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Aid Effectiveness, Debt Relief and Public Finance Response: Evidence from a panel of HIPC Countries

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ABSTRACT

Through the Heavily Indebted Poor Countries (HIPC) Initiative, substantial amounts of debt relief have been granted to a set of low-income countries as an alternative instrument of aid delivery. The theoretical (and moral) arguments in favour of debt relief are well established. However, the question whether debt relief is a more effective instrument of development assistance in practice is an empirical question. Hence, in this paper we investigate, for a panel of 28 decision point HIPC countries, the intertemporal linkages between debt relief and other fiscal variables such as current expenditure, government investment, taxation and domestic borrowing, in comparison to the effects of more traditional forms of development assistance, namely (non-debt relief) grants and concessional loans. To do so, we estimate a panel VAR and look at impulse response functions. Overall, we find that HIPC (only) debt relief impact on fiscal variables to follow fairly complex dynamics. For example, debt relief initially reduces government investment, but the effect becomes positive after two years, well outperforming other modes of aid delivery.

Keywords: HIPC, debt relief, fiscal response, aid effectiveness

JEL codes: F34, F35, O11, O19

1. INTRODUCTION

The international community has recently embarked on an ambitious quest to trigger a substantial acceleration of economic growth and development, in order to try crushing poverty, especially in lower-income countries. Ambitions are centered on an international consensus on a concrete, albeit broad set of development goals, the Millennium Development Goals (MDGs). For low-income countries, documents such as the Poverty Reduction Strategy Papers (PRSPs) should translate these broad targets into country-owned development strategies; from the donor side, it has provoked a substantial redrawing of the overall aid architecture, at such a scale that some authors refer to it as a true paradigm shift (Renard, 2006). Apart from the scaling up of aid, improving the effectiveness of aid is a crucial element of concern in this new paradigm: results could be improved, not only by scaling up efforts, but also by rechanneling scarce aid resources towards where they would be most productive in generating growth and reducing poverty. Moreover, it may be the case that aid effectiveness is not independent of the choice of aid modalities or instruments, leading to the importance of a disaggregated analysis of aid flows.

Traditionally, economists have tried to answer the aid effectiveness question using standard cross-sectional macro-economic growth models, through the inclusion of aid flows as an explanatory variable. Perhaps not surprisingly, the results were inconclusive, reflecting the heterogeneous way in which aid is both given and used by different governments. More recently, especially since the World Bank Policy Research Report on Assessing Aid (1998), a new consensus, albeit with continuing dissent voices, seems to emerge: If aid is given to countries characterized by good governance, there is a positive impact on economic growth (Van de Walle and Johnston (1996), Burnside and Dollar (2000)). This seems to confirm that, as in Franco-Rodriguez et al. (1998) “the core deficiency of this “aid-growth” literature is that it fails to recognize explicitly that aid is given primarily to the government, and that hence any impact of aid on the economy will depend on government behaviour, in particular how fiscal decisions on taxation and expenditure are affected by aid revenues” (p.1242). Again, the issue is raised that different aid instruments and modalities might provoke very different fiscal reactions of the recipient public sector (Mavrotas, 2002, 2005).

During the last decade, debt relief has slowly made its way as an important element of the international ‘Financing for Development’ agenda, through initiatives such as the Heavily Indebted Poor Countries (HIPC) Initiative, and more recently, at last year’s G8 summit in Gleneagles, where the G8 proposed to go beyond HIPC in granting additional multilateral debt relief to a specific set of countries, which is now known as the Multilateral Debt Reduction Initiative (MDRI). It is important to note that these debt relief initiatives nicely fit into the new aid architecture and the aid effectiveness debate: since debt relief to low-income countries is almost exclusively for debt owed to official creditors, these creditors are the same as those that provide (traditional forms of) aid to those countries. As such, debt relief is just one of the instruments of donor intervention (Berlage et al., 2003). So the crucial question is to what extent, and under which circumstances, debt relief is a more promising instrument than the more ‘traditional’ modes of aid delivery (project aid, program aid, either in the form of concessional loans or grants, technical assistance, etc.). Again here, differences in modalities may lead to differences in effectiveness, and differences in fiscal response behaviour of the recipient public sector. The idea that debt relief might be a more optimal form of aid delivery is in fact implicit in MDRI as this additional debt relief is very similar to budget support-type of aid, and will be granted to the beneficiary countries, i.e. post-HIPCs (only), partly as some substitute for it (Cassimon & Renard, 2006).

As noted by Chauvin and Kraay (2005), the arguments in favour of debt relief have ranged from the moral to the mundane. To concentrate on the latter, economic arguments are at least threefold. First of all, there is the direct effect that debt relief will free up public resources that would otherwise have been earmarked for debt service, i.e. the “fiscal space” (Heller, 2005) argument of debt relief. But even if this is not the case, and debt relief is merely “virtual”, i.e. an ‘accounting clean up’ of historic (and future) arrears accumulation, debt relief might still be an optimal reaction of donors for at least two good reasons¹. One is the so-called debt overhang argument, affecting both public and private sector behaviour. For the private sector, an excessive debt stock might deter investment for fear of future taxation; for the public sector, Krugman (1988) shows that high debt service obligations reduce the incentive of debtors to engage in policy reforms that raise revenues available for debt service, since part of the additional revenues accrue to the creditor. As a result, on top of the actual debt relief savings, debt relief, by removing debt overhang, may help in relieving some key bottlenecks for growth acceleration in low-income countries. Finally, to the extent that donors may succeed in receiving truly “additional” development budget resources, by using the aid instrument of debt relief, debt relief may transform itself into the *optimal* instrument of donor policy to the extent that the intervention benefits the recipient country. Again, to correctly measure the impact of debt relief, one should make a detailed analysis of the fiscal response behaviour of a recipient government on donor interventions of the debt relief type. Whatever the theoretical arguments, the actual impact of debt relief essentially remains an empirical question.

Disaggregated analysis of the fiscal response of aid has so far tended to disregard the potential effect of debt relief as a separate aid category², which is rather surprising, as debt relief is becoming a substantial part of aid efforts and because of the reasons explained in the previous paragraph. This paper aims at contributing to the existing aid effectiveness literature by looking at the fiscal effects of debt relief, relative to other types of interventions, for a panel of 28 Heavily Indebted Poor Countries (HIPC), that have reached at least decision point in the HIPC, and are currently receiving (at least interim) debt relief within the HIPC Initiative. We focus on debt relief granted through the HIPC Initiative (only). In doing so, the paper uses recent insights and methodologies from different parts of the aid effectiveness literature in general, and the recent fiscal response literature in particular.

This paper is organized as follows. The next section provides a brief review of the recent literature related to the aid effectiveness, debt relief as well as fiscal response literature. Section three describes our empirical strategy for the estimating the panel vector autoregressive model and deals with data issues. The fourth section presents the estimation results and the last section concludes, while also discussing some preliminary policy consequences.

2. AID EFFECTIVENESS, DEBT RELIEF AND THEIR FISCAL RESPONSES: A REVIEW OF RECENT LITERATURE AND PRACTICES

2.1. Aid effectiveness and fiscal response

The importance of recipient government conduct for the effectiveness of aid is implicit in the so-called fiscal response literature. These studies focus on the interactions among several categories of public expenditure and domestic and foreign revenue. More specifically, they try to look at the recipient government’s response to aid flows, in terms of the decisions between various sources of

¹ For a detailed discussion of this, see e.g. Cassimon & Vaessen (2006).

² One exception being McGillivray and Ouattara (2005).

revenue like taxation and domestic borrowing and areas of expenditure like public investment and recurrent government expenditure (Otim, 1996).

Fiscal response models view governments as organisms that attempt to optimize the value of some ultimate target such as the rate of economic growth. In reality, governments do this by steering certain intermediate policy variables to their desired levels. These policy variables differ from one study to the other, depending on the interest of the researcher, but usually include variables like public investment expenditure, government recurrent expenditure, tax revenue, public borrowing from domestic sources and aid (which can be disaggregated depending on the interest of the study). The government utility function is specified as a quadratic loss function, where the government attains maximum utility if the targets for the decision variables are met. This utility function is then optimised subject to the budget constraint that expenditures cannot exceed revenues. From this, a system of structural equations is derived. The parameters of this system are usually estimated using non-linear three stage least squares (NL3SLS).

Since these models are about the conduct of different governments, empirical applications are mostly case studies. Furthermore, depending on the aim of the study, the models are often modified in ways that make comparisons difficult. For example, aid can be disaggregated into its different sources (multilateral, bilateral, private,...) or by type (grants, loans,...). Overall, evidence suggests that loans tend to finance public investment, while official grants have a higher probability of leakage into government consumption (Heller (1975), Otim (1996)).

When distinguishing between different sources, multilateral aid seems to be preferable to bilateral assistance (Cashel-Cordo and Craig (1990), Otim (1996)). Another stylised fact is that aid often reduces domestic borrowing (Heller (1975), Morrissey et al. (2002)). A less robust finding is the effect of aid on taxation. While Heller (1975), Franco-Rodriguez et al. (1998), Ahmed (1998) and McGillivray and Ouattara (2005) find a reduction in the government tax efforts, Khan and Hoshino (1992), Otim (1996) and Morrissey et al. (2002) find that taxation increased in response to aid. The taxation effect is not independent of the aid modality: aid in the form of grants has a danger of negatively affecting domestic tax mobilisation, while aid in the form of loans has a positive effect on domestic revenue mobilisation (Gupta, et al, 2004).

Mavrotas and Ouattara (2005) also present a model that disaggregates aid into project aid, programme aid, technical assistance and food aid. They find that the government responds differently according to the nature of aid inflows. Technical assistance and food aid are mainly directed towards financing consumption whilst project aid and programme aid are used for investment purpose. Food aid and technical assistance does not reduce tax effort, and project aid and programme aid reduce borrowing. For Costa Rica, the effect of aid on government allocation of resources appears to have been negligible (Franco-Rodriguez (2000)). Finally, McGillivray's (2002) study on the fiscal response of the Philippine's government paints a dim picture: both bilateral and multilateral aid flows reduce public fixed capital expenditure and decreases taxation.

Fiscal response models have been criticised on a number of grounds. White (1992) argues that the theoretical models used in these studies is a partial one since it does not allow for the impact of aid on income or poverty. For instance, even if we know what the effect of aid is on tax collection, the question of how taxes affect income and growth still stands. The need to presume the existence of, and estimate, targets for government expenditure and revenue is also seen as a weak point. According to Morrissey et al. (2002), the estimates for the structural equations are very sensitive to the way in which the targets

are approximated. They circumvent this problem by estimating fiscal response models in a vector autoregression (VAR) framework. Their method also has the advantage of enabling the investigation of the dynamics of the relationship, accommodating another criticism that there is no attempt to analyse dynamic aspects of aid within fiscal response models (White, 2002).

2.2. Fiscal response effects of debt relief

Disaggregated analysis of the fiscal response of aid so far has tended to disregard the potential effect of debt relief as a separate aid category. One notable exception is McGillivray and Ouattara (2005) who, in a case study of Côte d'Ivoire, look at the impact of debt service. They find that for Côte d'Ivoire, using a model that isolates debt service from total government expenditure, the bulk of aid is allocated to debt servicing.

The absence of debt relief in disaggregated fiscal response studies is rather surprising, as recently, those granting or financing debt relief are the same as those giving new money in the form of either grants or concessional loans, i.e. debt relief by official creditors is simply one of the instruments of providing aid.

In principle, debt relief, be it in the form of debt service or debt stock reduction, frees resources in the recipient country government budget that can be rechanneled into other spending (or used to reduce the fiscal deficit). As such, from a resource viewpoint, operations on debt relief are very much equivalent in nature to a new (aid) money inflow, when the new aid is delivered in grant form through some budget support modality. So, debt relief should in principle provoke fiscal responses.

However, these fiscal response effects may not be so considerable in practice. As shown in the debt relief literature (see e.g. Cassimon & Vaessen (2006)), the general principle that debt relief mobilizes resources for other uses, is only valid to the extent that, in the absence of debt relief, debt would have been (fully) serviced. If this is not the case, the resource effect of debt reduction is virtual and refers mainly to an accounting clean-up of historical and future arrears accumulation. Real direct resource savings equal the share of debt service actually transferred in the absence of debt relief³. So this might severely limit fiscal response effects as say, increased recurrent spending or public investment.

However, fiscal response may be provoked in a more indirect way: An excessive debt burden can provoke a series of actions by the government, creating a vicious circle that can be stopped only by reducing debt to a sustainable level (in a broad sense). Excessive debt service might not only severely crowd-out spending on development priorities, it might also provoke sub-optimal fiscal and other government behavior (e.g. excessive domestic borrowing, excessive inflationary financing, excessive taxation of some sectors in the economy) and lessen incentives for economic reform. As a consequence, both private domestic as well as foreign investors might be discouraged to productively invest in the recipient economy. The overall result will be, among other things, a depressed economic growth rate. This is generally referred to as the *debt overhang hypothesis*⁴.

³ This is sometimes referred to as the *economic value* of debt relief, i.e. the present value of all future debt service payments that would effectively have been paid by the debtor in the absence of debt relief, with present value ideally measured at an appropriate (recipient country) discount rate and allowing for (partial or full) default.

⁴ A lot of authors question the negative strict causality between external debt and growth for low-income countries. Rather, an excessive external debt is one of the symptoms of the systemic development problem of these countries. As such, a lasting solution calls for systemic changes, including tackling institutional, political and other weaknesses, of which debt reduction will also be a necessary ingredient.

In such a context, debt relief can constitute an important element of a package triggering a return to a virtuous circle. As such, on top of real debt savings, debt reduction might ultimately increase resources available to the government due to higher net aggregate flows, originating not only from private sources, but mainly from public sources. This works in two ways. First, a large debt burden might bring about a breakdown in selectivity of donor interventions as new interventions are funded in order to allow the country to stay current on debt service payments, rather than for development purposes. This has been denoted as 'defensive lending' (Birdsall, Claessens and Diwan, 2003). Debt relief can restore selectivity as the need for 'defensive lending' abates. Second, following the new aid effectiveness literature (see e.g. Burnside and Dollar, 2000; World Bank, 1988) once the debt problem is solved, it is optimal to increase interventions in that country since the productivity of one more dollar of aid is higher there.

So far, empirical analysis has not focused on the factual fiscal response effects. Rather, the existing literature focuses on the effect of debt relief on outcome variables associated with aid effectiveness, like income (per capita) growth, poverty or private as well as public investment. One recent example is Chauvin and Kraay (2005). In their study, they try to assess the effects of debt relief on different outcome variables, like government investment, private investment, and economic growth or the quality of policies. Using an original panel dataset measuring the present value of debt relief of 62 low income countries, they find no convincing evidence of debt relief affecting any outcome variables. Although the fact that the authors appropriately model heterogeneity using panel data econometrics is clearly an improvement over the cross-section approach, we feel that it is too ambitious to directly connect debt relief to outcome variables, as we think this relationship is cluttered with time lags and innumerable other causal factors.

As such, our approach is much less ambitious in that we restrict ourselves to analyzing the effect of debt relief on the fiscal sphere. In doing so, we are much closer to the literature that studies the fiscal response of governments. However, as will be explained later, we will opt for a vector auto-regressive (VAR) approach, instead of usual non-linear three stage least squares (NL3SLS). Furthermore, we also deviate from the fiscal response literature that is generally characterised by a case study approach in that we will look at a panel of counties.

2.3. A particular application to HIPC debt relief

Furthermore, we restrict our analysis to debt relief embedded into the HIPC Debt Reduction Initiative. In 1996, on top of debt relief practices by bilateral creditors joined in the Paris Club, the HIPC-Initiative pledges additional relief for a specific sample of low-income countries (only), the heavily-indebted poor countries, in a once-and-for all effort that should bring them back to the level of sustainability, by reducing their debt to a common threshold debt level. Fair burden sharing between creditor (classes) is acknowledged as *all* creditors have to reduce their claims in an equiproportional way. It was enhanced in 1999, with threshold debt levels being lowered (in external terms, down to present value (PV) of debt to exports ratio of 150%; in fiscal terms down to a PV of debt to fiscal revenues ratio of 250%). At that moment, broad conditionality in the form of the PRSP requirement was formally introduced.

Currently, 7 years down the road, 18 countries have fully completed the HIPC process, having reached the so-called 'completion point', and having received irrevocable debt stock relief down to the threshold

level⁵. Furthermore, 10 countries are halfway, having reached a decision point agreement in which the amount of HIPC debt relief is determined (in principle) as well as additional conditionalities to be complied with by recipient countries in order to reach completion point. In the meantime, these countries receive so-called interim debt relief. 10 more countries still have to fulfill some entry requirements⁶. Overall, currently committed debt relief amounts to about 33 billion USD in present value terms.

A detailed study and assessment of the HIPC Initiative is beyond the scope and purpose of this paper⁷. Here we restrict ourselves to some general conclusions that will be important for our analysis. First of all, the HIPC initiative has shown to be more than an ‘accounting clean-up’ operation leading only to virtual debt relief. Partly due to the fact that also multilateral creditors (IMF, World Bank, regional development banks) reduced their claims, roughly half of total debt relief can be said to reflect truly real savings, available for additional priority spending. Furthermore, although debt relief is officially claimed to be additional, clear signs of this additionality are only to be witnessed at recipient country level, especially for post-completion point countries where net flows have indeed gone up more than with the amount of debt reduced (IMF and IDA, 2004). This would indicate that fiscal response effects should be present, although not necessarily very substantial.

Although debt relief practices have not been limited to the HIPC Initiative, we prefer to limit our analysis to HIPC debt relief. One reason is that most of the pre-HIPC debt relief can truly be labeled virtual, in the sense that it did most likely not lead to more resources being available in the budget in a cash flow sense, and, as such, fiscal response effects will be extremely limited. Moreover, getting more comprehensive annualized budget estimations of full debt relief, other than HIPC, will be very difficult, as we will explain in greater detail in section 3.2.

3. MODEL ESTIMATION, EMPIRICAL STRATEGY AND DATA ISSUES

In this study, we will not confine ourselves to time series data of one country, as is usual in the fiscal response literature. Instead, we will derive our coefficient estimates from a panel of 28 HIPC countries. There are several reasons why we choose to do so.

First of all, note that the specific interest of this study lies in studying the fiscal effects of debt relief, relative to other effects. Restricting ourselves to only one country would probably leave us with too little variation to adequately identify the effects of debt relief on other variables. A second reason is that time series data for developing countries is difficult to come by, and the quality may be questionable. Again, to come to meaningful estimates, a sufficient number of time series observations is necessary. Third, the aim of this paper is to look at the effect of a policy, not the effect of a policy in a specific country. If we want to estimate the likely effects that debt relief has on the public finance of recipient countries in general, it makes more sense to look at the average effect of different countries than to try and extract information about these effects only from a certain country’s own history.

⁵ Benin, Bolivia, Burkina Faso, Ethiopia, Ghana, Guyana, Honduras, Madagascar, Mali, Mauritania, Mozambique, Nicaragua, Niger, Rwanda, Senegal, Tanzania, Uganda and Zambia.

⁶ Furthermore, the extension of the so-called sunset clause up to the end of 2006 potentially enables more countries (such as Haiti, Kyrgyz Republic and Nepal) to qualify as a HIPC country.

⁷ See e.g. Claessens et al (1997) and Cohen (1996) for details of the rationale for HIPC, and e.g. OED (2004), Chauvin and Kraay (2005) for examples of preliminary detailed assessment studies.

3.1. A panel data VAR for fiscal response modelling

Traditionally, fiscal response models are estimated in their structural form using non-linear three stage least squares. However, it is well known that this method is extremely sensitive to the starting values. In this study, we follow Osei et al. (2005) and estimate the fiscal response model in a Vector Autoregressive (VAR) modelling framework. The rationale for this choice of econometric model is that fiscal aggregates are highly interlinked, and therefore likely to be endogenous (Fagernäs and Roberts (2004)). In addition, the VAR framework enables us to graph impulse-response functions, which provide a convenient way to evaluate the effect of a shock in one variable of interest on another variable of interest. Like in Osei et al (2005), our VAR comprises the variables that one usually finds in fiscal response models (tax and non-tax government revenue, government current primary expenditures, government investment, local borrowing, external borrowing and external grants). We also add debt relief as an additional aid aggregate.

The first model we will estimate is a pooled VAR with two lags. This model does not control for unobserved country heterogeneity, but might provide a useful baseline case. To see why, suppose that the true model is:

$$(1) \quad x_{it} = \beta x_{it-1} + \eta_i + \varepsilon_{it}$$

where x is the variable of interest, i denotes country and t denotes the time period. Furthermore, η_i is a country specific, unobservable effect, β is our coefficient of interest which we want to estimate and ε_{it} is an error term⁸. If (1) is the true model, but we estimate the pooled VAR:

$$(2) \quad x_{it} = \beta x_{it-1} + v_{it}$$

the time invariant individual effects will be absorbed in the error term, and the explanatory variable will be positively correlated with this error term. Standard results for omitted variable bias indicate that, at least in large samples, the OLS levels estimator for β is biased upwards (Bond (2002)).

Hence, in a second model, we will allow for unobserved country specific means in the dependent variable by estimating a fixed effects model. This could be done using the dummy variables estimator where we include country specific intercepts, or the within groups estimator, that transforms the variables in (1) to eliminate the time invariant unobservable effects. However, this estimator is only useful when the number of time observations becomes sufficiently large. To see this, consider the following fixed effects (within groups) estimator, which can be estimated by OLS:

$$(3) \quad (x_{it} - \bar{x}_i) = \beta(x_{it-1} - \bar{x}_i) + (\varepsilon_{it} - \bar{\varepsilon}_i)$$

The problem is that, in short panels, the within transformation introduces non-negligible correlation between the transformed lagged dependent variable and the transformed error term. Since the transformed lagged dependent variable is $x_{it-1} - \frac{1}{T-1}(x_{i1} + \dots + x_{iT-1})$, while the transformed error

⁸ Note that the example is for a simple AR(1) model. However, since the explanatory variables will be the same for each equation in our VAR, estimation can proceed on an equation by equation basis using OLS (Verbeek 2000). Furthermore, extensions to higher order autoregressive models and models with additional explanatory variables are straightforward as explained in Bond (2002).

term is $\varepsilon_{it} - \frac{1}{T-1}(\varepsilon_{i2} + \dots + \varepsilon_{iT})$, the component $\frac{-x_{it}}{T-1}$ is correlated with ε_{it} , while $\frac{-\varepsilon_{it-1}}{T-1}$ is correlated with x_{it-1} . Nickell (1981) has shown that this correlation is negative.

The usual way to consistently estimate the β in short panels with large N is to use a transformation that does not introduce all realisations of the disturbance in the error term, like for instance first differencing:

$$(4) \quad (x_{it} - x_{it-1}) = \beta(x_{it-1} - x_{it-2}) + (\varepsilon_{it} - \varepsilon_{it-1})$$

However, here the dependence of $(\varepsilon_{it} - \varepsilon_{it-1})$ on ε_{it-1} and of $(x_{it-1} - x_{it-2})$ on x_{it-1} implies correlation between the error term and the regressor. Hence, ordinary least squares estimates of β in the first differenced form will be inconsistent. However, if we are able to find instruments that are both correlated to $(x_{it-1} - x_{it-2})$ and orthogonal to $(\varepsilon_{it} - \varepsilon_{it-1})$, consistent estimates of the parameter vector can be obtained using two stage least squares. One such candidate would be x_{it-2} . So, provided there are at least three time series observations available, two stage least squares can be used to obtain a consistent estimate of β .

When the panel has more than three time series observations, additional instruments become available for $t > 3$. For instance, for period $t=4$, we can now use both x_{it} and x_{it-2} as instruments. However, since the model is overidentified with $T > 3$, two stage least squares is not asymptotically efficient. In this setting, the use of Generalised Method of Moments (GMM) has been proposed (Holtz-Eakin et al. (1988), Arellano and Bond (1991)). These types of estimators have become known as difference GMM and are quite common in micro-econometric analysis. This method has been extended to include also the equations in levels. In that case, lagged variables in differences can be used as additional instruments. This has become known as system GMM, which is the version we will use in this study. For a non-technical account, see Bond (2002).

Since our panel is roughly square, it is not clear which estimation method is most appropriate for us. The fixed effects version potentially suffers from the correlation between the transformed lagged dependent variable and the transformed error term mentioned above. However, the fact that our panel is roughly square also means that we are constrained in the number of instruments we can use. Since the system GMM method creates one instrument for each time period, variable and lag distance, only using $t-2$ as instruments would result in about 140 instruments, well above the suggested rule of thumb to keep the number of instruments smaller than the number of groups. In cases where the number of instruments is large relative to the number of observations, system GMM results are biased toward those of OLS. Given this, we feel that the efficiency gains from system GMM will be rather small, hence our preferred model will be the fixed effects model on which we base the impulse response functions. However, we also report estimation results using system GMM using a slightly modified instruments matrix to reduce the number of instruments.

Moreover, as in Osei et al. (2005), we will also investigate the fiscal response of the various variables using impulse response functions. Impulse response functions can be used to graphically show the response of one variable of interest (for instance government investment) to a shock in another variable of interest (for example debt relief). More specifically, we will use orthogonalized impulse response functions, which allows us to answer questions like "how does an innovation to external loans, holding everything else constant, affects government investment after 3 periods?". To calculate the impulse

response functions, we used the most popular approach proposed by Sims (1980), which involves a Cholesky decomposition to orthogonalize the shocks.

3.2. Data issues

The model is estimated for a sample of 28 HIPC countries that have reached at least decision point status in the HIPC Initiative, and are receiving HIPC relief, either as interim relief, or, at completion point, irrevocable HIPC debt relief.

For this sample, a database of fiscal variables is constructed by the authors, using data for these countries taken essentially from the budgetary data presented in IMF country reports, such as article IV reports, PRGF reviews, as well as HIPC decision and/or completion point documents. To the extent possible data are gathered spanning the period 1991-2004.

The VAR model we estimate consists of seven variables. Most of the variables are standard in the fiscal response literature, only the disaggregation may vary. The first variable in the system is government revenue. This variable is both tax and non-tax revenue. It also includes, when relevant, oil revenues, profits from state owned enterprises, etc. Next, we decided to disaggregate government expenditure into current expenditure and government investment. Government current expenditure is net of interest payments. Government investment includes net lending. The fourth variable in our system is net domestic borrowing. We also decided to disaggregate external financing into external borrowing and external grants. Obviously, both loans and grants are net of any HIPC component. All HIPC, both loan and grant components, are in the last variable called debt relief. We decided to estimate a VAR with two lags, as more lags would leave us with too few degrees of freedom, and experimentation showed further lags were generally insignificant.

It is important to discuss somewhat more extensively the debt relief data derived for this paper. Debt relief, including HIPC Initiative debt relief, cannot always be read immediately from the budgetary information provided by IMF reports and different countries use different ways of accounting for debt relief in their budget (see De Groot, Jennes & Cassimon (2003) for a more detailed treatment of this issue). HIPC debt relief has two major components: multilateral and bilateral debt relief. The multilateral part is typically accounted for as a grant and usually in a separate budget line⁹. Bilateral debt relief is often much more difficult to trace, as debt service is often presented in the budget net of debt relief, without a separate budget line indicating the amount of debt relief embedded. However, within the framework of completion point triggers and the PRSP, IMF (and World Bank) are usually tracking very closely the amount of HIPC debt relief actually granted, which means that total HIPC debt relief are available, e.g. added as memorandum items to the country budgetary tables. As such, for HIPC debt relief, it is in general feasible to construct a variable representing the total *annual* debt service relief resulting from the HIPC Initiative.

Obtaining such annualized figures is much more difficult for total debt relief figures, incorporating also historical so-called traditional Paris Club debt relief, and additional ad-hoc debt relief provided by both Paris Club and non-Paris Club bilateral creditors. For this type of debt relief, routine tracking is not performed and debt relief is summarized as exceptional financing 'below the line', where annual changes reflect changes in debt service arrears, and the impact of large rescheduling deals in the Paris Club involving clearance of debt service arrears stocks. Moreover, annual debt service relief figures

⁹ As such, HIPC debt relief in the form of grants has to be deducted from the amount of aid given in the form of grants, so grant figures in our database are of course net of HIPC debt relief grants.

cannot be deducted from routine debt statistics such as in the annual World Bank *Global Development Finance* reports¹⁰. Since this paper is largely focusing on the fiscal response of the HIPC Initiative, we only account for HIPC debt relief in this paper.

4. A DISCUSSION OF EMPIRICAL RESULTS

Before running the VAR, we choose to express the different variables in our system as percentages of GDP rather than using the absolute amounts. There are different reasons for why we do this. First, it relieves us from converting the absolute figures into a common currency and having to deflate them. Next, it also controls for the size of the economy. Furthermore, it takes out unobserved effects that affect all countries and series in the same way, as for instance the effect of the global economy.

Table 1 reports on the fiscal response effects of the different variables in our system. As outlined above, we present three estimates of the VAR, one based on pooled OLS (panel A), a fixed effects VAR (panel B) and a system GMM VAR (panel C). Remember that the pooled OLS model tends to overestimate the effects, while fixed effects tends to underestimate the effects. However, given the structure of our panel, we think the fixed effects model comes closest to reality, so we will mostly look at the results of panel B. Dependent variables are in the first row, explanatory variables (lagged once and twice) are in the first column. Since we are especially interested in the fiscal effects of aid, we will concentrate the lower half of panel B, which gives the impact of external borrowing, external grants and debt relief.

¹⁰ An attempt to construct such a comprehensive data base is done recently in Chauvin & Kraay (2005), focusing on estimates of the present value of debt relief embedded in a debt relief deal obtained in a given year.

TABEL 1: ALL HIPC COUNTRIES

Panel A: Pooled regression

		Government revenue	Current primary expenditure	Government investment	Domestic borrowing	External borrowing	External grants	Debt relief
Government revenue	L1	0.773 **	0.259 **	0.164	-0.073	0.159 *	0.149 +	0.002
	L2	0.116	-0.241 **	-0.151	-0.053	-0.193 *	-0.278 **	0.038
Current primary expenditure	L1	0.164 *	0.741 **	-0.063	0.165	-0.216 **	-0.022	0.145 **
	L2	-0.103	0.200 *	0.138	0.019	0.351 **	0.151 +	-0.162 **
Government investment	L1	-0.076	0.104	0.400 **	0.106	0.034	-0.09	-0.072 +
	L2	0.099	0.06	0.441 **	-0.059	0.082	0.239 **	0.048
Domestic borrowing	L1	-0.058	-0.077	0.180 *	0.164 *	0.162 **	0.225 **	-0.014
	L2	0.034	-0.002	-0.112	0.353 **	-0.146 **	-0.152 **	0.004
External borrowing	L1	-0.121	-0.142 +	0.117	-0.025	0.485 **	0.202 *	0.023
	L2	0.127 +	-0.017	-0.052	0.067	0.097	-0.149 +	-0.025
External grants	L1	-0.024	-0.057	0.229 +	-0.054	0.015	0.640 **	0.081 +
	L2	-0.05	-0.065	-0.177	-0.018	-0.09	-0.002	-0.017
Debt relief	L1	0.13	0.157	-0.351 *	-0.305	-0.292 *	-0.288 *	0.780 **
	L2	0.137	0.036	0.522 **	-0.171	0.363 *	0.417 **	0.007
R ²		0.89	0.82	0.86	0.27	0.65	0.8	0.61

Panel B: Fixed effects regression

		Government revenue	Current primary expenditure	Government investment	Domestic borrowing	External borrowing	External grants	Debt relief
Government revenue	L1	0.515 **	0.203 *	0.130	-0.094	0.072	0.237 **	-0.018
	L2	0.006	-0.177 *	0.096	-0.065	-0.095	-0.051	0.047
Current primary expenditure	L1	0.127 +	0.525 **	-0.02	0.188	-0.192 *	-0.051	0.151 **
	L2	-0.135 +	0.133	0.077	0.082	0.358 **	0.071	-0.159 **
Government investment	L1	-0.148 +	0.086	-0.005	0.139	-0.075	-0.233 **	-0.055
	L2	-0.004	0.084	-0.026	0.06	-0.084	-0.004	0.036
Domestic borrowing	L1	-0.037	-0.128 *	0.108 +	-0.077	0.072	0.195 **	-0.015
	L2	0.044	-0.091	-0.105	0.156 +	-0.189 **	-0.135 *	0.006
External borrowing	L1	-0.115	-0.253 **	0.228 *	-0.128	0.369 **	0.199 *	-0.02
	L2	0.077	-0.163 *	0.008	-0.039	0.005	-0.113	-0.047
External grants	L1	0.136	-0.043	0.042	-0.134	-0.137	0.340 **	0.056
	L2	0.109	-0.171 +	-0.082	-0.194	-0.157 +	-0.09	-0.029
Debt relief	L1	0.063	0.169	-0.314 *	-0.193	-0.432 **	-0.282 *	0.694 **
	L2	0.237 +	0.017	0.438 *	-0.370 +	0.176	0.286 *	-0.025
R ²		0.92	0.86	0.91	0.41	0.76	0.87	0.65

Panel C: System GMM

		Government revenue		Current primary expenditure		Government investment		Domestic borrowing		External borrowing		External grants		Debt relief	
Government revenue	L1	0.604	**	0.212		0.124		-0.342		0.119		0.222		-0.135	
	L2	0.092		-0.314	**	-0.230	+	-0.082		-0.329	**	-0.337	**	0.006	
Current primary expenditure	L1	0.173		0.777	**	-0.036		0.350	*	-0.089		-0.086		0.173	*
	L2	-0.05		0.202	+	0.341	*	0.238		0.559	**	0.146		-0.116	+
Government investment	L1	-0.13		0.253	+	0.532	**	0.283		0.247	+	0.1		0.001	
	L2	0.091		0.165		0.660	**	-0.001		0.285	*	0.462	**	0.099	
Domestic borrowing	L1	-0.126		-0.215	*	0.056		0.088		-0.047		0.119		-0.053	
	L2	-0.055		-0.125		-0.329	**	0.342	**	-0.386	**	-0.307	**	-0.037	
External borrowing	L1	-0.261	+	-0.297	*	0.063		-0.236		0.401	**	0.01		-0.046	
	L2	0.075		-0.042		-0.257		-0.092		-0.001		-0.284	*	-0.096	
External grants	L1	0.171		-0.211		0.215		-0.158		-0.226		0.498	**	0.092	
	L2	-0.092		-0.276	*	-0.286	+	-0.001		-0.332	*	-0.302	*	-0.014	
Debt relief	L1	0.244		0.218		-0.573	*	-0.572	*	-0.452	*	-0.239		0.748	**
	L2	0.399	+	-0.124		0.422		-0.428		0.064		0.28		0.037	

Notes: **, * and + denotes coefficient is significant at a 1, 5 and 10% significance level. All regressions include a constant, which is not reported. The number of observations is 277. L1 denotes lagged once and L2 denotes lagged twice. System GMM estimate uses lagged levels dated t-2 and t-3 as instruments for the difference equations, and t-1 and t-2 for the levels equations. However, instead of creating one instrument for each time period, variable and lag distance, we only create one instrument for variable and lag distance to avoid that the number of instruments becomes too large (i.e. we use the collapse option in xtabond2). Estimation was done in Stata9.2 for linux, using the xtabond2 function written by Roodman (2005) to do the system GMM.

The results in table 1 show that, of the 3 different aid variables, debt relief significantly affects **government revenue** (i.e. tax and non-tax revenue) and that this effect only appears after 2 years. An increase in debt relief appears to increase government revenue collection¹¹. The effect proves quite robust, as it shows up in both the fixed effects and the system GMM results. There is weak support in the system GMM results that external borrowing reduces government revenue collection in the next year, but the pooled OLS results suggest this effect is countered by an increased effort to raise tax and non-tax income in the second year. There is also evidence that government revenue responds positively to government current expenditure. Both the pooled OLS results and the fixed effects specification indicate the government revenue collection increases the year after an increase in government consumption.

¹¹ Note that the debt overhang effect would predict the opposite effect.

Figure 1: effect on government local revenue

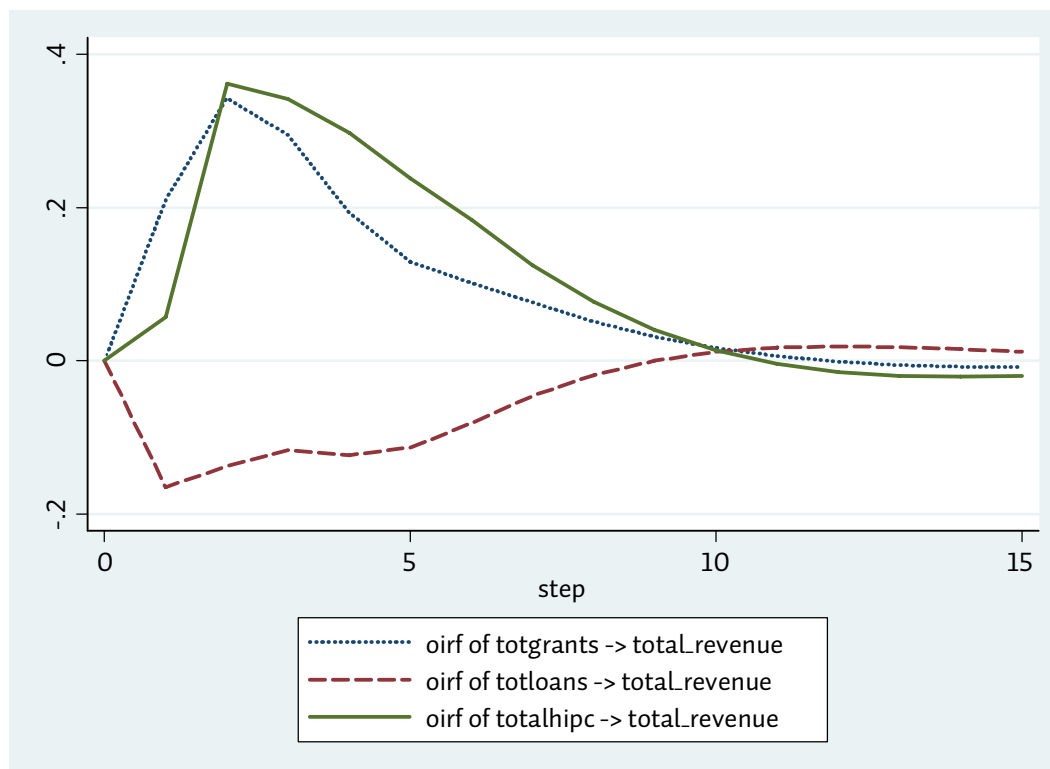


Figure 1 shows the orthogonalised impulse response functions for the three aid variables for the all HIPC fixed effects specification. The graph suggests similar effects of debt relief and grants on government revenue collection.

Debt relief does not seem to significantly affect **government primary consumption**. Loans, be it external or domestic, appear to discourage future current primary expenditure. There is weaker evidence that external grants also reduce government consumption, but this effect is only significant after two years. Furthermore, our fixed effects estimation results suggest that an increase in government revenue is followed by an increase in government consumption, but this effect is offset in the following year.

Figure 2 : effect on current primary expenditure

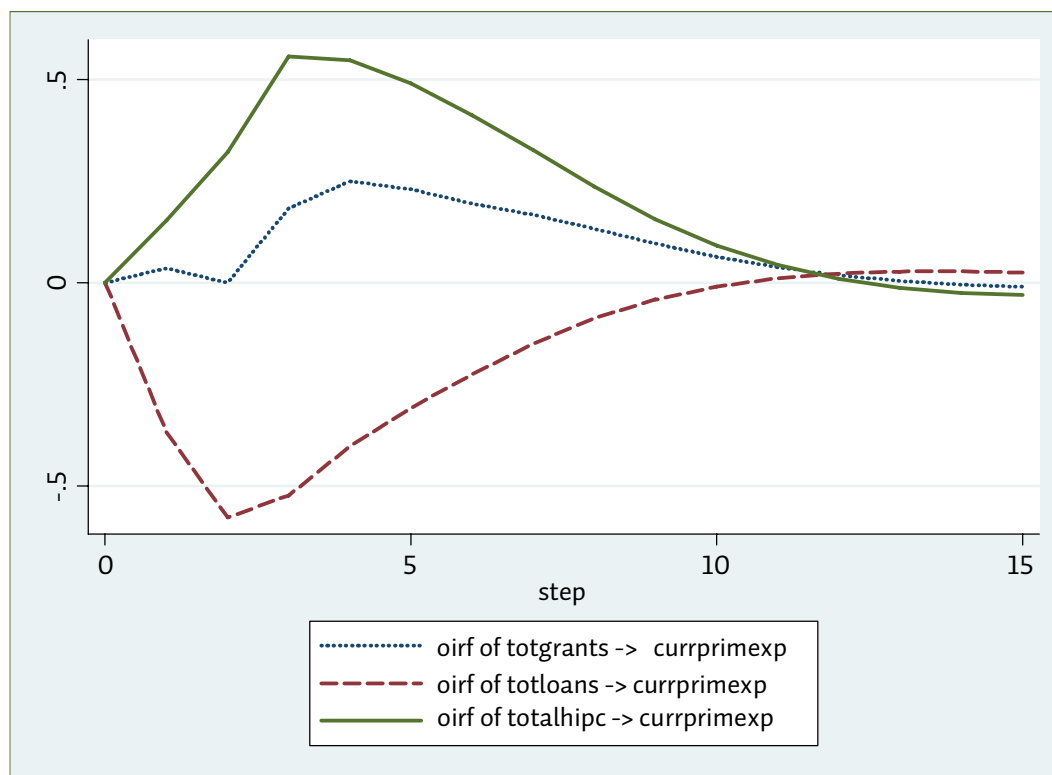


Figure 2 shows the impulse response functions of the three aid variables' effect on current primary expenditure. The graph clearly shows the discouraging effect external loans have on government consumption. Debt relief, and to a lesser extent grants seem to increase government consumption over time.

Our next variable, **government investment**, is an interesting one, as in other fiscal response applications, this variable is thought to be central in linking aid to poverty reduction. Hence a positive effect of the aid variables on government investment is seen as evidence of aid effectiveness. For the complete sample, our fixed effects estimates suggest that aid in the form of grants goes not affect government investment. Aid in the form of loans increases the share of GDP that goes to government investment. The effects of debt relief are interesting. In the first year after receiving debt relief, government investment seems to decrease. However, this effect is more than offset in the following year, where a 1 percent increase in debt relief as a share of GDP increases government capital expenditure as a share of GDP by 0.44. For the non-aid variables, domestic loans also encourage government investment, although this effect is less convincing, and the system GMM estimates suggest that this effect is offset after two years.

Figure 3: effect on government investment

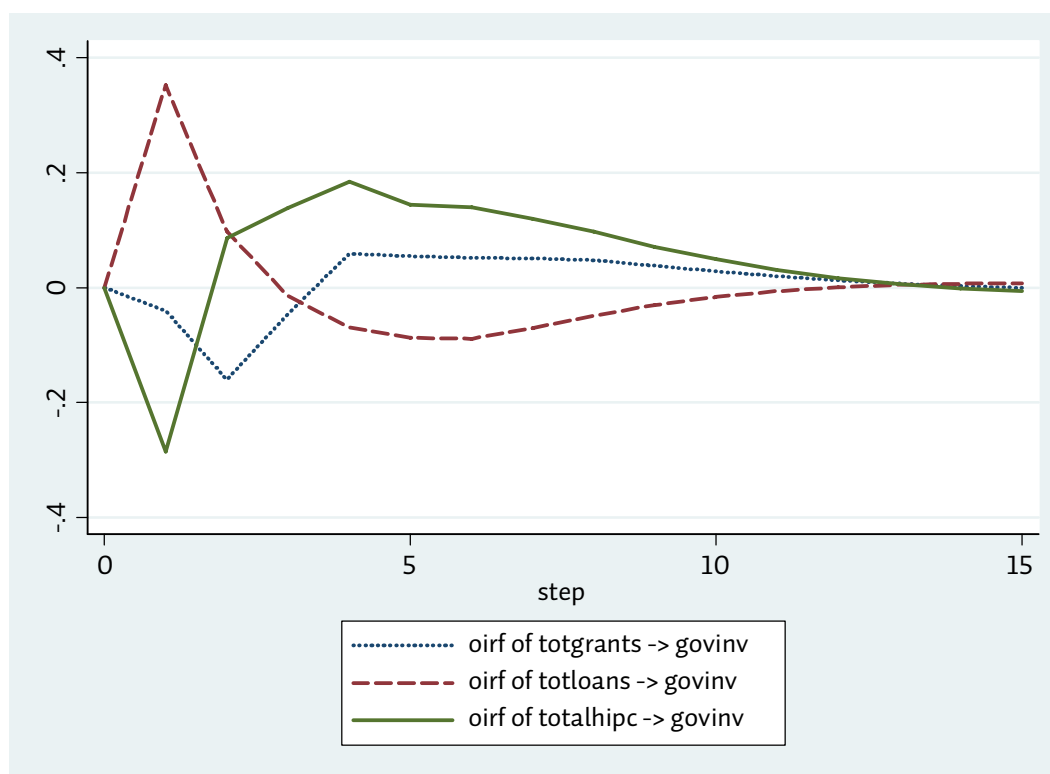


Figure 3 shows the corresponding impulse response functions, again for the three aid variables. It is interesting to see the difference between debt relief and external loans. While loans has a positive effect during the first two years it becomes negative in the third year, and stays like that for the rest of the time span. For debt relief, we observe the reverse. The first year following the shock in debt relief, government investment reduces, but from the next year onward, there is a positive effect, and the effects are fairly large. The effect of grants is marginal.

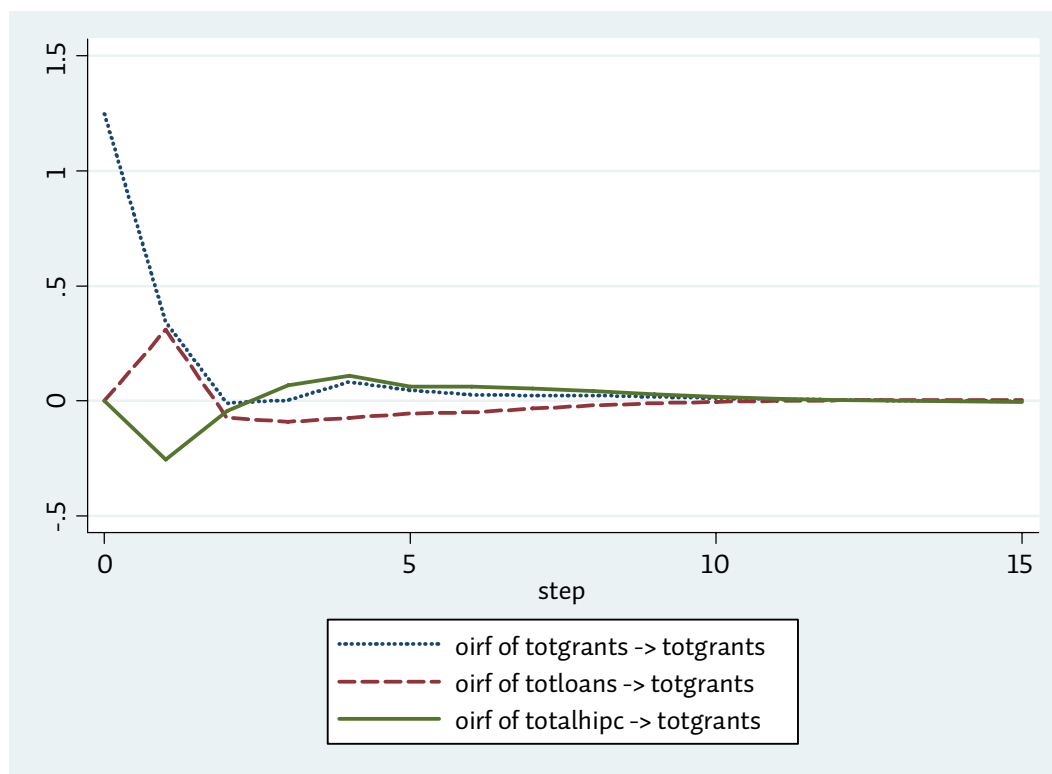
Looking at the results for government primary expenditure and government consumption together, our results seem to confirm what has been found in previous studies. Government consumption seems to be mainly financed through own tax and non-tax income, while external grants and domestic borrowing is directed to longer term public investment projects. The effects of debt relief on government expenditure are especially interesting. Judged by the impulse response functions, debt relief seems to encourage both recurrent and capital spending. However, in the later case, the effect is delayed, hinting at the existence of a j-curve effect.

The only aid variable that affects **domestic borrowing** is debt relief. While the effect of a shock in debt relief on domestic borrowing is clearly negative, our system GMM estimates finds that this effect manifests itself in the year after the shock, while our fixed effects results suggest the effect is only significant at the second lag.

It is also interesting to look at the intertemporal interactions between the three aid variables. For instance, there is evidence that countries that receive debt relief are able to significantly reduce their external borrowing in the next year, providing support for the defensive lending hypothesis mentioned previously. In the fixed effects model, there is some evidence that debt relief reduces grants in the year

next year, but this negative effect is offset in the next period. In any case, if we look at the system GMM results, there appears to be no effect of debt relief on aid in the form of grants. This is also shown in figure 4, which shows the impulse response of the 3 aid variables on aid in the forms of grants. Indeed the response of grants to a shock in debt relief is initially negative, but is quickly offset. The response of grants to a shock in external borrowing mirrors the behaviour of debt relief.

Figure 4 : effect on external grants



5. CONCLUSIONS AND POLICY IMPLICATIONS

In this paper, we study the fiscal response effects of (HIPC) debt relief, relative to other forms of intervention, presenting results that are not limited to individual country context. Overall, we find that HIPC (only) debt relief impact on fiscal variables to follow fairly complex dynamics. For example, debt relief initially reduces government investment, but the effect becomes positive after two years, well outperforming other modes of aid delivery.

Our study wants to contribute to the aid effectiveness debate. More specifically, we try to see if debt relief, a mode of aid delivery that has received renewed attention, provides a better alternative that aid in the form of grants or in the form of loans. However, since we are agnostic about the precise channels through which aid affects outcome variables, we measure aid effectiveness not in terms of increased growth or poverty reduction, but confine ourselves to identifying the fiscal effects of granting aid.

In doing so, we are closer to the field of study that is often labeled fiscal response analysis. We use recent advances in this literature and study the impact of aid on fiscal variables in a vector autoregressive (VAR) framework as in Osei et al. (2005) and Fagernäs and Roberts (2004). Additionally, since we are interested in estimating the likely effects that debt relief has on the public finance of recipient countries in general, it makes more sense to look at the average effect of different countries than to try and extract information about these effects only from a certain country's own history, hence we deviate from the case study approach that characterises the fiscal response literature and estimate a panel version of the VAR.

We find that an increase in debt relief appears to increase government revenue collection. For government expenditure, our results seem to confirm what has been found in previous studies. Government consumption seems to be mainly financed through own tax and non-tax income, while external grants and domestic borrowing is directed to longer term public investment projects. The effects of debt relief on government expenditure are especially interesting. Judged by the impulse response functions, debt relief seems to encourage both recurrent and capital spending. However, in the later case, the effect is delayed, hinting at the existence of a j-curve effect.

As for the interactions between the different aid variables, we find that countries that receive debt relief are able to significantly reduce their external borrowing in the next year, providing support for the defensive lending hypothesis. The response of grants to a shock in debt relief is initially negative, but is quickly offset. The response of grants to a shock in external borrowing mirrors the behaviour of debt relief.

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