid, there seems to be a high cumulative effect of changes in debt service payments.

We end the analysis of the HIC countries by looking slightly different at the aid flows. Specifically, in the third system in Table 6 we use the average grant element as dependent variable. As noted in Table 2 the grant element for the median HIC country showed a mildly cyclical behavior somewhat similar to the debt service payments, and the results in regressions (3a)-(3b) demonstrate that there is a statistically significant link

service payments. However, it is difficult to explain why Jamaica should be excluded from the analysis except for the fact that Jamaica is the HIC country with the highest debt service payments-to-GDP in all periods.

19 When Jamaica 1990-93 is excluded from the system with official aid, the elasticity of official aid with respect to debt service payments 0.76. So, whether or not we record a significant link from debt service to official aid the impact on effective aid is larger than on official aid.

between the average grant element and debt service payments. The average grant element of EDA loans is decreasing in the lagged growth rate and the initial real GDP per capita, although both effects are only weakly significant. Furthermore, the link between debt service payments and effective aid is confirmed, as there is a significant positive link from lagged debt service to the average grant element. So, when the debt service payments fell the average grant elements followed, and it appears to be of the order of one percentage point drop in debt service to GDP leading to a one percentage point drop in the average grant element. Again, we find causation from debt service to aid but not the other way round.

Needless to say the analysis of co-movements must be interpreted with caution in relation to the HIPC Initiative. We look at 15 HIC countries over a very interesting but fairly short period of time, and these countries were never promised anything in terms of additional inflows. However, the results about the divergence of official and effective aid are interesting. By varying the interest rate, the maturity or the grace period on a loan, it is easy to change the grant element in a way that will not be recorded in the ODA statistics. And it appears that the HIC countries did experience such changes in the composition of aid flows.

4. DISCUSSION

In this study we have focused on the additionality issue of the HIPC Initiative. The question of whether or not the debt relief resources are supplementing conventional aid flows is important for at least four reasons. First of all, it is impossible to measure if aid flows are in fact additional. Second, it is highly unlikely that the sum of all debt relief resources can ever be additional. Some bilateral donors have fixed aid budgets given as percentages of their gross national income, and for these donors (say, Denmark, The Netherlands, Norway, Sweden) debt relief have not been, and will not be, additional. For other countries (say, the US and Japan) it is questionable if it is the HIPC Initiative or foreign policy and that (may) generate increases in the foreign aid budgets. For the international financial institutions it has been argued that the World Bank (IDA) is unable to make the debt relief resources additional, while it should be possible for the IMF, at least to some extent. Third, the desirability of additionality on a country-by-country basis has been questioned. Authors like Kanbur (2000), Birdsall et al. (2002) and Birdsall and Williamson (2002) all call for non-additionality in order to strengthen

policy conditionality and country selectivity in future aid allocations. According to their view a major argument in favor of the HIPC Initiative is that donors can give up the defensive lending to highly indebted countries and reallocate aid to countries with good policies and institutions. Finally, it may be questioned if additionality is really necessary for a successful outcome of the HIPC Initiative. If the negative incentive effects of the debt overhang and the uncertainty in debt service payments are substantial, then HIPC debt relief may actually generate increasing growth and development even though the net transfers are kept constant.

The main result of our study is that additionality is actually important. If debt service payments and official development assistance are reduced one-for-one there is no impact on growth, while there may be a drop in investment rates. Moreover, even if the level of official assistance is kept constant there may be a negative impact on growth if the lending terms get harder, i.e., if the grant element of the loans decrease. This form of non-additionality is interesting because it is difficult to detect from (aggregated) official statistics and because it appears that changes in the grant element was actually related to changes in debt service payments in the Baker group of heavily indebted countries in the late 1980s and early 1990s.

When the changes in effective development assistance in the HIC group and the World Bank emphasis on policy conditionality and country selectivity in aid allocations—which seems to have broad support among US scholars and politicians—is coupled with our regression results, it emerges that not all HIPC countries are sure to benefit from the HIPC Initiative in terms of higher economic growth.

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Appendix A Data sources

Real per capita GDP growth (percent)	World Bank, WDI
Gross domestic investment (% of GDP)	World Bank, WDI
Initial real GDP per capita (1985-PPP\$)	Penn World Table, Mark 5
Institutional quality	Knack and Keefer (1995)
Budget surplus (% of GDP)	IMF, IFS and World Bank, WDI
Inflation (percent)	IMF, IFS (log differences of CPI)
Sachs-Warner openness	Sachs and Warner (1995)
External debt (% of GDP)	World Bank, WDI
NPV of debt (% of GDP)	Easterly (2001)
Debt service (TDS/GDP, percent)	World Bank, WDI
Official aid (ODA/GDP, percent)	OECD, DAC
Effective aid (EDA/GDP, percent)	Burnside and Dollar (2000)
Average grant element	Chang, Fernandez-Arias and Serven (1998)

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