Development aid and economic growth: A positive long-run relation

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ABSTRACT

We analyze the growth impact of official development assistance to developing countries. Our approach is different from that of previous studies in two major ways. First, we disentangle the effects of two kinds of aid: developmental and non-developmental. Second, our specifications allow for the effect of aid on economic growth to occur over long periods. Our results indicate that developmental aid promotes long-run growth. The effect is significant, large and robust to different specifications and estimation techniques.

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1. Introduction

Does aid promote economic growth? Interest in this question has grown as large infusions of aid to developing countries have been recommended in recent years as a means of escaping poverty traps and promoting development (Sachs et al., 2004; Sachs, 2005a, 2005b). Major efforts have been underway to mobilize resources for increases in aid (e.g., through an International Financing Facility). In contrast, some have argued that aid has historically been ineffective in promoting growth (Easterly, 2007a, 2007b; Rajan & Subramanian, 2008) and large increases in aid may therefore be undesirable. An intermediate position has been that more aid spurs growth under specific conditions, such as when countries have good macroeconomic policies (Burnside & Dollar, 2000).

Despite the large literature on aid and growth, "the debate about aid effectiveness is one where little is settled" (Rajan, 2005, p. 54). Empirical evidence has been provided in favor of the argument that aid spurs economic growth unconditionally or in certain macroeconomic environments (Burnside & Dollar, 2000; Clemens, Radelet, & Bhavnani, 2004; Collier & Dollar, 2002; Dalgaard, Hansen, & Tarp, 2004; Gomanee, Girma, & Morrissey, 2002; Guillaumont & Chauvet, 2001; Hansen & Tarp, 2001), that it is growth-neutral (Boone, 1994, 1996; Easterly, Levine, & Roodman,

2004; Easterly, 2005) or even growth-depresssing (Bobba & Powell, 2007).[1]

In this paper, we provide new cross-country evidence on the positive effect of aid on growth.[2] Drawing on existing appraisals of donor effectiveness, we distinguish between developmental and non-developmental aid as types of aid with distinct effects on per capita GDP growth. Our specifications, unlike earlier ones, allow aid flows to translate into economic growth after long time periods. We find that developmental aid has a positive, large, and robust effect on growth, while non-developmental aid is mostly

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[1] It has been argued that aid may inhibit development by creating a dependency mentality and overwhelming governments' administrative capacity (Kanbur, 2000), crowding out private sector development (Bauer, 1976; Krauss, 1983), worsening bureaucratic quality (Knack & Rahman, 2007), weakening governance (Knack, 2000; Rajan & Subramanian, 2007), and lowering competitiveness through Dutch Disease effects (Rajan & Subramanian, 2005).

[2] In testing whether developmental aid has an impact on economic growth, we assume that aid can either relax the budget constraint of the country or influence the composition of expenditures. It seems uncontroversial to argue the former, unless it is thought that aid can generate perverse consequences, possibly of sufficient magnitude to reduce recipient country welfare (Brecher & Bhagwati, 1982; Easterly, 2006). In contrast, the influence of aid transfers on the composition of government expenditures has been vigorously debated. In the area of public finance, there is a substantial and ambiguous literature on the "flypaper effect" and related topics (Hines & Thaler, 1995; Inman, 2008). A more specific literature on whether aid is fungible has come to ambiguous conclusions (Feyzioglu, Swaroop, & Zhu, 1998; Howard & Rothenberg, 1993; Khilji & Zampelli, 1994; Pettersson, 2007; Van de Walle & Cratty, 2005; Van de Walle & Mu, 2007).

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growth-neutral and occasionally negatively associated with economic growth.

We conclude that aid of the right kind is good for growth and that it translates into growth outcomes over sufficiently long periods of time. Our results carry potentially significant implications, as they entail that shifting the composition of aid in favor of developmental aid or increasing its quantity can lead to sizable long-term benefits. They also call into question arguments that aid is inherently ineffective and that donor budgets should be reduced. The findings shed light on the so-called "macro–micro paradox" wherein aid is found to have zero average effects in macroeconomic studies but positive effects in microeconomic studies such as project assessments (Boone, 1994; Clemens et al., 2004). A possible resolution is that whereas macroeconomic studies have been concerned with identifying the impact of total aid, which encompasses non-developmental aid, microeconomic studies have focused on assessing projects with plausible developmental impact.

The remainder of the paper is structured as follows: in the next section, we describe key findings of the aid-effectiveness literature. Section 3 highlights econometric challenges specific to growth-aid regressions. Section 4 presents our definition and measures of developmental aid. Empirical evidence is discussed in Sections 5 and 6. Section 7 presents our conclusions. Some results are not included here for brevity, but are available in an online supplementary appendix to which we refer as Minoiu and Reddy (2008, pp. 34–59).

2. Literature review

The aid-effectiveness literature has generally relied on two key assumptions: (i) that aid has a solely *contemporaneous* effect on growth (assumed by most of the papers on the topic), and (ii) that different kinds of aid have the *same* effect on growth. While a comprehensive literature review is beyond the scope of the paper, we review several key contributions.

A central issue in studies which assume that aid has a contemporaneous effect on growth, is that of endogeneity. Under the exclusion assumption, lagged aid has often served as a useful source of exogenous variation (Dalgaard et al., 2004). Other prominent instruments include "friends of the donors" variables which exploit the idea that aid may be given for geopolitical reasons that are extraneous to a country's economic performance (Alesina & Dollar, 2000; Easterly, 2003, 2005; Rajan & Subramanian, 2008). Examples include UN voting patterns, whether the recipient country is a member of or a signatory to a strategic alliance, whether it has been a colony of the donor, and whether the donor and the recipient share a common language.

Several studies have discussed the pitfalls of using geostrategic variables as instruments for total aid. For example, Fleck and Kilby (2006a) noted that these are more likely to capture aid flows motivated by donors' geostrategic considerations, which may not be extended to recipient countries for developmental purposes but rather to build and sustain political allegiances. Similarly, some geostrategic variables may fail the exogeneity and exclusion restrictions. For example, membership in geostrategic alliances may be correlated with expectations of aid flows from certain members of such alliances (Headey, 2005, 2007). In addition, colonial heritage variables may have a direct causal effect on growth, for example, by determining initial levels of technological advancement (Bagchi, 1982; Bertochhi & Canova, 1996; Grier, 1999; Price, 2003).

A growing literature has underlined the possibility that aid of different types may have different effects on growth. For example, Clemens et al. (2004) assess the impact of aid allocated to support the budget and balance of payments commitments, investments in infrastructure, agriculture, and industry.[3] The authors take the view that aid allocated to these sectors is likely to have a discernable impact on growth in the short run. They find that aid is effective, with estimates suggesting that a $1 increase in short-impact aid raises income, on average, by $1.64 (in present value). The authors state that aid which is aimed at supporting democracy, the environment, health, and education is likely to have a long-term impact on growth, but do not statistically identify its effect.[4]

More recently, Rajan and Subramanian (2008) provide evidence that total aid is ineffective at promoting growth, and attempt to distinguish between multilateral and bilateral aid; aid from Scandinavian and non-Scandinavian donors; and social, economic, and food aid. Throughout, aid is allowed to affect growth only contemporaneously and is instrumented for with "friends of the donors" variables. As suggested above, since variation in aid explained by geopolitical factors does not adequately predict variation in developmental aid, the authors' finding that aid predicted by geopolitical factors does not have an effect on growth is not surprising, since "[. . .] political variables may instrument, in part, for the purpose of aid. And the purpose of aid will likely influence the effects of aid on development." (Fleck & Kilby, 2006a, p. 220).

Our study reflects this insight and shares the approach of Headey (2007) and Bobba and Powell (2007) who argue that the failure to distinguish between growth-neutral geostrategic and growth-enhancing non-geostrategic aid accounts for the finding of a zero effect of total aid on growth in cross-country studies. Headey contends that bilateral aid (amounting to 70 percent of total aid) did not have an impact on growth during the Cold War mainly because it served donors' global geopolitical interests.[5] Using a dataset for 56 countries spanning 1970–2001, the author finds that multilateral aid flows were more effective than geostrategically driven bilateral aid flows during the pre-Cold War period. In contrast, bilateral aid has a positive and large effect on growth in the post-Cold War sample. In a similar vein, Bobba and Powell (2007) compare aid allocated to political allies with aid extended to non-allies. This distinction is motivated by evidence that political factors (such as past colonial ties or membership in political alliances) explain a large share of the variation in aid flows across OECD donor countries. Using instrumental variables, the authors uncover strong and robust evidence that aid extended to non-allies has a positive contemporaneous effect on recipient countries' average growth, whereas aid extended to political allies has the opposite effect.

Unlike many of the previous studies, we simultaneously (i) focus on the distinction between developmental aid and non-developmental aid and (ii) allow aid to have discernible effects on growth over long time periods. We provide new and robust evidence that aid of the right kind can have a sizable positive impact on long-run economic growth. Before defining and operationalizing our concept of development aid, we assess the misspecification

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[3] Other examples include Gomanee et al. (2002), who focus on the effect of an aid aggregate without food aid and technical assistance; Miquel-Florensa (2007) who compares the efficacy of tied relative to untied aid; Mishra and Newhouse (2007), who isolate the effect of health aid on infant mortality; and Asiedu and Nandwa (2006), who analyze whether aid spent in the education sector is growth-enhancing.

[4] Identifying the growth effect of long-term impact aid is made difficult by the short span of sector-level disbursement data in the DAC (2006) database.

[5] This argument is supported by Berthélemy and Tichit (2004), who argue that the end of the Cold War brought about reduced bias in aid allocation on the basis of colonial ties in favor of a fresh bias in favor of trade partners.

bias in a standard specification of the aid-growth relationship which assumes that different kinds of aid have the same effect on growth.

3. The pitfalls of misspecification[6]

A key premise in previous studies is that the effects of aid on growth are uniform. We challenge this premise by questioning whether aid offered for one purpose (e.g., general budgetary support to an authoritarian regime which enables it to sustain political support or military spending) will have the same effect on growth as aid spent on another (e.g., irrigation projects, rural roads, bridges and ports which help to bring goods to market, immunization campaigns, health clinics, and schools). If aid of different kinds indeed has different effects on growth, then using total aid as an explanatory variable for growth may lead to erroneous conclusions. The aggregative nature of the total aid variable—different components of which may have a positive, zero, or negative effect on growth—can explain the finding in the literature that aid is ineffective.

To illustrate, we derive the bias of the Ordinary Least Squares (OLS) and Two-Stage-Least-Squares (2SLS) estimators in the standard aid-growth model where different kinds of aid are assumed to have the same effect on growth. Suppose that the true model is given by

$$\gamma = DA\beta_1 + NDA\beta_2 + C\delta_T + \varepsilon_T \qquad (1)$$

where γ denotes per capita GDP growth, DA stands for developmental aid (and may be lagged to allow aid to operate on growth over a longer time period), NDA represents non-developmental aid (and may be lagged), and C is a matrix of suitable control variables. (Country subscripts are omitted.) Suppose also that the estimated model is given by

$$\gamma = TA\beta + C\delta_R + \varepsilon_R \qquad (2)$$

where TA represents total aid ($TA = DA + NDA$). Then the OLS estimator of the coefficient on TA is a weighted function of the true coefficients on DA and NDA:

$$\hat{\beta}^{OLS} \xrightarrow{P} \left[\beta_1 \frac{Cov(T\tilde{A}, D\tilde{A})}{Var(T\tilde{A})} + \beta_2 \frac{Cov(T\tilde{A}, N\tilde{D}A)}{Var(T\tilde{A})} \right] \qquad (3)$$

The weights are functions of variances and covariances of DA, NDA, and TA conditional on the covariates (with this conditionality signified by the tildes over the variables). If the two aid categories have opposite effects on growth, then the estimated coefficient on TA can be zero. Similarly, if DA is effective and NDA is ineffective, then the OLS estimator will suffer from attenuation bias.[7]

As noted, if aid affects growth contemporaneously and model (2) is estimated instead of model (1), an instrumentation strategy is necessary. Then, the 2SLS estimator of the effect of TA on growth is given by

$$\hat{\beta}^{2SLS} \xrightarrow{P} \left[\beta_1 \frac{Cov(D\tilde{A}, N\tilde{D}A)}{Cov(N\tilde{D}A, T\tilde{A})} + \beta_2 \frac{Var(N\tilde{D}A)}{Cov(N\tilde{D}A, T\tilde{A})} \right] \qquad (4)$$

Eqs. (3) and (4) suggest that the standard aid-growth regression may lead to erroneous conclusions because of the "strategic bias"

problem (Headey, 2005) arising from the failure to distinguish between the effects of different kinds of aid or because geopolitical instruments only pick up a component of the instrumented variable (e.g., only the NDA component of TA)—as conjectured in Murray's (2006) heterogeneous response and instrumental variables framework.

4. Defining developmental aid

We define developmental aid (DA) as aid expended in a manner that is anticipated to promote development, whether achieved through economic growth or other means. Non-developmental aid (NDA) is defined as aid of all other kinds. One way to think about this definition of DA is that it is possible to rank-order aid expenditures based on the extent to which they are expected to promote development. Subsequently, one can identify a threshold of effectiveness in promoting development that will determine developmental and non-developmental expenditures.[8]

Data limitations prevent us from directly identifying development-promoting aid expenditures—the ideal proxy for DA. For example, sector-level aid disbursement data (e.g., aid spent on social infrastructure and services, health and education, employment, and housing and social services) are unavailable for the period considered (1960–2000).[9] We employ a second-best solution based on the assumption that DA is likely undergirded by the developmental motive. Accordingly, we draw on the findings of the aid allocation literature and use established aid-quality donor rankings to identify development-friendly donor countries. DA measures are then constructed by pooling bilateral aid flows from these donors.[10]

Throughout the analysis, multilateral aid (MA) is treated as a separate component of aid, possibly developmental in nature. Our conjecture is that aid channeled through and spent by multilateral organizations is more likely to be expended in a developmental manner. The definition of multilateral aid provided in the OECD-DAC database reflects this idea: "Multilateral transactions are those made to a recipient institution which conducts all or part of its activities in favor of development" (DAC, 2006). The evidence on the nature of multilateral aid flows is mixed: Headey (2007) finds that multilateral aid is much less determined by strategic factors than is bilateral aid, but Fleck and Kilby (2006b) argue that multilateral aid responds to influential members' interests. Taking an agnostic stance, we allow MA to have an independent effect on growth.

The aid allocation literature has documented various motives underlying bilateral aid flows to developing countries (Dollar & Levin, 2004; Berthélemy & Tichit, 2004; and Berthélemy, 2006). Alesina and Dollar (2000) show that the largest donors are more likely to be motivated by political and strategic considerations, a result which seems robust to the end of the Cold War. Such motives can explain more of aid allocations over 1970–1994 than do

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[6] Analytical derivations for the equations shown in this section are available in Minoiu and Reddy (2008).

[7] The problem can also be cast as a standard omitted variables problem. To see this, note that the true model can be re-written as $\gamma = \beta_1 TA + (\beta_2 - \beta_1)NDA + C\delta_T + \varepsilon_T$ while the estimated model omits the NDA term. The bias on the total aid coefficient depends on the relative sizes of β_1 and β_2 and the (conditional) variance-covariance matrix of the data. (We are grateful to the editor for suggesting this interpretation.)

[8] Note that neither the motive for aid provision, nor the ultimate effects of aid expenditure are employed to define DA. For example, aid motivated by geostrategic interests but spent in a manner which is anticipated to promote development as well as aid motivated by developmental goals spent accordingly but which eventually fails to spur growth, are both part of DA according to our definition.

[9] To circumvent this problem, Clemens et al. (2004) use sector-level aid commitment data (1973–2000) to obtain disbursements of three types of aid: short-term aid (with a developmental impact within 4 years), long-term aid, and humanitarian aid. Sector-level disbursements are estimated assuming that the fraction of disbursements equals that of commitments for each aid type and year.

[10] We also experimented with other proxies for DA, such as the share of total aid predicted by variations in the quality of the agricultural season, and total bilateral aid from donors chosen according to statistical criteria (Minoiu & Reddy, 2008).

poverty, regime type (e.g., the presence of democracy), or the economic policy of the recipient. In particular, the US pattern of aid is heavily influenced by its interests in the Middle East, with one third of it having been allocated to Egypt and Israel during the period.[11] In addition, large donors such as the UK and France directed most of their bilateral aid to former colonies; in fact, non-democratic former colonies received on average two times more aid than democratic non-colonies. French and Japanese aid is found to have had the lowest elasticity to the income of recipients, and both countries sent unusually large amounts of aid to Egypt. They also tended to either favor old colonies (France) or allied countries as measured by the correlation of UN General Assembly voting patterns (Japan). UN votes cast by recipient countries are able to explain aid allocations from Germany, France, the UK and the US even after controlling for income, institutional quality, and macroeconomic policies.

In contrast, aid from Nordic nations "seems remarkably free from self-interest and, indeed more oriented towards their stated objective of poverty alleviation, the promotion of democracy, and human rights" (Gates & Hoeffler, 2004, p. 16). Alesina and Dollar (2000) report that small donor aid has the highest elasticity to recipient income, while Gates and Hoeffler (2004) show that Nordic countries (Denmark, Finland, Norway, and Sweden) give grants and concessional loans to poorer countries, many of which are in sub-Saharan Africa (SSA). "Norway and Denmark are lauded for their singular focus on development." (Brainard, 2006, p. 8) Some donors send little money to former colonies (the Netherlands, 17 percent) or have little scope for fostering global strategic interests due to a lack of colonial past. Alesina and Dollar (2000) conclude that "Certain donors (notably, the Nordic countries) respond more to the *correct* incentives, namely income levels, good institutions of the receiving countries, and openness" (p. 33; italics in original text). Similarly, Gates and Hoeffler (2004) argue that Nordic donors as an aggregate differ markedly from other donors in their allocation of aid: their recipients are more likely to be democracies and have a better human rights record. At odds with the findings of Alesina and Dollar (2000) that countries open to international trade are favored by Nordic donors, Gates and Hoeffler (2004) report that the same countries still direct significant amounts of aid to recipients with "poor" trade policies.[12]

Based on this evidence, we assume that Scandinavian donors and selected additional donors have aid programs that are more likely to target developmental aims (especially economic infrastructure, poverty alleviation, and social services), and that their aid is more likely to be spent in a growth-enchancing manner. We consider the following two distinct proxies for DA: total bilateral aid from Denmark, Finland, the Netherlands, Norway, and Sweden ('G1'), and total bilateral aid from a larger group of countries comprised of: G1 plus Austria, Canada, Ireland, Luxembourg, and Switzerland ('G2'). There is some contention in the aid allocation literature that the Netherlands and Canada are similar to Nordic countries, although there is no definite evidence on the matter (Gates & Hoeffler, 2004).

Scandinavian donors in G1 fared well according to the 2007 ranking produced from the Commitment to Development Index (CDI). The CDI assesses the performance of rich nations along various dimensions of policy, including aid, trade, investment, migration, security, environment, and technology. One of its components, the Aid CDI ranks donor nations after adjusting their aid figures for the type of aid extended to recipient countries (Roodman, 2005, 2006, 2007). In particular, the index penalizes donor countries which offer tied rather than untied aid, loans rather than grants, and too many small aid projects which are likely to burden the recipient government with administrative responsibilities.[13] Four of our G1 donor countries (Denmark, Norway, Sweden, and the Netherlands) were the highest-ranking according to the 2005 Aid CDI. This is not surprising since a small share of Nordic aid is tied (with the exception of Denmark) and it is concentrated on social infrastructure, especially in the health sector (Gates & Hoeffler, 2004).

Assuming that the highest-ranking nations on the quality-adjusted aid ladder are more likely to provide DA, we choose one more group of development-friendly countries which rank in the top 10 according to the 2005 Aid CDI. The third proxy for DA is pooled bilateral aid from the following ten donors: G1 plus Belgium, France, Ireland, Switzerland, and the United Kingdom ('G3'). Notably, this group includes donor countries that have been shown to allocate aid in a geostrategic manner, so we expect a lower effectiveness of its aid.

Once DA and MA are extracted from TA, the remainder is viewed as NDA ($NDA = TA - MA - DA$) and is also allowed to have a distinct impact on growth.

5. Empirical evidence

We estimate a standard cross-country growth-aid model in a sample of developing countries over 1960–2000. The aid variable is defined as grants plus net loans with a grant element higher than 25 percent (DAC, 2006). Lagged values of DA and NDA are included to explain variations in the recipients' average growth rate of per capita GDP. In our baseline specifications (similar to those of Rajan & Subramanian, 2008), the control variables are initial per capita income, initial level of life expectancy, institutional quality (World Bank Country Policy and Institutional Assessment, CPIA index averaged over 1960–1999), geography (average number of frost days and tropical land area), initial level of government consumption, an indicator of social unrest (revolutions), the growth rate of terms of trade and their standard deviation, initial economic policy (updated Sachs–Warner openness dummy), and continent dummies (for SSA and East Asia). For variables list, data sources, and summary statistics, see Tables 1 and 2.

Fig. 1 shows the shares of bilateral and multilateral aid in total aid by decade. In the 1960s, almost 90 percent of aid was channelled to recipient countries through bilateral arrangements. However, the share of bilateral aid decreased in later decades to roughly two thirds. Fig. 2 depicts the relative weight of DA measured by our first proxy—cumulative bilateral aid from groups G1–G3. Bilateral contributions of the G1 and G2 donors only account for at most

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[11] Concerning the structure of US aid, Brainard (2006, p. 8) argues that "a look at the US foreign assistance budget in any given year makes it clear that only a small fraction of funds is allocated strictly according to economic and poverty criteria—less than 15 percent". Moreover, Fleck and Kilby (2006a) show that domestic politics play an important role in US aid allocations. A conservative Congress directs aid based on commercial concerns (e.g., trade relations). In contrast, a liberal president and Congress give more weight to development concerns in aid allocation.

[12] Although there is evidence of heterogeneity in terms of aid allocation patterns among Nordic donors themselves (Gates & Hoeffler, 2004), they have been labeled "like-minded" (Stokke, 1989) and the literature usually treats them as one uniform group.

[13] In constructing the Aid CDI, tied aid is penalized 20 percent and partially tied aid is discounted 10 percent. The donors' selection rules for recipients of their aid are assessed using a selectivity weight which aims to capture the recipients' *need* for aid along the following dimensions: governance, poverty level, and income level. Greater project proliferation has the effect of discounting aid from a donor, while donor policies aimed at encouraging charitable giving to development organizations have the opposite effect. Final donor rankings are based on the ensuing quality-adjusted aid variable (Roodman, 2005, 2007).

Table 1
Variables and sources.

Variable	Source
Multilateral aid, in 2003 million US$	DAC database (2006)
Net bilateral aid (grants and concessional loans) broken down by donor, in 2003 million US$	
GDP in 2000 million US$	World Development Indicators online database (2006)
Initial literacy level	
Income-group classification	
Real per capita GDP growth rate	Rajan
Initial per capita GDP	and
Initial life expectancy	Subramanian
Institutional quality (World Bank CPIA, 1960–1999)	(2008)
Geography variable	
Initial level of government consumption (% of GDP)	
Indicator of social unrest (# revolutions)	
Terms of trade (average and standard deviation)	
Original Sachs-Warner policy variable	Sachs and Warner (1995)
Updated Sachs-Warner variable	Wacziarg and Welch (2003)
Institutional quality (annual ICRG index, 1984–1989)	Stephen Knack and Keefer, Philip (1995) IRIS-3: File of ICRG data. College Park, Maryland: IRIS (producer). East Syracuse, New York: The PRS Group, Inc. (distributor)
Burnside and Dollar (2000) policy variable	Easterly et al. (2004)

Table 2
Summary statistics of selected variables.

Variable	# countries	Mean	Std. Dev.	Min	Max
Cross-sectional regressions					
Per capita GDP Growth	86	1.3825	1.7510	−3.3734	6.7943
Initial Per Capita GDP	82	7.3858	0.6859	5.9442	8.9671
Initial Level of Life Expectancy	97	48.8192	10.9880	31.6100	71.6800
Institutional Quality (CPIA)	88	0.5271	0.1234	0.2250	0.8590
Geography	89	−0.4722	0.8306	−1.0400	1.7839
Initial Government Consumption	107	17.0369	12.3362	1.3766	65.0415
Revolutions	107	0.2243	0.2354	0.0000	1.4444
Terms of trade (Average)	107	112.0005	21.7761	66.6658	176.2134
Terms of trade (St. Dev.)	107	23.8871	18.1735	0.0058	94.3235
Initial policy	107	0.0187	0.1361	0.0000	1.0000

Variable	# obs	Mean	Std. Dev.	Min	Max
Panel regressions (5-year average panel)					
Per capita GDP growth	743	1.4407	3.7023	−14.2798	22.9337
Log(inflation)	631	0.2181	0.4681	−0.0436	4.1922
Institutional Quality (CPIA)	728	0.5309	0.1272	0.2250	0.8590
Geography	736	−0.4691	0.8190	−1.0400	1.7839
Initial Per Capita GDP	754	7.7613	0.8277	5.7739	10.0276
Revolutions	762	0.2126	0.3534	0.0000	2.6000
Initial policy	880	0.1864	0.3896	0.0000	1.0000
Government Consumption	766	20.7881	11.0700	2.1432	73.4520
G1 aid/GDP	700	0.0076	0.0254	−0.0005	0.3448
G2 aid/GDP	700	0.0110	0.0292	−0.0025	0.3630
G3 aid/GDP	700	0.0353	0.0644	−0.0004	0.5828
Non-G1 aid/GDP	700	0.0574	0.0792	−0.0009	0.6123
Non-G2 aid/GDP	700	0.0539	0.0758	−0.0013	0.6067
Non-G3 aid/GDP	700	0.0297	0.0465	−0.0019	0.4814
Multilateral aid/GDP	700	0.0296	0.0499	−0.0013	0.3918

18 percent of total bilateral aid, given that certain major donors are excluded. The inclusion of the UK and France in G3 raises the share of bilateral aid to around 30 percent. On the one hand, bilateral aid accounts on average for 6–7 percent of recipients' GDP, while the average ratio of *MA* to GDP ranges between 1 and 3.9 percent. *DA* from G3 countries, on the other hand, contributed 5–9 percent of recipient countries' GDP over 1960–1990, while *DA* from G1 countries accounted for at most 3 percent of recipients' GDP over the same period. These summary statistics reflect the fact that our development-friendly countries are relatively small donors.

5.1. Cross-sectional regressions[14]

To estimate the long-term effect of aid on growth and allow for deep lags on the aid variable, our dependent variable is the average per capita GDP growth rate over 1990–2000, while

[14] All robustness checks to the cross-sectional results are available in Minoiu and Reddy (2008). These include estimating a model where *DA*, *MA*, and *NDA* are included in the regressions one at a time to investigate potential multicollinearity.

Table 3
Cross-sectional OLS regressions: replicating the results of Rajan and Subramanian (2008).

	Dependent variable				
	Average growth (1960–2000)	Average growth (1960–1980)	Average growth (1970–2000)	Average growth (1980–2000)	Average growth (1990–2000)
Total aid/GDP (1960–1970)	−0.16				
	[2.76]				
Total aid/GDP (1960–1970)		−2.97			
		[2.95]			
Total aid/GDP (1960–1980)			0.99		
			[2.00]		
Total aid/GDP (1970–1980)				2.98	
				[2.79]	
Total aid/GDP (1980–1990)					5.21**
					[2.09]
Observations	61	58	64	64	77
R-squared	0.73	0.51	0.72	0.68	0.56

*Source*: Authors' calculations.

Notes: The dependent variable is the average annual growth rate of GDP per capita. The specifications are as in Rajan and Subramanian (2008), with the same lags for total aid. The control variables are the same as in Rajan and Subramanian (2008) (initial income, initial life expectancy, institutional quality, geography, initial government consumption, revolutions, average and standard deviation of terms of trade, initial policy, and continent dummies), but the estimated coefficients are not shown. Robust standard errors are in brackets.
** Statistical significance at the 5 percent level.
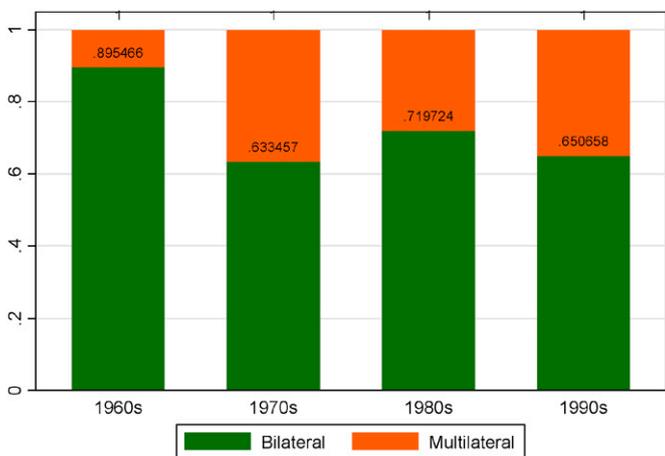
Source: OECD-DAC

Fig. 1. Bilateral and multilateral aid as a share of total aid.
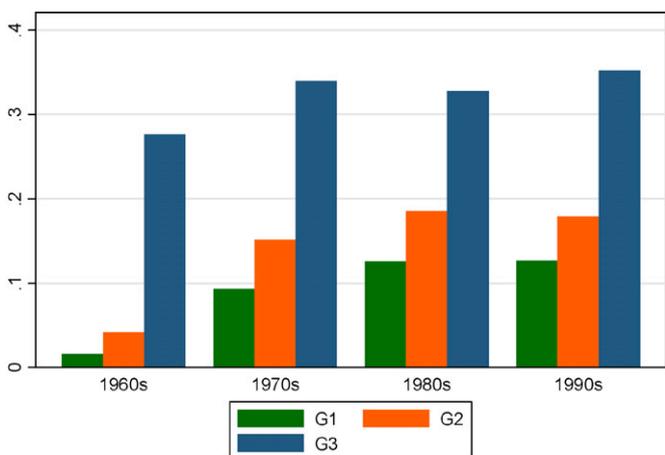
Source: OECD-DAC | Bilateral aid is the sum total of bilateral flows from the largest 22 donors

Fig. 2. Developmental aid as a share of bilateral aid.

the explanatory variables—*DA*, *MA*, and *NDA*—are averaged over 1960–1990.[15]

We begin by replicating the standard growth-aid model presented by Rajan and Subramanian (2008). We obtain the same results as the authors (Table 3), reflecting aid's persistent lack of power in explaining subsequent growth. In contrast, when we include deeper lags of *TA* (Table 4), the effect of aid turns positive: average growth in the 1990s is well explained by *TA* lagged over 1960–1980, 1960–1990, and 1970–1990. The coefficients range between 6.8 and 8.5, suggesting that an increase of total aid during these periods by 1 percentage point of GDP is associated with an average per capita GDP growth rate that is higher by approximately 0.068 to 0.085 percentage points in the 1990s.[16]

Table 5 presents several novel specifications in which we examine the possibility that the most growth-enhancing form of aid is *DA*—pooled bilateral aid from the donors belonging to groups G1–G3.[17] The results reveal some remarkable regularities. First, we identify a positive and statistically significant estimated effect of bilateral aid from G1 and G2 donors on growth, with coefficients that are large in magnitude: average growth in the 1990s was higher by as much as 1.2–1.3 percentage points for countries which had received 1 additional percentage point of GDP as aid transfers from these donor countries over the previous three decades. The effects are large, rendering the coefficients both statistically and economically meaningful. A weaker effect is identified for bilateral aid from G3 donors: a 1 percentage point increase the ratio (to GDP) of aid received between 1960 and 1990 is associated with subsequent growth rates that are higher by 0.14 percentage

[15] Regression results for specifications in which the dependent variable is growth averaged over 1970–2000 and 1980–2000 did not prove robust since the feasible aid lags were shorter, restricting our ability to test whether aid acts on growth with deep lags for these earlier time periods.

[16] In contrast, including deeper lags in Rajan and Subramanian's specifications in a panel context led to weaker results (Minoiu & Reddy, 2008), suggesting that lagging total aid is insufficient to obtain a statistically significant aid impact coefficient, and that these cross-sectional findings may be driven by omitted variables.

[17] The results are robust to weighing the observations to reduce the influence of outliers according to the Huber (1981) procedure (Minoiu & Reddy, 2008).

Table 4
Cross-sectional OLS regressions: introducing deeper lags than Rajan and Subramanian (2008).

	Dependent variable		
	Average growth (1990–2000)	Average growth (1990–2000)	Average growth (1990–2000)
Total aid/GDP (1960–1980)	8.45**		
	[3.31]		
Total aid/GDP (1960–1990)		8.22**	
		[3.57]	
Total aid/GDP (1970–1990)			6.77**
			[2.71]
Observations	64	64	70
R-squared	0.65	0.64	0.61

Source: Authors' calculations.
Notes: The dependent variable is the average annual growth rate of GDP per capita. The specifications are as in Rajan and Subramanian (2008), with the difference that we include deeper lags of total aid. The control variables are the same as in Rajan and Subramanian (2008) (initial income, initial life expectancy, institutional quality, geography, initial government consumption, revolutions, average and standard deviation of terms of trade, initial policy, and continent dummies), but the estimated coefficients are not shown. Robust standard errors are in brackets.
** Statistical significance at the 5 percent level.

Table 5
Cross-sectional OLS regressions: The effect of developmental aid on growth.

	Dependent variable		
	Average growth (1990–2000)	Average growth (1990–2000)	Average growth (1990–2000)
G1 aid/GDP (1960–1990)	131.97***		
	[43.66]		
G2 aid/GDP (1960–1990)		120.25***	
		[34.15]	
G3 aid/GDP (1960–1990)			14.75**
			[7.31]
Non-G1 aid/GDP (1960–1990)	−3.67		
	[6.54]		
Non-G2 aid/GDP (1960–1990)		−5.03	
		[6.50]	
Non-G3 aid/GDP (1960–1990)			1.32
			[5.39]
Multilateral aid/GDP (1960–1990)	26.71	21.83	6.73
	[17.22]	[15.16]	[17.80]
Initial income	−0.24	−0.04	−0.54
	[0.70]	[0.70]	[0.66]
Initial life expectancy	0.01	0.01	0.04
	[0.09]	[0.08]	[0.09]
Institutional quality	3.85	3.26	3.89
	[3.61]	[3.52]	[4.45]
Geography	0.48	0.43	0.39
	[0.37]	[0.39]	[0.38]
Initial government consumption	−0.05*	−0.05**	−0.04
	[0.03]	[0.02]	[0.03]
Revolutions	−1.53**	−1.57**	−1.85**
	[0.67]	[0.64]	[0.83]
Terms of trade average	0.04	0.03	0.02
	[0.04]	[0.03]	[0.04]
Terms of trade standard deviation	−0.16***	−0.16***	−0.15***
	[0.04]	[0.03]	[0.04]
Initial policy	−0.03	−0.18	0.11
	[0.60]	[0.57]	[0.64]
SSA dummy	−3.62**	−3.75**	−3.20*
	[1.63]	[1.55]	[1.63]
East Asia dummy	1.09	1.26*	0.88
	[0.72]	[0.73]	[0.86]
Constant	−0.23	−0.88	2.65
	[4.76]	[4.78]	[4.65]
Observations	64	64	64
R-squared	0.69	0.72	0.66

Source: Authors' calculations.
Notes: The dependent variable is the average annual growth rate of GDP per capita. Robust standard errors are in brackets.
* Statistical significance at the 10 percent level.
** Statistical significance at the 5 percent level.
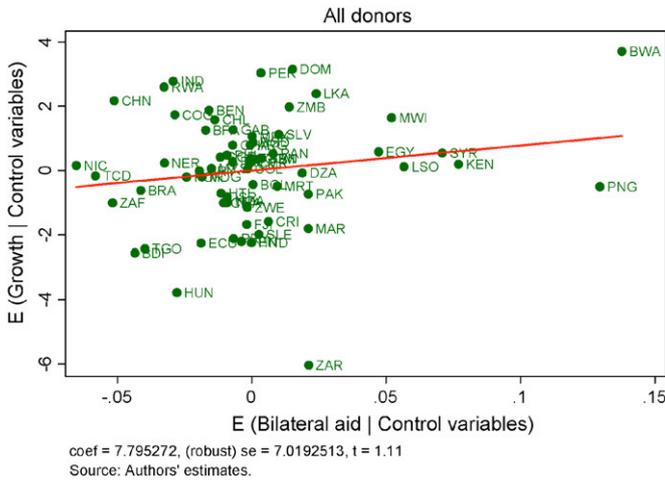*** Statistical significance at the 1 percent level.

Fig. 3. Conditional scatterplot. Growth (1990–2000) vs. lagged bilateral aid (1960–1990).

Fig. 4. Conditional scatterplot. Growth (1990–2000) vs. lagged G1 aid (1960–1990).

Fig. 5. Conditional scatterplot. Growth (1990–2000) vs. lagged G2 aid (1960–1990).

points. The reduced coefficient on bilateral aid from G3 donors is not surprising due to the presence in this group of large geostrategic donors such as the UK, Belgium, and France (Alesina & Dollar, 2000).

In all three specifications, *MA* has a positive, yet insignificant effect on subsequent growth. This finding may be surprising in light of arguments that multilateral aid is less plagued by political considerations than bilateral aid or that it solves strategic and coordination problems among donors and hence is more likely to be allocated based on recipient country needs (Bobba & Powell, 2006). In our specifications, *MA* is averaged over 1960–1990, thus capturing an important share of the structural adjustment lending extended in the 1970s and 1980s. The literature on the effectiveness of structural adjustment loans remains largely inconclusive.[18]

We illustrate the strength of the association between different aid categories and average growth (conditional on the covariates) in Figs. 3–6. These are partial regression residual plots showing the relationship between average growth in the 1990s and lagged bilateral aid (for all donors and by donor group) after the effects of all the other predictors—initial income, initial life expectancy, institutional quality, geography, initial government consumption, initial openness to international trade, social unrest, terms of trade, multilateral aid, and continent dummies—have been removed. Fig. 3 reveals that total lagged bilateral aid is only weakly correlated with subsequent growth (the *t*-statistic on the bilateral aid coefficient is 1.11). In contrast, the remaining figures show that once bilateral aid is sliced into its *DA* and *NDA* components, there is an upward-sloping, strong relationship between lagged *DA* and later growth.

The analysis of the outliers in these partial scatterplots is also informative. Two of the outliers are Botswana (BWA) and the Democratic Republic of Congo (ZAR)—landlocked, primary commodity exporting countries with markedly different growth trajectories. Botswana is often perceived to have had

an exemplary institutional framework (characterized by unbroken democratic governance and institutional probity) and sound macroeconomic policies (e.g., prudent fiscal and debt policies), whereas the Democratic Republic of Congo remains plagued by weak institutions, competition for mineral rents, and deep

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[18] Easterly (2005) argues that structural adjustment loans have historically been ineffective in reducing macroeconomic distortions and spurring growth. Similarly, Hansson (2007) claims that aid channeled through the European Union has also failed to raise short-run growth in recipient countries, arguing that *MA* is more likely to be spent on achieving macroeconomic stablization and poverty alleviation rather than on measures which promote long-run growth. (See also earlier studies such as Conway, 1993; Doroodian, 1993; Khan, 1990; Killick, 1995; Lipumba, 1994; Mosley, Harrigan, & Toye, 1991.)
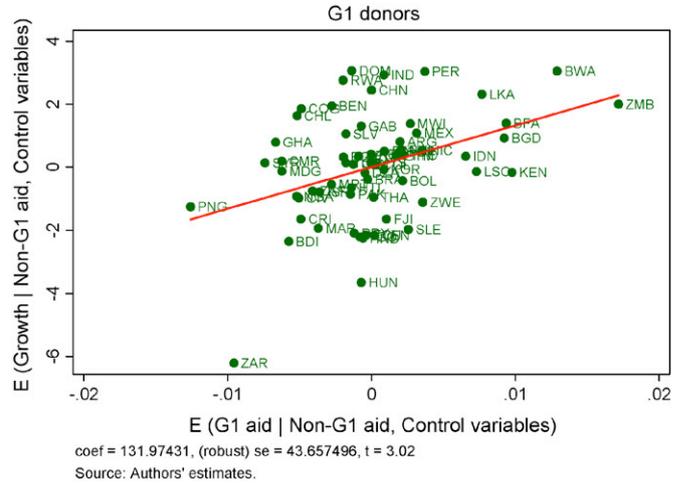

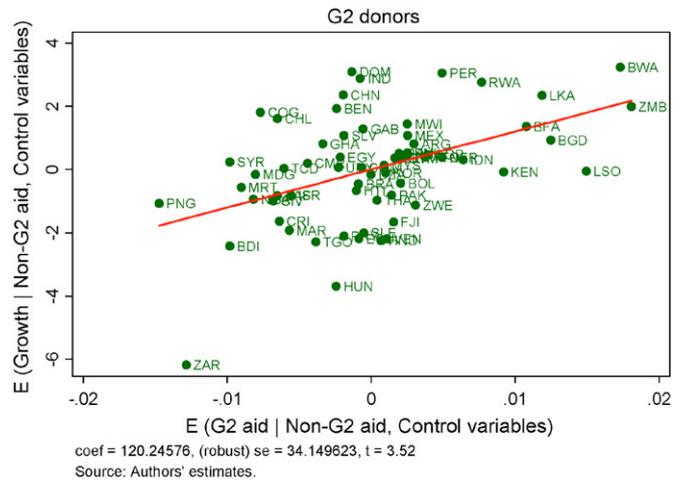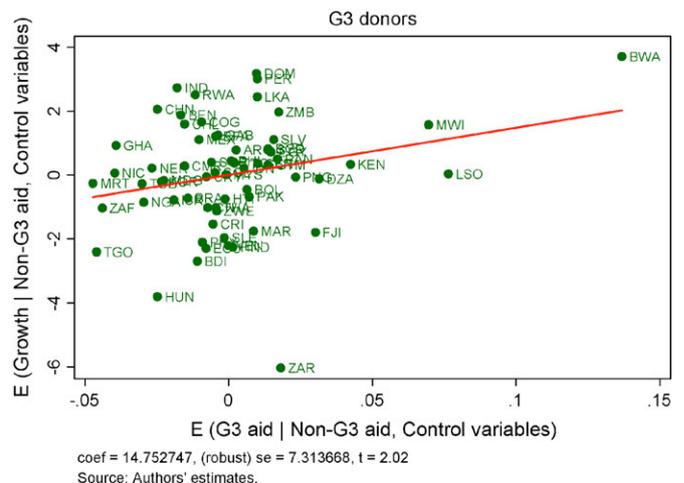**Fig. 6.** Conditional scatterplot. Growth (1990–2000) vs. lagged G3 aid (1960–1990).

civil conflict. These factors are only partially captured by our explanatory variables (such as geography, terms of trade volatility, and institutional quality), suggesting that although *DA* appears to be an important growth-promoting factor, it is not the only one.

Several key concerns emerge regarding the cross-sectional regressions presented here. For instance, lagged aid may act as a proxy for time-invariant country-specific unobservables (an idea explored, for example, by Dalgaard et al., 2004). This possibility is dealt with using panel data analysis in the following section. Furthermore, lagged aid may capture the impact of growth determinants which are not well proxied by our covariates, thus rendering the results sensitive to the choice of information set. We try to address the latter concern by estimating the same model with alternative explanatory variables. First, we replace the World Bank CPIA index with another institutional variable in lagged form in order to minimize possible endogeneity bias. We use the International Country Risk Guide (ICRG) index from the IRIS III dataset (Knack & Keefer, 1995) averaged over 1984–1989. Second, we add initial literacy as a proxy for the human capital. The results (reported in Minoiu & Reddy, 2008) show that when changing the set of control variables, the coefficients on *DA* remain significant and even increase for all groups of development-friendly donor countries.

5.2. Panel regressions

We re-estimate our model using panel data comprised of eight 5-year averages between 1960 and 2000 and the system GMM estimator (Blundell & Bond, 1998). This estimation strategy appears to be appropriate in our setting because the unobserved country-specific fixed effects are eliminated through first-differencing, endogenous variables are instrumented out, and our panel is short and wide. The system GMM estimator uses a system of equations in first differences and levels (of GDP), where the instruments employed in the levels equations are suitably lagged first-differences of the endogenous series, while those used in the differenced equation are lagged levels of the endogenous series.

We take institutional quality and revolutions to be contemporaneously uncorrelated with growth, while the geography variable and the time dummies are treated as being strictly exogenous and used as instruments. The following covariates are treated as endogenous: beginning-of-period per capita income, inflation, policy (openness), government consumption, and one period lagged aid (*DA*, *MA*, and *NDA*). We use all possible lags in building the set of instruments. The least innocuous assumption behind the moment conditions of the system GMM estimator is that the first differences of the endogenous variables are orthogonal on the unobserved individual-specific effects (such as the initial level of efficiency). This justifies using suitably lagged first-differences of endogenous variables as instruments in the levels equation.[19] As an empirical matter, we check the validity of the instruments with the Hansen test of over-identifying restrictions. Furthermore, we assess the validity of subsets of instruments using the Arellano-Bond *m1* and *m2* test statistics for AR(1) and AR(2)-type serial correlation in the differenced residuals. To conclude that the instruments are valid,

we need to find evidence of first-, but not second-order serial correlation in the differenced residuals.

To test the hypothesis that aid operates on growth with a time lag, while maintaining a parsimonious model, we include distinct aid lags in distinct specifications (Table 6). The formulations include the aid categories lagged 1, 3, and 5 periods (corresponding to 5, 15, and 25 years). Once again, *DA* is found to have a positive and significant impact on growth decades later: for the G1 and G2 donor groups, a 1 percentage point increase in the *DA*/GDP ratio is associated with average growth that is higher by 0.2 percentage points 5 years later, and higher by 0.7–1.1 percentage points 25 years later. Not surprisingly, the effect of bilateral aid from G3 donors is much smaller and not robust across specifications. As in the cross-sectional regressions, *MA* and *NDA* have no statistically discernable impact on growth. Their coefficients alternate in sign between positive and negative and are imprecisely estimated.

In all regressions, the *p*-values of the Hansen test of over-identifying restrictions indicate that the GMM instruments are valid.[20] Furthermore, the *m1* and *m2* statistics for most specifications suggest that there is first-order serial correlation in the differenced residuals, but there is no second-order serial correlation. However, as the sample size shrinks (in specifications with deep lags of aid), the validity and relevance of a subset of instruments from the differenced equation becomes questionable according to the Arellano–Bond test of second-order serial correlation as fewer lags (observations) are available to construct the instruments. This increases the possibility of a downward bias and demands caution in interpreting the results (Bond, Hoeffler, & Temple, 2001).

6. Further results

We also estimated richer specifications aimed at testing (i) whether low and lower-middle income countries are more effective at translating aid into economic growth, and (ii) whether *DA* is more effective in specific policy environments.[21]

6.1. Income threshold effects

It has been suggested that the presence of income threshold effects may influence countries' ability to render capital productive and generate economic growth. For example, according to the poverty trap model outlined in Sachs et al. (2004), thresholds for the productivity of capital may exist in less developed countries, making it difficult for them to embark on a path of sustained economic growth, especially when combined with low savings rates and high population growth. Sachs et al. (2004) argue that a poverty trap induced by low productivity of capital, low savings rates, or high population growth can be the result of underlying structural causes such as poor infrastructure and resulting high transportation costs, small market size, low agricultural productivity, high disease burden, inadequate skilled personnel, and low availability of new technology.

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[19] This assumption is satisfied if the endogenous series have constant means after conditioning on common time effects (as we do in our specifications by including a full set of time dummies). This does not seem unreasonable to assume for variables such as aid or government consumption. As for per capita GDP, the requirement is that per capita income growth be uncorrelated with country-specific effects before conditioning on other covariates—again not implausible in the long run. (For a complete discussion, see Bond et al., 2001.)

[20] A cautionary note is in order, as a relatively high number of instruments may lead to overfitting of the endogenous variables and could weaken the Hansen test of instruments' joint validity (Roodman, 2009). We tested for robustness of our Table 6 results by aggressively lowering the numbers of instruments (either by limiting lag depth or by collapsing the instruments), and found that the results held up primarily for *DA* proxied G1 and G2 aid, and to a lesser extent for G3 aid as we might expect given the hypothesis that some G3 donors have historically been more often guided by strategic interests in supplying aid than those belonging to G1 and G2. (The results are shown in Minoiu & Reddy, 2008).

[21] The results discussed in this section are reported in Minoiu and Reddy (2008).

Table 6
Panel (System GMM) regressions: the effect of developmental aid on growth.

Aid is lagged	5 years			15 years			25 years		
G1 aid/GDP (lagged)	**19.57***** **[6.40]**			**14.22**** **[6.22]**			**111.27**** **[44.14]**		
G2 aid/GDP (lagged)		**18.41***** **[6.22]**			**16.69***** **[6.32]**			**74.62***** **[17.27]**	
G3 aid/GDP (lagged)			**11.19**** **[4.74]**			**4.77** **[3.02]**			**0.52*** **[0.31]**
Non-G1 aid/GDP (lagged)	2.34 [5.45]			6.14 [4.25]			1.54 [2.47]		
Non-G2 aid/GDP (lagged)		1.87 [5.48]			5.30 [4.23]			1.55 [2.47]	
Non-G3 aid/GDP (lagged)			−8.04* [4.79]			1.82 [5.94]			−0.13 [4.12]
Multilateral aid/GDP lagged	−5.38 [7.18]	−4.46 [6.89]	4.51 [5.98]	−14.14 [8.77]	−16.45* [9.44]	−6.55 [5.22]	8.24 [12.23]	5.79 [11.50]	22.02** [11.17]
Log inflation (1+(inf/100))	−1.64*** [0.30]	−1.55*** [0.31]	−1.64*** [0.28]	−1.48*** [0.31]	−1.48*** [0.30]	−1.49*** [0.29]	−1.63*** [0.30]	−1.60*** [0.30]	−1.54*** [0.28]
Institutional quality	7.08*** [2.60]	6.39*** [2.43]	5.28* [2.72]	7.20** [3.17]	6.95** [3.20]	6.93** [3.09]	3.33 [5.06]	3.28 [4.70]	4.15 [2.61]
Geography	0.38* [0.20]	0.43** [0.20]	0.33* [0.20]	0.27 [0.28]	0.29 [0.26]	0.29 [0.27]	0.52* [0.30]	0.51* [0.30]	1.92 [4.32]
Initial income	−1.11** [0.48]	−0.90* [0.49]	−0.73 [0.49]	−1.15** [0.58]	−1.13* [0.62]	−1.25** [0.58]	−0.78 [0.69]	−0.77 [0.67]	−0.77 [0.71]
Revolutions	−1.51*** [0.54]	−1.63*** [0.60]	−1.59*** [0.60]	−1.46* [0.82]	−1.47* [0.87]	−1.62* [0.90]	−2.20* [1.17]	−2.42* [1.29]	−2.66** [1.29]
Initial policy	0.70 [0.52]	0.71 [0.52]	0.60 [0.53]	0.60 [0.58]	0.57 [0.55]	0.64 [0.55]	0.61 [0.60]	0.59 [0.59]	0.67 [0.63]
Initial government consumption	−0.05** [0.02]	−0.07*** [0.02]	−0.04* [0.02]	−0.00 [0.02]	−0.01 [0.02]	−0.01 [0.02]	−0.02 [0.03]	−0.02 [0.03]	−0.02 [0.03]
SSA dummy	−2.33** [0.93]	−2.03** [0.91]	−2.79*** [0.87]	−2.92*** [1.02]	−2.80*** [1.03]	−3.34*** [0.92]	−3.74*** [0.92]	−3.75*** [0.98]	−3.72*** [1.12]
East Asia dummy	1.17 [0.75]	1.31* [0.70]	1.80*** [0.63]	1.37* [0.74]	1.38* [0.73]	1.20* [0.71]	1.22 [0.84]	1.37* [0.76]	1.44* [0.76]
Hansen test p-value	1.000	1.000	1.000	1.000	1.000	1.000	0.974	0.956	0.978
AR(1) test p-value (m1)	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.037	0.027
AR(2) test p-value (m2)	0.372	0.409	0.509	0.053	0.050	0.071	. . .	. . .	. . .
Observations	468	468	468	336	336	336	202	202	202

Source: Authors' calculations.
Notes: The dependent variable is the average annual growth rate of GDP per capita. Robust standard errors are in brackets. Coefficients and standard errors for the developmental aid variables are in boldface.
  * Statistical significance at the 10 percent level.
 ** Statistical significance at the 5 percent level.
*** Statistical significance at the 1 percent level.

To test whether aid is more effective in low or lower-middle income countries than elsewhere, we include interaction terms of *DA* with income-group dummies in the baseline specifications. The data do not favor this hypothesis. However, since a large proportion of our 107-country sample are low and lower-middle income countries, we face a variance-inflating problem due to high collinearity between the *DA* variable and the interaction variable. Nevertheless, while the interaction term is mostly insignificant, the aid-effectiveness coefficient remains positive, large, and statistically significant.

6.2. Aid and the policy environment

We also tested the conjecture that aid is more effective when specific macroeconomic policies are in place (Burnside & Dollar, 2000; Collier & Dollar, 2001, 2002). To capture the policy environment, we experimented with the following measures: the original and updated Sachs-Warner policy variables (Sachs & Warner, 1995; Wacziarg & Welch, 2003) and a policy index representing the weighted average of budget surplus, inflation, and trade openness (Burnside & Dollar, 2000). In the baseline specifications, the evidence in favor of aid raising growth only in good policy environments remains inconclusive. The interaction term coefficient

is only significant in 4 out of 9 cases, and the level of statistical significance never reaches 1 percent.

7. Discussion and conclusions

In this paper, we re-estimated the causal relationship between aid and growth in a large cross-section of aid recipients, allowing for different kinds of aid to have distinct effects on growth. We attempted to disentangle the effects of two components of aid: a developmental component consisting of growth-promoting expenditures, and a non-developmental component consisting of other expenditures. While we cannot directly measure developmental aid due to data limitations, we draw on existing appraisals of donor effectiveness to construct proxies for it. In particular, develomental aid represents total bilateral flows from donor countries which are generally reputed to have development-oriented programs or rank highly according to established aid quality indices. Our specifications allow for the effect of aid on economic growth to appear after long time lags (possibly involving several decades).

We find that developmental aid—as opposed to non-developmental aid—has a positive and robust effect on subsequent growth. The coefficient estimates show a sizable marginal impact:

in cross-country regressions, an increase in average bilateral aid from Scandinavian countries by 1 percentage point of GDP over 1960–1990 is associated with average per capita GDP growth rates in the 1990s that are higher by 1.2–1.3 percentage points. The effect is slightly smaller when bilateral aid from a larger number of donor countries is used as a proxy for developmental aid. Panel regressions confirm the cross-sectional results: an increase in average bilateral aid from countries ranking highest according to the Aid Commitment to Development Index of 1 percentage point of GDP is associated with average per capita GDP growth 15 years later that is higher by 0.2 percentage points. The deep lags considered in our specifications suggest that the causal impact of developmental aid operates over several decades. This result is consistent with the view that aid finances investments in physical infrastructure, organizational development, and human capabilities, which bear fruit only over long periods.

A key concern about our empirical approach is that donors we use to construct our proxy for developmental aid may have simply been lucky in their choice of recipients—which had stellar subsequent growth performances for reasons unrelated to aid—or may have "cherry-picked" recipients in anticipation of high-growth trajectories. In both cases, bilateral aid from such donors would spuriously appear to be positively correlated with growth. Although these concerns cannot be fully dismissed, we argue that they cannot entirely account for our results.

First, could certain donor countries have simply been lucky enough to have chosen the "right" recipients? There is extensive empirical evidence that donors do not specialize to any notable extent in providing aid to certain recipients or regions. For example, Acharya, de Lima, and Moore (2006), Knack and Rahman (2007), and Easterly (2007a) document high donor fragmentation both at the country and sector level and conclude that donors tend to "plant their flag" everywhere. Similarly, Alesina and Dollar (2000) find that Nordic countries tend to be involved everywhere, even if only to a small extent. We sought to determine whether this is the case in our data, and found that 90 percent of the recipients in our sample received aid from each development-friendly donor group considered over 1960–1990.

Second, could some donors have chosen their recipients in anticipation of high-growth trajectories? This is also possible, although growth performance in the 1960s and 1970s is a poor indicator of average growth rates decades later. To illustrate, of the 51 countries which were growing in the 1960s, 21 countries experienced negligible or negative growth four decades later (Reddy & Minoiu, 2009). Furthermore, casual evidence from the development discourse prevailing in the 1960s and 1970s suggests that few countries which later did well were successfully forecast as such and many of the countries which later did poorly were also rarely predicted to do so (see Garner, 2008, for a comparative study of initial conditions and subsequent growth trajectories of the Republic of Korea and the Democratic Republic of Congo). While it is also possible that donors focused on providing aid to developing countries with growth-promoting features such as a better institutional environment, a superior human rights record, or a higher concern for pro-poor allocation of aid, we believe that the large set of covariates included in our specifications reduces these factors' possible confounding effects.

Notwithstanding concerns about luck and skill in the initial selection of recipient countries, the robust results uncovered here give rise to important policy implications. First, our findings help counter claims that aid is inherently ineffective and aid budgets should be reduced. On the contrary, an increase in aid and a change in its composition in favor of developmental aid are likely to create sizable returns in the long run. Further, by showing that donor characteristics may matter for aid effectiveness, the study calls into question the trend towards greater aid selectivity based on an exclusive focus on recipient countries' characteristics (such as institutional characteristics and macroeconomic policies). At a minimum, the quality of the donor–recipient match may matter for aid effectiveness. More substantially, donor characteristics (and in particular, donor motives) may—through their effects on the nature of aid disbursed—have an effect on aid effectiveness which is independent of recipient characteristics (Kilby & Dreher, 2009).

Our finding that aid from specific donors promotes economic growth while aid from other donors does not raises an important question: What is it that makes aid from certain donors work? Data on sectoral allocations of aid at the donor–recipient level is incomplete and cannot serve as a basis for a conclusive analysis. For this reason, we remain agnostic as to the mechanisms which make aid from certain donors more growth-promoting than aid from others. For example, it could be argued that effective donors have more efficient administrations, face lower overhead costs, or are less bureaucratic so that more of each dollar of aid reaches the intended recipients (Easterly & Pfutze, 2008). A second possibility is that certain donors spend their resources better, by choosing priorities well and developing productive relationships with partners in the receipient country which ensure that official development assistance functions as intended. A third possibility is that aid from donors free of strategic preoccupations is more likely to facilitate politically costly, but growth-enhancing economic reforms (Bearce & Tirone, 2008). According to this argument, the aid-growth causal mechanism breaks down when the strategic benefits associated with providing aid are large for the donor government, as it cannot credibly enforce its conditions for desirable economic reforms in the recipient countries.

Despite a substantial aid-effectiveness literature, we still know little about what makes some types of aid more growth promoting than others. Our analysis points to the need for further research aimed at identifying the growth effects of distinct categories of aid over relevant time periods and better understanding the strategies of the most effective donors, so as to isolate the channels through which development aid works.

References

Acharya, A., de Lima, A. T. F., & Moore, M. (2006). Proliferation and fragmentation: Transactions costs and the value of aid. *Journal of Development Studies*, *42*(1), 1–21.

Alesina, A., & Dollar, D. (2000). Who gives foreign aid to whom and why? *Journal of Economic Growth*, *5*, 33–63.

Asiedu, E., & Nandwa, B. (2006). Does foreign aid promote economic growth? A dynamic panel analysis. In *Paper presented at the UNU-WIDER conference on aid: Principles, policies and performance* Helsinki, June 16–17.

Bagchi, A. K. (1982). *The political economy of underdevelopment*. Cambridge, UK: Cambridge University Press.

Bauer, P. (1976). *Dissent on development*. Cambridge, MA: Harvard University Press.

Bearce, D. H., & Tirone, D. C. (2008). *Foreign aid, recipient growth, and the strategic goals of donor governments*. Mimeograph. Department of Political Science, University of Pittsburgh.

Berthélemy, J.-C. (2006). Bilateral donors' interest vs. recipients' development motives in aid allocation: Do all donors behave the same? *Review of Development Economics*, 10(2), 179–194.

Berthélemy, J.-C., & Tichit, A. (2004). Bilateral donors' allocation decisions: A three dimensional panel analysis. *International Review of Economics and Finance*, 13(3), 253–274.

Bertocchi, G., & Canova, F. (1996). *Did colonialization matter for growth? An empirical exploration into the historical causes of Africa's underdevelopment*. Center for Economic Policy and Research Working Paper No. 1444, Washington, DC.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143.

Bobba, M., & Powell, A. (2006). *Multilateral intermediation of foreign aid: What is the tradeoff for donor countries?* Inter-American Development Bank Working Paper No. 4500, Washington, DC.

Bobba, M., & Powell, A. (2007). *Aid and growth: Politics matters*. Inter-American Development Bank Working Paper No. 601, Washington, DC.

Bond, B., Hoeffler, A., & Temple, J. (2001). *GMM estimation of empirical growth models*. Center for Economic Policy and Research Discussion Paper No. 3048, Washington, DC.

Boone, P. (1994). *The impact of foreign aid on savings and growth*. Center for Economic Performance Working Paper No. 1265, London School of Economics and Political Science.

Boone, P. (1996). Politics and the effectiveness of foreign aid. *European Economic Review*, 40(2), 289–329.

Brainard, L. (2006). *Security by other means. Foreign assistance, global poverty, and american leadership*. Washington, DC: Brookings Institution Press and the Center for Strategic and International Studies.

Brecher, R., & Bhagwati, J. (1982). Immiserizing transfers from abroad. *Journal of International Economics*, 13(3–4), 353–364.

Burnside, C., & Dollar, D. (2000). Aid, policies and growth. *American Economic Review*, 90(4), 847–869.

Clemens, M. A., Radelet, S., & Bhavnani, R. (2004). *Counting chickens when they hatch: The short-term effect of aid on growth*. Center for Global Development Working Paper No. 44, Washington, DC.

Collier, P., & Dollar, D. (2001). Can the world cut poverty in half? How policy reform and effective aid can meet international development goals. *World Development*, 29(11), 1787–1802.

Collier, P., & Dollar, D. (2002). Aid allocation and poverty reduction. *European Economic Review*, 46(8), 1475–1500.

Conway, P. (1993). An atheoretic evaluation of success in structural adjustment programs. *Economic Development and Cultural Change*, 42(2), 267–292.

Dalgaard, C.-J., Hansen, H., & Tarp, F. (2004). On the empirics of foreign aid and growth. *Economic Journal*, 114(496), 191–216.

Development Assistance Committee, Paris. (2006). *Development Assistance Committee (DAC) online database*. Available from: www.oecd.org/dac/stats/idsonline.

Dollar, D., & Levin, V. (2004). *The increasing selectivity of foreign aid: 1984–2002*. World Bank Policy Research Working Paper Series No. 3299, Washington, D.C.

Doroodian, K. (1993). Macroeconomic policies and adjustment under policies commonly supported by the International Monetary Fund. *Economic Development and Cultural Change*, 41(4), 849–864.

Easterly, W. (2003). Can foreign aid buy growth? *Journal of Economic Perspectives*, 17(3), 23–48.

Easterly, W. (2005). What did structural adjustment adjust? The association of policies and growth with repeated IMF and World Bank adjustment loans. *Journal of Development Economics*, 76(1), 1–22.

Easterly, W. (2006). *The white man's burden: Why the west's efforts to aid the rest have done so much ill and so little good*. New York, Oxford, UK: Oxford University Press.

Easterly, W. (2007a). Are aid agencies improving? *Economic Policy*, 22(52), 633–678.

Easterly, W. (2007b). Was development assistance a mistake? *American Economic Review Papers and Proceedings*, 97(2), 328–332.

Easterly, W., Levine, R., & Roodman, D. (2004). *New data, new doubts: A comment on burnside and dollar's "Aid, Policies and Growth"*. Center for Global Development Working Paper No. 26, Washington, D.C.

Easterly, W., & Pfutze, T. (2008). Where does the money go? Best and worst practices in foreign aid. *Journal of Economic Perspectives*, 22(2), 29–52.

Feyzioglu, T., Swaroop, V., & Zhu, M. (1998). A panel data analysis of the fugibility of aid. *World Bank Economic Review*, 12(1), 29–58.

Fleck, R. K., & Kilby, C. (2006a). How do political changes influence US bilateral aid allocations? Evidence from panel data. *Review of Development Economics*, 10(2), 210–223.

Fleck, R. K., & Kilby, C. (2006b). World Bank independence: A model and statistical analysis of US influence. *Review of Development Economics*, 10(2), 224–240.

Garner, P. (2008). Congo and Korea: A study in divergence. *Journal of International Development*, 20, 326–346.

Gates, S., & Hoeffler, A. (2004). *Global aid allocation patterns: Are Nordic donors different?* The Center for the Study of African Economies Working Paper No. 234, Oxford University.

Gomanee, K., Girma, S., & Morrisey, O. (2002). Aid and growth: Accounting for transmission mechanisms in sub-Saharan Africa. In *Paper presented at the University of Oxford "Understanding Poverty and Growth in sub-Saharan Africa" conference* March 18–19,

Grier, R. M. (1999). Colonial legacies and economic growth. *Public Choice*, 98(3–4), 317–335.

Guillaumont, P., & Chauvet, L. (2001). Aid and performance: A reassessment. *Journal of Development Studies*, 37(6), 66–92.

Hansen, H., & Tarp, F. (2001). Aid and growth regressions. *Journal of Development Economics*, 64(2), 547–570.

Hansson, P. (2007). Does EU aid promote growth? In Y. Bourdet, J. Gullstrand, & K. Olofsdotter (Eds.), *The European Union and developing countries: Trade, aid and growth in an integrating world* (pp. 188–211). Glos, UK and Northampton, MA: Edward Edgar Publishing.

Headey, D. D. (2007). Geopolitics and the effect of foreign aid on economic growth: 1970–2001. *Journal of International Development*, 20(2), 161–180.

Headey, D. D. (2005). *Foreign aid and foreign policy: How donors undermine the effectiveness of overseas development assistance*. Centre for Efficiency and Productivity Analysis Working Paper No. 5, School of Economics, University of Queensland.

Hines, J. R., & Thaler, R. H., Jr. (1995). The flypaper effect. *Journal of Economic Perspectives*, 9(4), 217–226.

Howard, P., & Rothenberg, P. J. (1993). Foreign aid and the question of fungibility. *Review of Economics and Statistics*, 75(2), 258–265.

Huber, P. (1981). *Robust statistics*. New York: Wiley.

Inman, R. P. (2008). *The flypaper effect*. National Bureau of Economic Research Working Paper No. 14579, Cambridge, MA.

Kanbur, R. (2000). Aid, conditionality and debt in Africa. In F. Tarp (Ed.), *Foreign aid and development: Lessons learnt and directions for the future*. New York: Routledge.

Khan, M. (1990). The macroeconomic effects of fund-supported adjustment programs. *IMF Staff Papers*, 37(2), 195–231.

Khilji, N. M., & Zampelli, E. M. (1994). The fungibility of US military and non-military assistance and the impacts on expenditures of major aid recipients. *Journal of Development Economics*, 43(2), 345–362.

Kilby, C., & Dreher, A. (2009). *The impact of aid on growth revisited: Do donor motives matter?* KOF Swiss Economic Institute Working Paper No. 225, Swiss Federal Institute of Technology, Zürich.

Killick, T. (1995). *IMF programmes in developing countries: Design and impact*. London: Taylor and Francis.

Knack, S., & Rahman, A. (2007). Donor fragmentation and bureaucratic quality in aid recipients. *Journal of Development Economics*, 83(1), 176–197.

Knack, S. (2000). *Aid dependence and the quality of governance: A cross-country empirical analysis*. World Bank Policy Research Working Paper No. 2396, Washington, DC.

Knack, S., & Keefer, P. (1995). Institutions and economic performance: Cross-country tests using alternative institutional measures. *Economics and Politics*, 7(3), 207–227.

Krauss, M. B. (1983). *Development without aid: Growth, poverty & government*. New York: McGraw-Hill.

Lipumba, N. H. I. (1994). *Structural adjustment policies and economic performance of African countries*. Center for Development Economics Working Paper No. 138, Williams College.

Minoiu, C., & Reddy, S. (2008). *Development aid and economic growth: A positive long-run relation (March 24, 2008)*. Available at SSRN: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=903865.

Miquel-Florensa, J. (2007). *Aid effectiveness: A comparison of tied and untied aid*. Department of Economics Working Paper No. 3, York University.

Mishra, P., & Newhouse, D. (2007). *Does health aid reduce infant mortality?* International Monetary Fund Working Paper No. 07/100, Washington, DC.

Mosley, P., Harrigan, J., & Toye, J. (1991). *Aid and power: The World Bank and policy-based lending*. London: Routledge.

Murray, M. P. (2006). Avoiding invalid instruments and coping with weak instruments. *Journal of Economic Perspectives*, 20(4), 111–132.

Pettersson, J. (2007). Foreign sectoral aid fungibility, growth, and poverty reduction. *Journal of International Development*, 19(8), 1074–1098.

Price, G. N. (2003). Economic growth in a cross-section of non-industrial countries: Does colonial heritage matter for Africa? *Review of Development Economics*, 7(3), 478–495.

Rajan, R. (2005). Aid and growth: The policy challenge. *Finance and Development*, 42(4), 53–55.

Rajan, R., & Subramanian, A. (2008). Aid and growth: What does the cross-country evidence really show? *Review of Economics and Statistics*, 90(4), 643–665.

Rajan, R., & Subramanian, A. (2007). Does aid affect governance? *American Economic Review*, 97(2), 322–327.

Rajan, R., & Subramanian, A. (2005). *What undermines aid's impact on growth?* National Bureau of Economic Research Working Paper No. 11657, Cambridge, MA.

Reddy, S., & Minoiu, C. (2009). Real income stagnation of countries: 1960–2001. *Journal of Development Studies*, 45(1), 1–23.

Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, 71(1), 135–158.

Roodman, D. (2007). *The commitment to development index.* 2007 ed. Essay, Washington, DC: Center for Global Development.

Roodman, D. (2006). *Building and running an effective policy index: Lessons from the commitment to development index.* Mimeograph. Center for Global Development, Washington, DC.

Roodman, D. (2005). *The commitment to development index* (2005 ed.). Washington DC: Center for Global Development.

Sachs, J. D. (2005a). *The end of poverty: Economic possibilities of our time.* New York: Penguin.

Sachs, J. D. (2005b). *Investing in development: A practical plan to achieve the millennium development goals (UN Millennium Project).* London: Earthscan.

Sachs, J. D., McArthur, J. W., Schimdt-Traub, G., Kruk, M., Bahadur, C., Faye, M., et al. (2004). Ending Africa's poverty trap. *Brookings Papers on Economic Activity*, *1*, 117–240.

Sachs, J. D., & Warner, A. M. (1995). *Economic convergence and economic policies.* Mimeograph. Department of Economics, Harvard University.

Stokke, O. (Ed.). (1989). *Western middle powers and global poverty. The determinants of the aid policies of Canada, Denmark, the Netherlands, Norway, and Sweden.* Uppsala: The Scandinavian Institute of African Studies. Oslo: The Norwegian Institute of International Affairs

Van de Walle, D., & Mu, R. (2007). *Fungibility and the flypaper effect of project aid: Micro-evidence from Vietnam.* World Bank Policy Research Working Paper No. 4133, Washington, DC.

Van de Walle, D., & Cratty, D. (2005). *Do donors get what they paid for? Micro-evidence on the fungibility of development aid.* World Bank Policy Research Working Paper No. 3542, Washington, DC.

Wacziarg, R., & Welch, K. H. (2003). *Trade liberalization and growth: New evidence.* National Bureau of Economic Research Working Paper No. 10152, Cambridge, MA.

World Bank. (2006). *World development indicators online.* Washington, DC: The World Bank Group. Available from: http://devdata.worldbank.org/dataonline/old-default.htm.