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Grants vs. Loans

TITO CORDELLA and HULYA ULKU*

Under what conditions should grants be preferred to loans? To answer this question, we present a simple model à la Krugman (1988) and show that, for any given level of development assistance, higher concessionality is good for growth if countries are poor, have bad policies, and have high debt obligations. We then test our model by estimating a modified growth model for a panel of developing countries, and find evidence supporting most of our predictions. [JEL F35, H63, O40]
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In July 2001, U.S. President George W. Bush, endorsing a recommendation made by the Meltzer (2000) Commission, proposed that the World Bank and other development agencies replace up to 50 percent of their future lending with grants. According to then U.S. Treasury Secretary Paul O'Neill, the "more-grants-less-loans" philosophy was justified by the belief that the World Bank, by lending instead of donating funds to fight poverty, had driven poor countries "into a ditch."[1] The endorsement created a serious divide between the United

*Tito Cordella is a lead economist in the Latin American and the Caribbean Region of the World Bank. Hulya Ulku is a lecturer at the Institute for Development Policy and Management (IDPM) at the University of Manchester in the United Kingdom. The authors would like to thank Ratna Sahay for drawing their attention to the issue and for her initial collaboration on the project. They would also like to thank Oya Celasun, Alejandro Justiniano, Aart Kraay, Humberto Lopez, Domenico Lombardi, Ugo Panizza, Rodney Ramcharan, Arvind Subramanian, and one anonymous referee, as well as seminar participants at the IMF, the World Bank, and the 2005 Latin American and Caribbean Economic Association meeting for helpful comments and suggestions.

[1]See "Treasury Chief Accuses World Bank of Harming Poor Countries," by J. Kahn, *The New York Times*, February 21, 2002. For a more complete discussion of the original proposal and the subsequent debate, see Sanford (2002).

States and European donor countries. The U.K. secretary for international development, in particular, dubbed the proposal "crazy," arguing that it was an attempt to "wreck" the World Bank's lending programs by depleting the amount of resources available for fighting poverty and promoting growth.[2]

If international (as well as domestic) political considerations brought the grants vs. loans debate into the limelight, they unfortunately overshadowed economic considerations. Indeed, many questions remain unresolved. Does the way in which aid is delivered matter in fostering development and growth? Is there any trade-off donors (or recipients) should be aware of? Should the composition of aid flows be tailored according to recipients' characteristics? Should good policies be rewarded with more grants or with more loans?

In spite of the wide media coverage of the grants vs. loans debate, to our knowledge there has been no attempt either to answer these questions with the help of a clear-cut model, or to assess empirically whether the degree of aid concessionality affects aid recipients' growth outcome. To fill such a gap, in this paper we first provide a very simple model that underscores some of the basic trade-offs and sheds some light on the conditions under which loans are more (or less) effective than grants in fostering growth. We then estimate a modified growth model to test our theoretical predictions.

In order to make a meaningful comparison of grants and loans, we look at the composition of aid flows for any given level of development assistance. In doing so, we implicitly agree with Lerrick and Meltzer (2002), who point out that if the same level of assistance is maintained, grants cannot cost more than loans.[3] Indeed, for a given amount of assistance, it is the degree of concessionality that determines the size of the loan.

When donors' resources are limited, the best they can do (to foster growth) is to offer recipient countries the largest loan they are willing to service. The size of that loan is positively correlated with the quality of policies and institutions in the recipient country. Countries with good policies are indeed able to absorb larger volumes of international assistance, and thus to put larger aid flows to work. Countries with bad policies instead have low absorptive capacity.[4] Analogously, the cost of servicing a large loan, and thus the incentives for defaulting on it, is larger in highly indebted and poor countries. We also show that, even in the case in which recipient countries might default on their concessional loans (and thus donors' budget constraint is slack), excessive concessionality might hamper growth.

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[2]See quotes by Clare Short, then U.K. international development secretary, in "IMF Awaits Confrontation," by D. Schepp, *BBC News*, April 16, 2002 (available via the Internet at http://news.bbc.co.uk/2/hi/business/1933690.stm). A compromise between the United States and Europe was finally reached on June 15, 2002, at the Halifax meeting of the Group of Seven (G-7) finance ministers when it was agreed that 18 percent to 21 percent of future aid would be in the form of grants rather than loans.

[3]The fact that we agree with Lerrick and Meltzer (2002) on this point does not imply that we agree with their claim that grants are always better than loans.

[4]Notice that by absorptive capacity we mean only the capacity to service a loan.

Building on these intuitions, the principal results of our theoretical analysis are that the level of loan concessionality that maximizes growth decreases with the quality of a recipient country's policy environment and the level of per capita income, and increases with the stock of debt.

In the empirical part of this paper, we modify a standard growth regression by including a measure of concessionality that we interact with a policy index,[5] with per capita gross domestic product (GDP), and with a measure of indebtedness. The results of our regressions lend empirical backing to some of the predictions of the model. Indeed, once we control for absolute levels of development assistance, we find quite strong evidence that an increase in the degree of concessionality of such assistance is good for growth in countries with poor policy and institutional environments and low per capita GDP. On the contrary, countries that have better policy environments or are just richer seem to be able to absorb less-concessional (but larger) aid flows more effectively. However, we could not find any conclusive evidence as to whether concessionality does or does not help growth in highly indebted countries.

Although our framework builds on the old sovereign debt literature à la Cohen and Sachs (1986) and Krugman (1988), the spirit of the analysis is closer to the recent theoretical literature on aid effectiveness in the presence of conflicts between donors' and recipients' objectives.[6] The main lesson we can derive from this relatively new literature is that incentives matter (Easterly, 2001). If this is the case, the way in which aid is disbursed also matters, and donors should tailor their assistance according to the recipient country's characteristics. In this respect, the grant vs. loan analysis of this paper complements that of Cordella and Dell'Ariccia (2007), who focus on the trade-off between budget support and project aid in fostering development and growth.

The existing literature on concessionality focuses mainly on government revenue and spending patterns. In particular, Odedokun (2004) finds that grants reduce tax efforts and government spending on investment and increase fiscal deficit. Similarly, Clements and others (2004) find that loans lead to increases in government revenues whereas grants tend to decrease them. However, Bulow and Rogoff (2005) point out that multilateral development institutions tend to push loans and thus foster overborrowing by developing countries. For this reason, they advocate more grants. Radelet (2005) also advocates the use of grants in the case of poor countries that lack the capacity to generate the resources to repay loans. He also argues that the criteria for allocating grants across countries should be based on per capita income levels and not on indebtedness.

[5]In the spirit of (among others) Burnside and Dollar (2000), Hansen and Tarp (2001), Collier and Dollar (2002), and Easterly, Levine, and Roodman (2004).

[6]See, among others, Murshed and Sen (1995), Svensson (2000), Federico (2001), Cordella and Dell'Ariccia (2002), and Azam and Laffont (2003).

Although the debate on grants and loans often gets the limelight, not much attention has been paid by the literature on the relationship between aid concessionality and economic growth. To the best of our knowledge, the only other authors who are currently studying this important issue are Iimi and Ojima (2005), who analyze how grants, loans, and the degree of concessionality affect economic growth. Our research differs from theirs in at least two important ways. First, whereas they use cross-sectional data from 61 countries, we use international panel data from 62 developing countries for the period 1976–95, which enables us to control for omitted variable biases and to some extent for endogeneity problems. Second, our study focuses on how country characteristics affect the relationship between concessionality and growth and shows that, although concessional aid is generally associated with a higher growth rate, it is more effective in countries with a poor policy environment and low per capita income.[7]

I. Model

In order to assess which is the more effective way of delivering concessional assistance, we develop a stylized framework in which a donor is willing to transfer a fixed amount of developmental assistance, $\bar{A}$, to assist a developing country (hereinafter the recipient). The donor may choose grants, loans, or any combination of the two. Without any loss of generality, we assume that the donor chooses from a continuum of loan packages with different degrees of concessionality attached. Of course, for a fixed amount of assistance, the degree of concessionality is inversely correlated with the size of the loan: lower concessionality implies larger loans; higher concessionality, smaller loans. Normalizing the donor's discount factor to zero, and assuming (for the moment) that the recipient always pays back the loans it receives, the donor is willing to offer the recipient any aid package

$$\{L, c | cL \geq \bar{A}\}, \tag{1}$$

where L is the amount of the loan and $c \in (0,1)$ is the degree of loan concessionality, that is, the fraction of the loan that the recipient does not have to pay back. If $c \to 0$, the loan ($L \to \infty$) is nonconcessional, whereas if $c = 1$, the loan ($L = \bar{A}$) is a grant, that is, it is fully concessional.

In what follows, we assume that without development aid the recipient's production is equal to $\bar{y}$, whereas a loan L yields (gross) returns zL. Following Krugman (1988), we denote by z, $z \in R^+$, a choice variable capturing the contribution of an aid recipient country's adjustment effort to production (per unit of investment). We also assume that the cost of adjustment per unit of input is given by $\frac{\alpha}{2}z^2$, where the parameter α denotes the *exogenous* quality of the overall political and institutional environment.

[7]These findings are also in line with the theoretical implications of Rai and Sjöström (2001) that more productive agents prefer investment subsidy, whereas the rest take the grants.

High values of α are indeed associated with a deterioration of such an environment and (see lemma below) with a decrease in the *endogenous* adjustment effort z. Total production in the recipient country is then given by

$$Y = \bar{y} + zL \tag{2}$$

and the recipient's objective function by

$$U = \bar{y} + L\left(z - \frac{\alpha}{2}z^2\right) - \min\{\gamma Y; (1-c)L + D\}, \tag{3}$$

where γY, $\gamma \in (0,1)$, denotes the maximum amount of debt that the recipient is able (willing) to pay, $(1-c)L$ denotes the recipient's obligations vis-à-vis the donor, and D denotes other existing repayment obligations.

Following the sovereign debt literature, γY can be thought of as the costs of default, which, as in Cohen and Sachs (1986), is assumed to be a constant fraction of output.[8] Accordingly, the country will repay the debt as long as the cost of repaying it, $(1-c)L + D$, is smaller than the cost of default. Without great loss of generality, and in order to simplify the analysis, we work under assumption (As1):[9]

$$\alpha > \gamma > \frac{D}{\bar{y}}. \tag{As1}$$

Furthermore, since we are looking at development assistance, it is natural to assume that the latter is concessional enough so that resource transfers have an upper bound. More precisely, we work under assumption[10] (As2):

$$c > \dot{c} \equiv \frac{A(1-\gamma)^2(2(a-\gamma)+\gamma^2)}{\alpha(2-(2-\gamma)\gamma)(A-D+\gamma\bar{y})}. \tag{As2}$$

Assume now that the donor offers a loan of size $L = \dfrac{\bar{A}}{c}$, and the recipient chooses z to maximize Equation (3). The following lemma then follows.

Lemma: *There is a level of loan concessionality* c^*, $\mathrm{c}^* \in (0,1)$, *such that if* $\mathrm{c} < \mathrm{c}^*$, *the recipient chooses a level of adjustment effort* $\hat{z} = \dfrac{1-\gamma}{a}$ *and defaults on its debt; if instead* $\mathrm{c} \geq \mathrm{c}^*$, *the recipient chooses a level of adjustment effort* $\tilde{\mathrm{z}} = \dfrac{1}{\mathrm{a}}$ *and repays its debt.*

Proof: See Appendix I.

[8]This would be the case if the cost of defaulting was conducive to trade sanctions or to other forms of isolation (for example, financial autarky).

[9]The assumption guarantees that default costs are small enough ($\gamma < a$) for the country to default if it receives a large enough loan, and large enough not to default if it receives fully concessional assistance ($\gamma > \frac{D}{\bar{y}}$). The latter assumption is equivalent to assuming that before receiving the loan the country is solvent or, alternatively, that its debt has already been restructured.

[10]This condition ensures that aid recipient countries will suffer an output loss should they decide to default. It is thus crucial for the second part of the proposition, below, to hold for all c.

Using the lemma, it is now easy to assess the relationship between the degree of aid concessionality and consumption (or growth, which we can define as $Y - \bar{y}$). In particular, we have the following:

Proposition: *If $c \geq c^*$, by decreasing the degree of concessionality, donors increase economic growth in aid recipient countries. However, decreasing c beyond c^* yields a reduction in economic growth. Finally, c^* decreases in $\bar{y}$ and increases in α, D and $\bar{A}$.*

Proof: See Appendix I.

Thus, should the donor's objective be to maximize growth under constraint (1), the optimal degree of loan concessionality is given by $c = c^*$. It is higher in countries with a bad policy environment (high values of α, low values of z); it decreases with the level of initial production GDP ($\bar{y}$) and increases with other existing repayment obligations (D), as well as with the volume of assistance.

Before seeking to derive more general lessons from the analysis, let us try to grasp the main intuitions within the simple framework we developed. First, one should keep in mind that, for a given amount of resources devoted to development assistance, the degree of concessionality determines the size of the loan. Although larger loans yield larger investment opportunities, they also bring larger repayment obligations, and thus higher incentives to eventually default. Following the sovereign debt literature, we worked under the assumption that the cost of defaulting on external obligations is a function of GDP. Thus, a recipient that anticipates a default would also anticipate that part of its GDP would be confiscated. This implies lower returns from a given level of adjustment effort,[11] and thus lower effort (see the lemma). Given that the donor's resources are limited, the best it can do is to offer the recipient the largest loan that the recipient would find in its self-interest to service. A lower level of concessionality (larger loans) would not only create an incentive for the recipient to default (and thus violate the donor's resource constraint), but would also reduce the recipient's adjustment effort. A higher level of concessionality would decrease only the resources that the donor could make available to the recipient, and thus will be associated with lower consumption (growth).

We also found that the incentive-compatible threshold level of concessionality, c^*, increases with the recipient's adjustment costs, which are determined by the quality of the institutional environment. Indeed, if such costs are high enough, the recipient would find it in its best interest to default on relatively small loans, and thus decrease its adjustment effort.

[11] The marginal returns from the adjustment effort are given by $\frac{\partial U}{\partial z} = \frac{\bar{A}}{c}(1 - \gamma - \alpha z)$ when the recipient anticipates default, and by $\frac{\partial U}{\partial z} = \frac{\bar{A}}{c}(1 - \alpha z)$ when the no-default condition is verified (see Equations (A.1) and (A.2) in Appendix I).

In this case, the donor would be better off increasing the grant component of the aid package. In doing so, it would create the condition for the recipient not only to repay the debt, but also to maintain a high adjustment effort. A high level of other repayment obligations would have the same effect, and the recipient's incentive to default on large (and thus mostly nonconcessional) loans would be magnified.[12] Thus, in highly indebted countries the donor's choice should be tilted toward more concessionality. For analogous reasons, servicing the debt is more costly for poor countries, which should also receive more concessional aid packages. Finally, our model suggests that an increase in the volume of development assistance should be accompanied by an increase in the level of concessionality.

Testable Impliations

Our model has clear testable implications. In particular, from the fact that the threshold level of loan concessionality c^*—below which less-concessional assistance harms growth—decreases with the quality of the overall political and institutional environment and the level of initial GDP and increases with the level of indebtedness, it follows directly that

Testable Implication 1: *The impact of concessionality on growth should be larger in countries with a bad policy environment and bad institutions than in countries with a good policy environment and good institutions.*

Testable Implication 2: *The impact of concessionality on growth should be larger in poorer countries than in richer ones.*

Testable Implication 3: *The impact of concessionality on growth should be larger in highly indebted countries than in less indebted ones.*

II. Empirical Evidence

In this section, we first describe our data and methodology and then investigate the above implications using a modified growth model.

Data

The data used in this paper consist of an unbalanced panel of 62 countries and five four-year time periods from 1976–79 to 1992–95.[13] The dependent variable is the real per capita GDP growth (*Dpcgdp*) calculated as the log difference of per capita real GDP (*Pcgdp*) from Heston, Summers, and Aten's (2002) *Penn World Table* (PWT 6.1). Data on effective developmental

[12]In our setup, default is a yes-no decision. We implicitly assume cross-default negative pledge clauses that rule out partial defaults.

[13]See Appendix Table A3 for a list of countries and the availability of four-year averaged data. See Appendix Table A4 for a complete list of variables and their sources, and Appendix Tables A5 and A6 for the summary statistics and correlation coefficients.

assistance (*Eda*), *Loans*, and *Grants* are from the World Bank database developed by Chang, Fernandez-Arias, and Servén (1999), which defines *Eda* as the sum of the grant equivalent of loans and official grants (excluding technical assistance). The grant equivalent of a loan is defined as the difference between the present values of the loan's disbursements and the stream of expected debt service payments.[14]

We calculate the degree of concessionality (*Conc*), dividing *Eda*[15] by total development assistance (*Tda*), that is, by the sum of *Grants* and *Loans*, which can be written as $Conc = \frac{Eda}{Loans + Grants}$.

To assess the quality of a country's policies and institutional framework, following Collier and Dollar (2002), we use the country policy and institutional assessment (*Cpia*) index from the World Bank. This index ranges from 1 to 5, with higher values indicating a better policy environment.[16]

Among the remaining variables, present value of debt (*Debt*) is from World Bank Global Finance Development; the terms of trade index (*Tot*), the openness variable (*Open*), and GDP in current U.S. dollars are from the IMF World Economic Outlook database; and life expectancy (*Lifexp*) is from the World Bank World Development Indicators database. Last, the dummy variable for civil war (*War*) is from Doyle and Sambanis (2000), and the dummy variable for IMF programs (*Imf*) was constructed by the authors.

Throughout the paper, *Eda Debt* and *Tda* are expressed as shares of GDP. Finally, in order to deal with the outliers problem in a noncontroversial way, we used the Hadi (1994) method, which identifies multiple outliers in multivariate data,[17] and eliminated 21 observations.

Methodology and Results

The main aim of our empirical analysis is to assess the effects of loan concessionality on economic growth under different policy environments, per

[14]Grant equivalent is simply the grant component of the concessional loan. When grant equivalent is expressed as a share of the discounted face value of the loans, it is referred to as grant element. Conversely, loans are calculated by dividing the grant equivalent by the grant element.

[15]In the original data set, because of issues related to calculation of the net present value of external debt, there are cases in which *Eda* takes a negative value (negative concessionality). Because we are interested in concessional aid, we decided to drop those observations from our data set.

[16]The *Cpia* is a composite measure of the policy environment consisting of 20 equally weighted components divided into five categories: macroeconomic management, structural policies, policies for social inclusion, public sector management, and institutions. The latest *Cpia* data are available (albeit not publicly) for 76 countries. For more details, see Collier and Dollar (2002).

[17]More precisely, we used the hadimvo routine in STATA8 and identified outliers with respect to our variables of main interest ($\Delta Pcgdp$, *Eda*, *Conc*, *Cpia*, and *Budget*) at the standard 5 percent level cutoff. Results with and without outliers are quite similar.

capita income levels, and degrees of indebtedness. With this in mind, we modify a standard growth equation to include the *Conc* variable and the following interacted terms: *Polcon* (*Cpia* * *Conc*); *Gdpcon* (*Pcgdp* * *Conc*); and *Debtcon* (*Debt* * *Conc*). Our main specification is thus

$$\begin{aligned} Dpcgdp = {} & \alpha_0 + \alpha_1 Lningdp_{i,t} + \varphi_0 Eda_{i,t} + \varphi_1 Conc_{i,t} + \beta' X_{i,t} \\ & + \varphi_2 Polcon_{i,t} + \varphi_3 Debtcon_{i,t} + \varphi_4 Gdpcon_{i,t} + \lambda_t + \varepsilon_{i,t}, \end{aligned} \tag{4}$$

where *Lningdp* denotes the logarithm of per capita GDP in the first year of the four-year period, and $X_{i,t}$ is a vector of control variables, including *Cpia*, *Debt*, *Open*, *Lifexp*, *Tot*, *Imf*, and *War* dummies, which control for the quality of the institutional environment, indebtedness levels, degree of openness to international trade, quality of health services, intensity and vulnerability of countries to exogenous shocks, financial crises, and civil wars, respectively. All regressions include time fixed effects (λ_t), and regional dummies are included in all level equations[18] to control for the time- and region-specific fixed effects. This specification allows us to test whether it is indeed true that the effect of concessionality on growth "higher in countries with a poor policy environment ($\varphi_2 < 0$), higher levels of debt ($\varphi_3 < 0$), and a lower level of development ($\varphi_4 < 0$).

The estimation of Equation (4) poses several econometric problems, including omitted variables bias and the possible endogeneity of some of the explanatory variables, among them *Conc* and its interacted terms. In order to partially address this problem, we use a two-step system generalized method of moments (GMM) estimator,[19] and lag our right-hand-side variables by one period. This lag allows us to focus on the longer-run effects of changes of the economic environment on growth and to fully acknowledge that the effect of concessionality on growth is necessarily lagged. In fact—as long as one does not think that Ricardian equivalence holds perfectly—the degree of concessionality should matter less for economic growth at the time a loan is disbursed than at the (future) time in which it has (eventually) to be repaid.

[18]The regional dummies include *Ssa* (sub-Saharan Africa), *Asia*, and *Latin America*. We also introduce an *Hipc* dummy for the heavily indebted poor countries. These dummies cover all countries in the data except for the Middle East.

[19]The original GMM estimator, referred to as differenced GMM, which was developed by Arellano and Bond (1991), yields inefficient estimates, because lagged levels are poor instruments for first-difference equations, particularly for persistent series. The system GMM estimator proposed by Arellano and Bover (1995) and Blundell and Bond (1998) eliminates this problem by using the lagged levels as instruments for first-difference equations and the lagged first differences as instruments for level equations. Within the system GMM estimators, the two-step system GMM is shown to yield more efficient and reliable results than one-step system GMM, provided that the standard errors of the former estimator are corrected for their downward bias. In our estimates, we use STATA's xtabond2 routine, developed by David Roodman, with the two-step and the robust option, which enables us to correct for the finite sample bias in the standard errors by using the two-step covariance matrix developed by Windmeijer (2000).

Finally, to avoid having a large instrument matrix that might cause redundant moment conditions and biases in GMM estimators, only the first two (in the level equations) and first three lags (in the differenced equations) of *Lningdp*, *Eda*, *Cpia*, *Debt*, and *Imf* are included in the instrument matrices. Terms of trade shocks are used as strictly exogenous instruments in both level and difference equations, whereas the time fixed effects and regional dummies are included only in the level equations. The remaining variables are assumed to be predetermined, given that their first lags have been used in the analysis.[20]

The results of our regressions are summarized in Table 1, columns 1–5.[21] First, we notice that the *Eda* coefficient is always negative and significant in most of the regressions. However, in our specification, aid affects growth through different channels, and the fact that the *Eda* coefficient is negative does not imply that the total effect of *Eda* on growth is negative.

Indeed, the total derivative of growth on *Eda*,[22] which we denote by *Tot Eda* in our tables,

$$\frac{\partial Pc\Delta gdp}{\partial Eda} = \varphi_0 + \frac{\varphi_1}{Tda} + \frac{\varphi_2 Cpia}{Tda} + \frac{\varphi_3 Debt}{Tda} + \frac{\varphi_4 Pcgdp}{Tda}, \tag{5}$$

is positive, and it is generally significant after computing the corresponding standard errors.

The coefficients of *Cpia* and *Lifexp* have the expected positive sign and are significant in all regressions. The coefficient of *Open* is positive in all regressions and significant in the main regression, in which all interacted terms are included as regressors. Even though the debt coefficient enters all regressions with a positive sign and is significant in the majority of the regressions, it is not robust to different specifications.[23]

As can be seen in Table 1, the *Conc* coefficient is always positive and significant, and the interacted terms have all the right signs. Two out of the three interacted terms—*Polcon* and *Gdpcon*—are significant both when alone and when all interacted terms are included in the regression. These findings support the prediction of our model that countries with a weak institutional environment and low per capita GDP need more concessional forms of assistance.

To get a better sense of how the effect of concessionality on growth depends on policies and economic factors, in Table 2 we compute the estimated first derivatives of growth with respect to *Conc* at the sample

[20]Because all the explanatory variables except for the *Lningdp* are lagged for one period, the lag lengths of instrument variables start from the second lags, except for *Lningdp*.

[21]Two assumptions must be satisfied for this estimator to be consistent. The original errors should not be serially correlated with each other or with the regressors. To address these issues, we run a Sargan test of overidentifying restriction, and we then test for second-order autocorrelation in the error term.

[22]Remembering that $Conc \equiv \frac{Eda}{Tda}$.

[23]See Appendix Tables A1 and A2.

Table 1. Two-Step System GMM Regressions
Dependent variable: per capita GDP growth (Dpcgdp)

	(1)	(2)	(3)	(4)	(5)
Lningdp	–0.023*	–0.023*	–0.023*	0.015	0.014
	(0.014)	(0.012)	(0.014)	(0.022)	(0.020)
*Eda*_1	–1.007**	–0.576	–1.008**	–1.019**	–0.871**
	(0.381)	(0.411)	(0.386)	(0.489)	(0.371)
*Conc*_1	0.073**	0.262***	0.071*	0.198***	0.299***
	(0.032)	(0.096)	(0.039)	(0.060)	(0.093)
*Cpia*_1	0.026***	0.058***	0.026***	0.025***	0.046***
	(0.007)	(0.016)	(0.007)	(0.006)	(0.013)
*Debt*_1	0.081*	0.055*	0.077	0.087*	–0.085
	(0.044)	(0.032)	(0.090)	(0.045)	(0.101)
*Open*_1	0.021	0.022	0.021	0.024*	0.022*
	(0.017)	(0.019)	(0.017)	(0.015)	(0.013)
*Lifexp*_1	0.203**	0.227***	0.204**	0.199***	0.228***
	(0.081)	(0.084)	(0.083)	(0.069)	(0.085)
*Tot*_1	–0.007	–0.002	–0.007	–0.006	–0.004
	(0.010)	(0.011)	(0.010)	(0.009)	(0.009)
*War*_1	0.012	0.019	0.012	0.014	0.009
	(0.014)	(0.015)	(0.015)	(0.013)	(0.013)
*Imf*_1	–0.012	–0.004	–0.012	–0.011	–0.005
	(0.010)	(0.009)	(0.011)	(0.008)	(0.009)
*Polcon*_1		–0.074**			–0.055*
		(0.034)			(0.028)
*Debtcon*_1			0.008		0.311
			(0.174)		(0.195)
*Gdpcon*_1				–0.032**	–0.033**
				(0.014)	(0.014)
Constant	–0.031	–0.144	–0.030	–0.349**	–0.386**
	(0.092)	(0.099)	(0.091)	(0.163)	(0.150)
*Tot Eda*_1[1]	1.140	1.014	1.120**	2.189***	2.119**
	(1.016)	(0.890)	(0.410)	(0.580)	(0.902)
Observations	236	236	236	236	236
Number of countries	62	62	62	62	62
Sargan/Hansen *p*-value[2]	0.93	0.93	0.91	0.88	0.93
AR (2) *p*-value[3]	0.63	0.48	0.63	0.53	0.48

Source: Authors' calculations. See Appendix Table A4 for the sources of variables used in the estimations.

Notes: Standard errors in parentheses. *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent.

Eda and *Debt* are expressed as a share of GDP. Level equations in the two-step system GMM include regional dummies (*Asia, Ssa, Hipc,* and *Latin America*).

All regressions include time dummies.

[1]The coefficient of *Tot Eda* reflects the total impact of *Eda* on the growth rate of per capita GDP.

[2]H_0: regressors are not correlated with the residuals.

[3]H_0: errors in first difference equations exhibit no second-order serial correlation.

Table 2. *Cpia/Pcgdp* Sensitivity of Concessionality

	Cpia		
Pcgdp	Mean−SD	Mean	Mean + SD
Mean–SD	0.15	0.12	0.08
Mean	0.09	0.05	0.02
Mean + SD	0.03	−0.01	−0.04

Source: Authors' calculations.

Notes: SD = standard deviation. Calculations are based on coefficients from Table 1, column 5. Values represent the estimated derivative of growth with respect to concessionality for a country (with a balanced budget) at the mean values of *Cpia* and *Pcgdp* and one standard deviation of the variables below or above the average.

average values of *Cpia* and *Pcgdp* and one standard deviation above and below the mean.[24] Indeed, we find that although in poor countries the derivative of concessionality in terms of growth is positive, it becomes negative as policies improve and per capita income levels increase.

To check the robustness of our results we also carry out various sensitivity analyses. First, to see if our findings are sensitive to the numbers of the lags included in the instrument matrix we run our main regression with different lag lengths. Appendix Table A1 suggests that, overall, our results are quite robust in this dimension. Specifically, all the interacted terms have the expected sign, *Gdpcon* is significant in all regressions, *Polcon* is significant in the majority of the regressions, and, this time, *Debtcon* is significant in two out of six regressions.

As a second robustness test, we reestimated our main equation using ordinary least squares (OLS), difference GMM, and one-step system GMM. Although these estimators are inferior to the two-step system GMM, it was important to check whether the results differed dramatically across different estimators. Looking at the first three columns of Appendix Table A2, it appears that the coefficients, including those of the interacted terms, have the correct sign and are significant in the majority of the regressions. The results of the one-step system GMM regression, which does not have the biases of the OLS and difference GMM, are almost identical to those of our main regression. Finally, the fourth column of Appendix Table A2 reports the findings of the regression with *Edasquare* to take into account the possibility that the impact of grants on the growth rate of per capita income might be nonlinear. The coefficient of *Edasquare* is not significant, and its inclusion does not affect the other variables.

To sum up the main results of this section, using data from a large sample of aid recipient countries for the period 1975–95, we have found quite convincing evidence that the effect of the degree of loan concessionality on

[24]Because the *Debtcon* coefficient is insignificant, we ignored it in estimating the derivative of growth with respect to concessionality, assuming a zero budget deficit.

economic growth depends on aid recipient countries' characteristics. In particular, in line with the predictions of our model, a high degree of loan concessionality improves aid effectiveness in poor countries and in countries with a poor policy environment. These results hold true in different specifications of the econometric model and are robust to different estimation techniques. However, we should also mention that the results of the empirical analysis provide only weak evidence that more concessionality leads to higher growth in countries with high levels of debt.

III. Conclusions

There is no doubt that the political economy (or the politics) of international development has played a major role in shaping the grants vs. loans controversy. Under such circumstances, it is not surprising that economic analysis lagged somewhat behind. To fill such a gap, we developed a simple analytical framework to understand the main trade-offs that could guide the choice of the right amount of concessionality in development assistance. This helped us derive clear testable implications, which steered our empirical analysis and allowed us to better understand the conditions under which more- (or less-) concessional aid flows are conducive to better economic performance.

This paper starts by recognizing that in order to compare grants and loans meaningfully one should keep the amount of assistance as fixed. This highlights a basic trade-off: more concessionality means fewer repayment obligations but also fewer resources available for donors to offer to recipient countries.

Focusing on this basic trade-off leads to an immediate realization that neither of the corner situations (all grants or all loans) should a priori be the most desirable outcome, and that the optimal mix of grants and loans depends on the specific characteristics of a country. In this paper, we emphasize the quality of policies, the accumulated debt burden, and the level of development. Of course, there are several other channels through which the level of concessionality may affect economic performance. We focused on these because of their prominence in the current policy debate.

We are aware of the limitations of our analysis. First, the question of whether economic growth is the right metric with which to measure the success of aid is very pertinent. It could well be argued that some donors are more interested in improving access to basic health care or education, or more generally in fighting poverty, than in promoting growth. Unfortunately, data on health and education are at best incomplete, and data on poverty are difficult to collect and compare. However, it is possible to build on the data of Dollar and Kraay (2002), who show that, in developing countries, per capita income for the poor grows one for one with aggregate per capita income. This in turns implies that per capita growth could be used as a proxy for poverty reduction, and allows us to argue that our measure of success is highly correlated with such a reduction.

We also have to recognize that throughout our analysis we kept the amount of assistance constant and, in doing so, we explicitly avoided dealing

with the problem of how to allocate assistance efficiently across different countries. In addition, we did not look at how aid was disbursed, and thus at whether the policy environment affected the allocation of aid flows among budget support, project aid, and other forms of assistance. Furthermore, we looked only at official aid flows, and thus we are unable to say much about whether the effectiveness of aid flows mediated by nongovernmental organizations (NGOs) follows the same patterns as official aid.

With these caveats in mind, we think this paper offers quite convincing evidence that a good policy environment allows countries to effectively absorb more resources, even if these resources have to be repaid, whereas high poverty levels and poor policy environments have the opposite effect. However, we have not been able to find compelling evidence that countries with high debt levels could benefit from more concessional assistance. The reason for this is that donors tend to evergreen their lending to low-income countries so that existing debt levels are purely fictitious. If this is the case (see also Cordella, Ricci, and Ruiz-Arranz, 2005), it is then not surprising that indebtedness levels do not affect the way in which concessionality affects growth.

Two main messages arise from our analysis. The first is that it is crucial to link the amount of concessionality to the quality of the policy environment. This does not imply that countries with bad policies should be rewarded with more grants. It just means that once the optimal allocation of development assistance has been decided across countries, countries with bad policies should be offered fewer, but more concessional, resources. This would also make it easier to deliver aid through NGOs, bypassing the corrupt recipient country governments, and would help punish them without punishing innocent citizens (who are already likely to suffer from the bad policy environment).

The second message is that the grants vs. loans choice is an easy one for the poorest countries. Providing them with larger but less-concessional aid packages could negatively affect both their current and future growth performance through the accumulation of a stock of eventually unsustainable debt. This view is gaining popularity and has shaped some of the features of the HIPC Initiative. The donor community has in fact stipulated that any new HIPC borrowing (after debt relief is granted) should be on highly concessional terms and preferably in the form of grants. This would prevent repeating the mistakes of the past, when large loans left poor countries poor *and* indebted.

APPENDIX I

Proof of the Lemma

Assume that the country repays its debt. Then the problem it faces is that of

$$\underset{z}{Max}\, \bar{y} + \frac{\bar{A}}{c}\left(z - \frac{\alpha}{2}z^2 - 1 + c\right) - D. \tag{A.1}$$

The first-order condition (FOC) of the problem yields an optimal level of adjustment effort $\tilde{z} = \frac{1}{\alpha}$. We still must verify that at $z = \tilde{z}$ the recipient repays its debt. For this to be

true, we need $\gamma Y(\tilde{z}) \geq (1-c)\dfrac{\bar{A}}{c} + D$. Substituting the value of $\tilde{z}$ in Equation (2), this condition can be rewritten as

$$\gamma\left(\bar{y} + \frac{\bar{A}}{\alpha c}\right) \geq (1-c)\frac{\bar{A}}{c} + D,$$

or

$$c \geq \tilde{c} \equiv \frac{\bar{A}(\alpha - \gamma)}{\alpha(\gamma\bar{y} + \bar{A} - D)}.$$

In addition, using assumption (As1), it is immediately evident that $0 < \tilde{c} < 1$. Assume now that the country does not repay its debt. Then the problem it faces is

$$\underset{z}{Max}\, \bar{y} + \frac{\bar{A}}{c}\left(z - \frac{\alpha}{2}z^2\right) - \gamma\left(\bar{y} + \frac{\bar{A}}{c}z\right). \tag{A.2}$$

The FOC of the problem yields an optimal level of adjustment effort $\hat{z} = \dfrac{1-\gamma}{\alpha}$. We still must verify that at $z = \hat{z}$ the recipient does not repay its debt. For this to be true, we need $\gamma Y(\hat{z}) \leq (1-c)\dfrac{\tilde{A}}{c} + D$. This condition can be rewritten as $\gamma(\bar{y} + \dfrac{\bar{A}(1-\gamma)}{\alpha c} \leq (1-c)\dfrac{\bar{A}}{c} + D$, or $c \leq \hat{c} \equiv \dfrac{\bar{A}(\alpha - (1-\gamma)\gamma)}{\alpha(\gamma\bar{y} + \bar{A} - D)} < 1$. It is then easy to verify that $\hat{c} > \tilde{c}$. This in turn implies that (1) for $c \leq \tilde{c}$, $\hat{z}$ is the equilibrium adjustment effort level; (2) for $c > \hat{c}$, $\tilde{z}$ is the equilibrium adjustment effort level; and (3) for $c \in [c^*, \hat{c}]$, $\tilde{z}$ and $\hat{z}$ are the two candidate equilibrium adjustment effort levels. To determine which one is indeed the equilibrium, notice that $U(\tilde{z}) = \bar{y} + \bar{A} - D + \dfrac{\bar{A}(1-2\alpha)}{2\alpha c}$, $U(z) = (1-\gamma)\left(\bar{y} + \dfrac{(1-\gamma)\bar{A}}{2\alpha c}\right)$, and $U(\tilde{z}) > U(\hat{z}) \Leftrightarrow c > c^* \equiv \dfrac{\bar{A}(2(\alpha-\gamma)+\gamma^2)}{2\alpha(\gamma\bar{y} + \bar{A} - D)}$. It is then immediately evident that $c^* \in [\tilde{c}, \hat{c}]$, so that the optimum level of effort is given by $\hat{z} = \dfrac{\gamma}{a}$ for $c \in [0, c^*]$, and by $\hat{z} = \dfrac{1}{a}$ for $c \in [c^*, 1]$.

Proof of the Proposition

If $c > c^*$, consumption in the recipient country is given by $Y^{nd} = \bar{y} + \dfrac{\bar{A}}{c}\left(\dfrac{1-\alpha}{\alpha}\right) - A$, where superscript *nd* stands for nondefault. It is immediately evident that $\dfrac{\partial y^{ND}}{\partial c} < 0$. If instead $c < c^*$, consumption in the recipient country is given by $Y^{\mathrm{d}} = (1-\gamma)\left(\bar{y} + \dfrac{\bar{A}}{c}(1-\gamma)\right)$, where superscript *d* stands for default. It is then easy to show that $Y^d > Y^{nd}_{c=c^*} \Leftrightarrow c < \dfrac{Ax^*(1-\gamma)^2}{A(1-\alpha(1-c^*) - \alpha c^*(D - \gamma\bar{y}))}$. Substituting the value for c^*, the condition can be written as $c < \dot{c}$.

The remainder of the proof follows from (As1), which insures that $\dot{c} < c^*$, and (As2), which insures that $c > \dot{c}$. Finally, it is easy to check that $\dfrac{\partial c^*}{\partial \alpha} = \dfrac{\bar{A}(2-\gamma)\gamma}{2\alpha^2(\gamma\bar{y} + \bar{A} - D)} > 0$;

$$\frac{\partial c^*}{\partial D} = \frac{\bar{A}(2(\alpha-\gamma)+\gamma^2}{2\alpha(\gamma\bar{y}+\bar{A}-D)^2} > 0; \quad \frac{\partial c^*}{\partial \bar{A}} = \frac{(\gamma\bar{y}-D)(2(\alpha-\gamma)+\gamma^2)}{2\alpha(\gamma\bar{y}+\bar{A}-D)^2} > 0;$$

$$\frac{\partial c^*}{\partial \bar{y}} = -\frac{\bar{A}(2(\alpha-\gamma)+\gamma^2)}{2\alpha(\gamma\bar{y}+\bar{A}-D)^2} < 0.$$

APPENDIX II

For Robustness Test, Description of Data, and Summary Statistics, see Tables A1–A6.

Table A1. Two-Step System GMM Regressions with Different Lag Lengths
Dependent Variable: Per Capita GDP Growth (*Dpcgdp*)

	(1)	(2)	(3)	(4)	(5)	(6)
Lag lengths of differenced instruments	1	1	2	2	3	3
Lag lengths of level instruments	2	3	2	3	2	3
Lningdp	0.016	0.019	0.013	0.014	0.017	0.018
	(0.024)	(0.023)	(0.025)	(0.020)	(0.024)	(0.022)
*Eda*_1	–0.952**	–0.930**	–1.014*	–0.871**	–0.818*	–0.856**
	(0.421)	(0.448)	(0.509)	(0.371)	(0.434)	(0.410)
*Conc*_1	0.297***	0.338***	0.276**	0.299***	0.299***	0.314***
	(0.106)	(0.111)	(0.110)	(0.093)	(0.091)	(0.090)
*Cpia*_1	0.042***	0.051***	0.043***	0.046***	0.049***	0.047***
	(0.014)	(0.013)	(0.014)	(0.013)	(0.015)	(0.013)
*Debt*_1	–0.031	–0.081	–0.021	–0.085	–0.134	–0.093
	(0.136)	(0.109)	(0.138)	(0.101)	(0.110)	(0.085)
*Open*_1	0.021	0.023	0.026	0.022*	0.023*	0.021*
	(0.018)	(0.018)	(0.020)	(0.013)	(0.012)	(0.012)
*Lifexp*_1	0.217**	0.214*	0.205**	0.228***	0.208**	0.226**
	(0.108)	(0.117)	(0.093)	(0.085)	(0.089)	(0.085)
*Tot*_1	–0.002	–0.002	–0.001	–0.004	–0.000	–0.000
	(0.011)	(0.010)	(0.009)	(0.009)	(0.011)	(0.010)
*War*_1	–0.005	–0.001	–0.004	–0.005	–0.003	–0.003
	(0.010)	(0.009)	(0.009)	(0.009)	(0.010)	(0.009)
*Imf*_1	0.008	0.009	0.013	0.009	0.012	0.009
	(0.010)	(0.012)	(0.012)	(0.013)	(0.014)	(0.014)
*Polcon*_1	–0.048	–0.066**	–0.044	–0.055*	–0.063*	–0.056**
	(0.033)	(0.027)	(0.033)	(0.028)	(0.034)	(0.027)
*Debtcon*_1	0.234	0.338	0.232	0.311	0.423*	0.342*
	(0.285)	(0.240)	(0.256)	(0.195)	(0.226)	(0.180)
*Gdpcon*_1	–0.034**	–0.036**	–0.032**	–0.033**	–0.033*	–0.034**
	(0.015)	(0.016)	(0.016)	(0.014)	(0.017)	(0.014)
Constant	–0.399**	–0.439**	–0.374*	–0.386**	–0.402**	–0.431***
	(0.178)	(0.171)	(0.188)	(0.150)	(0.165)	(0.152)

Table A1 *(concluded)*

	(1)	(2)	(3)	(4)	(5)	(6)
*Tot Eda*_1[1]	2.075*	2.138*	1.888*	2.092**	2.001**	2.518***
	(1.181)	(1.286)	(1.075)	(0.899)	(1.078)	(0.878)
Observations	236	236	236	236	236	236
Number of countries	62	62	62	62	62	62
Sargan/Hansen *p*-value[2]	0.40	0.66	0.81	0.93	0.87	0.98
AR(2) *p*-value[3]	0.51	0.46	0.51	0.48	0.43	0.45

Source: Authors' calculations. See Appendix Table A4 for the sources of variables used in the estimations.

Notes: Standard errors are in parentheses. *Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Eda and *Debt* are expressed as a share of GDP. Level equations in the two-step system generalized method of moments (GMM) include regional dummies (*Asia, Ssa, Hipc,* and *Latin America*).

All regressions include time dummies.

[1]The coefficient of *Tot Eda* reflects the total impact of *Eda* on the growth rate of per capita GDP.

[2]H_0: regressors are not correlated with the residuals.

[3]H_0: errors in first difference equations exhibit no second-order serial correlation.

Table A2. Different Regression Techniques

Dependent variable: per capita GDP growth (Dpcgdp)

	OLS (1)	One-Step Differenced GMM (2)	One-Step System GMM (3)	Two-Step System GMM with Edasquare (4)
Lningdp	–0.009	–0.006	0.017	0.013
	(0.013)	(0.031)	(0.020)	(0.022)
*Eda*_1[1]	–0.806**	–0.533	–0.746*	–1.906**
	(0.313)	(0.340)	(0.390)	(0.895)
*Conc*_1	0.072	0.093	0.315***	0.363***
	(0.061)	(0.079)	(0.095)	(0.090)
*Cpia*_1	0.019**	0.005	0.049***	0.049***
	(0.009)	(0.014)	(0.013)	(0.013)
*Debt*_1	–0.086*	0.059	–0.042	–0.019
	(0.052)	(0.085)	(0.083)	(0.127)
*Open*_1	0.026***	0.036**	0.023*	0.031**
	(0.009)	(0.015)	(0.014)	(0.015)
*Lifexp*_1	0.083*	0.273	0.193**	0.193**
	(0.050)	(0.260)	(0.081)	(0.093)
*Tot*_1	–0.001	0.006	–0.006	0.004
	(0.005)	(0.005)	(0.008)	(0.011)
*War*_1	–0.001	0.004	0.013	0.012
	(0.005)	(0.015)	(0.010)	(0.014)

Table A2 *(concluded)*

	OLS (1)	One-Step Differenced GMM (2)	One-Step System GMM (3)	Two-Step System GMM with Edasquare (4)
*Imf*_1	–0.006	0.003	–0.007	–0.001
	(0.005)	(0.006)	(0.007)	(0.010)
*Polcon*_1	–0.010	0.008	–0.062**	–0.065**
	(0.016)	(0.023)	(0.027)	(0.027)
*Debtcon*_1	0.246**	0.235*	0.238	0.181
	(0.110)	(0.143)	(0.162)	(0.230)
*Gdpcon*_1	–0.010	–0.035*	–0.034**	–0.031**
	(0.010)	(0.021)	(0.016)	(0.015)
*Edasq*_1				0.129
				(0.116)
Constant	–0.021	–0.011*	–0.399***	–0.403***
	(0.116)	(0.006)	(0.148)	(0.149)
*Tot Eda*_1[1]	0.807***	1.044***	1.672*	1.659
	(0.315)	(0.295)	(1.073)	(1.878)
Observations	236	174	236	236
Number of countries	62	62	62	62
R^2	0.35	–	–	–
Sargan/Hansen *p*-value	–	–	0.93	0.99
AR(2) *p*-value	–	0.29	0.48	0.52

Source: Authors' calculations. See Appendix Table A4 for the sources of variables used in the estimations.

Notes: Standard errors in parentheses. *Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Eda and *Debt* are expressed as a share of GDP. OLS and the level equations in the two-step system GMM include regional dummies (*Asia, Ssa, Hipc,* and *Latin America*). All regressions include time dummies.

[1]The coefficient of *Tot Eda* reflects the total impact of *Eda* on the growth rate of per capita GDP.

Table A3. Availability of Four-Year Averaged Data for Each Country

ID	Country	Code	Number of Observations	ID	Country	Code	Number of Observations
1	Algeria	DZA	4	32	Madagascar	MDG	4
2	Bangladesh	BGD	4	33	Malawi	MWI	4
3	Belize	BLZ	3	34	Malaysia	MYS	4
4	Benin	BEN	4	35	Mali	MLI	4
5	Bolivia	BOL	4	36	Mauritania	MRT	3
6	Botswana	BWA	4	37	Mauritius	MUS	4
7	Burkina Faso	BFA	4	38	Morocco	MAR	4
8	Burundi	BDI	4	39	Nepal	NPL	4
9	Cameroon	CMR	4	40	Nicaragua	NIC	4
10	Central African Rep.	CAF	4	41	Niger	NER	4

Table A3 *(concluded)*

ID	Country	Code	Number of Observations	ID	Country	Code	Number of Observations
11	China	CHN	3	42	Pakistan	PAK	4
12	Comoros	COM	4	43	Panama	PAN	4
13	Costa Rica	CRI	4	44	Papua New Guinea	PNG	4
14	Dominican Republic	DOM	4	45	Paraguay	PRY	4
15	Ecuador	ECU	4	46	Peru	PER	4
16	Egypt	EGY	4	47	Philippines	PHL	4
17	El Salvador	SLV	4	48	Rwanda	RWA	3
18	Ethiopia	ETH	4	49	Senegal	SEN	4
19	Fiji	FJI	4	50	Seychelles	SYC	3
20	Gambia, The	GMB	4	51	Sierra Leone	SLE	4
21	Ghana	GHA	4	52	Sri Lanka	LKA	4
22	Guatemala	GTM	4	53	St. Lucia	LCA	3
23	Guinea	GIN	4	54	St. Vincent & Grens.	VCT	3
24	Guyana	GUY	3	55	Syrian Arab Republic	SYR	4
25	Haiti	HTI	4	56	Thailand	THA	4
26	Honduras	HND	4	57	Togo	TGO	4
27	India	IND	4	58	Trinidad and Tobago	TTO	3
28	Indonesia	IDN	4	59	Tunisia	TUN	4
29	Jamaica	JAM	4	60	Uganda	UGA	3
30	Kenya	KEN	4	61	Zambia	ZMB	3
31	Lesotho	LSO	4	62	Zimbabwe	ZWE	3

Notes: The numbers in the table indicate the number of periods for which countries have all the observations used in the analysis. Total number of periods is five; however, one period is lost owing to the use of the first lags of the variables in the analysis. Total number of observations is 236.

Table A4. Description of Variables

Variable Name	Definition	Source	Variable Codes in the Main Source	Variable Codes in the Tables
Per capita real GDP	Real per capita gross domestic product in 1996 constant US$ (thousands)		*RGDPCH*	*Pcgdp*
Per capita GDP growth	Log difference of *Pcgdp*	Authors' calculation	_	*Dpcgdp*
Population	Population in thousands of people (*POP*)	PWT (6.1)	*POP*	*Pop*
Real GDP	Real gross domestic product in 1996 constant US$ (millions). Computed multiplying *Pcgdp* by *Pop*	Authors' calculation	_	*Rgdppwt*

Table A4 *(continued)*

Variable Name	Definition	Source	Variable Codes in the Main Source	Variable Codes in the Tables
Log of initial per capita GDP	Natural log of the first year's per capita GDP (*RGDPPCH*) in the four-year period	Authors' calculation	_	*Lningdp*
Unit import price index	Price index (base 1996) for the unit value of the world imports	IMF International Financial Statistics (IFS)	_	*Unimpva96*
Effective development assistance as share of GDP	Present value of total effective development assistance in millions of current US$ (*EDA*) deflated using 1996 unit import price index from *IFS* and divided by real GDP (*Rgdppwt*)	Chang, Arias, and Servén (1999)	*EDA*	*Eda*
Grants	Total grants in millions of current US$(*Grants*) deflated using 1996 unit import price index from *IFS*	Chang, Arias, and Servén (1999)	*Grants*	*Grants96*
Loans	Present value of total loans in millions current US$ (*Loans*) deflated using 1996 unit import price index from *IFS*	Chang, Arias, and Servén (1999)	*Loans*	*Loans96*
Total official developmental assistance as a share of GDP	Sum of *Grants96* and *Loans96* divided by real GDP (*Rgdppwt*)	Authors' calculation	_	*Tda*
Concessionality	*Eda* divided by *Tda*	Authors' calculation	_	*Conc*
Policy index	World Bank's country policy and institutional assessment index (*CPIA*)	World Bank (confidential)	*CPIA*	*Cpia*
Present value of debt as share of GDP	Present value of debt in current $US, source: Global Finance Development; GDP in current $US; source, World Economic Outlook database	Authors' calculation	_	*Debt*
Interaction of concessionality and policy index	Concessionality times *Cpia*	Authors' calculation	_	*Polcon*
Interaction of concessionality and present value of debt as a share of GDP	Concessionality times *Debt*	Authors' calculation	_	*Debtcon*
Interaction of concessionality and per capita GDP	Concessionality times *Pcgdp*/1000	Authors' calculation	_	*Gdpcon*

Table A4 *(concluded)*

Variable Name	Definition	Source	Variable Codes in the Main Source	Variable Codes in the Tables
Openness	Exports plus imports as a share of real GDP (*OPENK*)	PWT (6.1)	*OPENK*	*Open*
Life expectancy	Life expectancy at birth (total years)	WDI	*SPDYN LE00IN*	*Lifexp*
TOT	Terms of trade index for goods and services, based on 1996 prices (*TT*)	WEO	*TT*	*Tot*
Civil War	Dummy for civil war; 1 for war, zero otherwise. Calculated using start and end year of the civil war in *JCR_EWARD* data	Doyle and Sambanis (2000); World Bank	*Yrend warstds*	*War*
IMF program	Dummy for IMF program (1 if there is an IMF program)	IMF and authors' calculation	–	*Imf*

Table A5. Summary Statistics

Variable	*N*	Min	Max	Mean	Median	SD
Ingdp	236	447	11133	2798	2365	1966
Pcgdp_1	236	551	10278	2714	2351	1838
Dpcgdp	236	–0.09	0.10	0.01	0.01	0.03
Eda_1	236	0.00	0.07	0.02	0.01	0.01
Tda_1	236	0.00	0.12	0.03	0.02	0.02
Conc_1	236	0.05	0.89	0.45	0.47	0.18
Cpia_1	236	1.07	4.85	2.82	2.83	0.64
Debt_1	236	0.01	0.58	0.16	0.14	0.11
Open_1	236	0.08	1.68	0.64	0.54	0.34
Tot_1	236	0.31	5.16	1.14	1.03	0.45
Lifexp_1	236	0.35	0.75	0.57	0.57	0.09
War_1	236	0.00	1.00	0.18	0.00	0.36
Imf_1	236	0.00	1.00	0.48	0.50	0.43
Debtcon_1	236	0.00	0.31	0.07	0.05	0.05
Polcon_1	236	0.15	2.64	1.24	1.21	0.54
Gdpcon_1	236	0.29	3.48	1.02	0.82	0.64

Source: Authors' calculations. See Appendix Table A4 for the definitions and the sources of the variables.

Notes: *Eda*, *Debt*, and *Tda* are expressed as a share of GDP. *Tda* refers to the sum of loans and grants. *Lifexp* is in hundreds. SD = standard deviation.

Table A6. Correlation Coefficients

	Dgdp	*Ingdp*	*Pcgdp*	*Eda*	*Tda*	*Conc*	*Cpia*	*Debt*	*Open*	*Tot*	*Lifexp*	*War*	*Imf*	*Debtcon*	*Polcon*	*Gdpcon*
Dgdp	1															
Ingdp	0.19*	1														
Pcgdp	0.11*	0.93*	1													
Eda	–0.19*	–0.49*	–0.44*	1												
Tda	–0.24*	–0.40*	–0.35*	0.93*	1											
Conc	–0.04	–0.63*	–0.61*	0.66*	0.46*	1										
Cpia	0.34*	0.26*	0.25*	–0.12*	–0.12*	–0.23*	1									
Debt	–0.11*	0.19*	0.18*	0.18*	0.37*	–0.28*	–0.03	1								
Open	0.14*	0.49*	0.47*	0.16*	0.26*	–0.13*	0.24*	0.26*	1							
Tot	–0.13*	–0.20*	–0.13*	0.02	0.06	0	–0.01	0.08	–0.05	1						
Lifexp	0.32*	0.80*	0.73*	–0.47*	–0.36*	–0.56*	0.32*	0.24*	0.36*	–0.19*	1					
War	0.01	–0.07	–0.09	–0.17*	–0.21*	0.03	–0.15*	–0.16*	–0.31*	–0.04	0	1				
Imf	–0.09	–0.25*	–0.25*	0.14*	0.21*	0.06	0.08	0.28*	–0.15*	0.00	–0.07	0.11*	1			
Debtcon	–0.11*	–0.19*	–0.19*	0.61*	0.67*	0.32*	–0.15*	0.74*	0.18*	0.00	–0.10*	–0.12*	0.27*	1		
Polcon	0.09	–0.50*	–0.49*	0.60*	0.42*	0.85*	0.26*	–0.27*	–0.01	0.00	–0.39*	–0.04	0.13*	0.25*	1	
Gdpcon	0.14*	0.59*	0.55*	0.03	0.00	0.17*	0.06	0.00	0.50*	–0.23*	0.44*	–0.06	–0.25*	0.13*	0.18	1

Source: Authors' calculations. See Appendix Table A4 for the sources of variables used in the estimations.
Notes: *Eda*, *Debt*, and *Tda* are expressed as a share of GDP. *Tda* refers to the sum of loans and grants. *Significant at 10 percent.

REFERENCES

Arellano, M., and S. Bond, 1991, "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, Vol. 58 (April), pp. 277–297.

———, and O. Bover, 1995, "Another Look at the Instrumental Variable Estimation of Error-Components Models," *Journal of Econometrics*, Vol. 68 (July), pp. 29–51.

Azam, J.P., and J.J Laffont, 2003, "Contracting for Aid," *Journal of Development Economics*, Vol. 70 (February), pp. 25–58.

Blundell, R., and S Bond, 1998, "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," *Journal of Econometrics*, Vol. 87 (August), pp. 115–143.

Bulow, J., and K. Rogoff, 2005, "Grants Versus Loans for Development Banks," paper presented at the American Economic Association Meetings, Philadelphia, January.

Burnside, C., and D. Dollar, 2000, "Aid, Policies, and Growth," *American Economic Review*, Vol. 90 (September), pp. 847–867.

Chang, C., E. Fernandez-Arias, and L. Servén, 1999, "Measuring Aid Flows: A New Approach," Policy Research Working Paper No. 2050 (Washington, World Bank).

Clements, B., S. Gupta, A. Pivovarsky, and E.R Tiongson, 2004, "Foreign Aid: Grants Versus Loans," *Finance and Development*, Vol. 41 (September), pp. 46–49.

Cohen, D., and J. Sachs, 1986, "Growth and External Debt Under Risk of Debt Repudiation," *European Economic Review*, Vol. 30 (June), pp. 529–560.

Collier, P., and D. Dollar, 2002, "Aid Allocation and Poverty Reduction," *European Economic Review*, Vol. 46 (September), pp. 1475–1500.

Cordella, T., and G. Dell'Ariccia, 2002, "Limits of Conditionality in Poverty Reduction Programs," *Staff Papers, International Monetary Fund*, Vol. 49 (Special Issue), pp. 68–86.

———, 2007, "Budget Support vs. Project Aid: A Theoretical Appraisal," *Economic Journal*, forthcoming.

Cordella, T., L.A. Ricci, and M. Ruiz-Arranz Debt Overhang, or Debt Irrelevance? Revisiting the Debt-Growth Link," IMF Working Paper 05/233 (Washington, International Monetary Fund).

Dollar, D., and A. Kraay, 2002, "Growth is Good for the Poor," *Journal of Economic Growth*, Vol. 7, pp. 195–225.

Doyle, M., and N. Sambanis, 2000, "International Peacebuilding: A Theoretical and Quantitative Analysis," *American Political Science Review*, Vol. 94 (December), pp. 779–801.

Easterly, W., 2001, *The Elusive Quest for Growth: Economists' Adventures and Misadventures in the Tropics* (Cambridge, Massachusetts, MIT Press).

Easterly, W., R. Levine, and D. Roodman, 2004, "Aid, Policies, and Growth: Comment," *American Economic Review*, Vol. 94 (September), pp. 774–780.

Federico, G., 2001, "Samaritans, Rotten Kids and Policy Conditionality," CSAE Working Paper No. 2001.16 (Oxford, Centre for the Study of African Economies, Oxford University).

Hadi, A.S., 1994, "A Modification of a Method for the Detection of Outliers in Multivariate Samples," *Journal of the Royal Statistical Society, Series B (Methodological)*, Vol. 56 (2), pp. 393–396.

Hansen, H., and F. Tarp, 2001, "Aid and Growth Regressions," *Journal of Development Economics*, Vol. 64 (April), pp. 547–570.

Heston, A., R. Summers, and B. Aten, 2002, "Penn World Table Version 6.1," Center for International Comparisons at the University of Pennsylvania (CICUP), October.

Iimi, A., and Y. Ojima, 2005, "Complementarities Between Grants and Loans," JBICI Working Paper No. 20 (Tokyo, Japan Bank for International Cooperation Institute).

Krugman, P., 1988, "Financing vs. Forgiving a Debt Overhang," *Journal of Development Economics*, Vol. 29 (November), pp. 253–268.

Lerrick, A., and A. Meltzer, 2002, "Grants: a Better Way to Deliver Aid. (Pittsburgh, Gailliot Center for Public Policy, Carnegie Mellon). Available via the Internet: http://www.house.gov/jec/imf/grant.pdf.

Meltzer, A.H., 2000, "Report of the International Financial Institution Advisory Commission," March. Available via the Internet: http://www.house.gov/jec/imf/meltzer.pdf.

Murshed, M., and S. Sen, 1995, "Aid Conditionality and Military Expenditure Reduction in Developing Countries: Models of Asymmetric Information," *Economic Journal*, Vol. 105 (March), pp. 498–509.

Odedokun, M., 2004, "Multilateral and Bilateral Loans Versus Grants: Issues and Evidence," *World Economy*, Vol. 27 (February), pp. 239–263.

Radelet, S., 2005, "Grants for the World's Poorest: How the World Bank Should Distribute its Funds," Center for Global Development Brief (Washington, Center for Global Development). Available via the Internet: http://www.cgdev.org/content/publications/detail/268.

Rai, A.S., and T. Sjöström, 2001, "Grants vs. Investment Subsidies," CID Working Paper No. 85 (Cambridge, Massachusetts, Harvard Center for International Development, Harvard University).

Sanford, J., 2002, "World Bank: IDA Loans or IDA Grants? *World Development*, Vol. 30 (May), pp. 741–762.

Svensson, J., 2000, "Foreign Aid and Rent-Seeking," *Journal of International Economics*, Vol. 51 (August), pp. 437–461.

Windmeijer, F., 2000, "A Finite Sample Correction for the Variance of Linear Two-Step GMM Estimators," IFS Working Paper No. 00/19 (London, Institute for Fiscal Studies).