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Business Cycle Fluctuations, Large Shocks, and
Development Aid: New Evidence

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Business Cycle Fluctuations, Large Shocks, and Development Aid:
New Evidence

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Abstract

We examine the cyclical properties of development aid using bilateral data for 22 donors and over 100 recipients during 1970–2005. We find that bilateral aid flows are on average procyclical with respect to business cycles in donor and recipient countries. However, they become countercyclical when recipient countries face *large* adverse shocks to the terms-of-trade or growth collapses—thus playing an important cushioning role. Aid outlays contract sharply during severe donor economic downturns; this effect is magnified by higher public debt levels. Additionally, bilateral aid flows are higher in the presence of IMF programs and are more countercyclical for recipient countries with stronger institutions.

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I. Introduction

In the decade prior to the global financial crisis, bilateral aid flows to developing countries increased markedly. The onset of the crisis, however, raised widespread concerns that the *supply* of aid would decline. The presumption was that higher public expenditures aimed at supporting financial systems and stabilizing advanced economies, coupled with revenue shortfalls, would strain donor budgets. As aid recipients were expected to be hit hard by the crisis, there were also concerns that the *demand* for development aid would increase. Given the severity of the crisis in donor countries and its transmission channels to developing countries (such as lower exports, FDI, portfolio flows, and remittances), prospects of strained fiscal and external positions in recipient countries loomed, particularly for low-income countries with limited access to international capital markets.[2]

The crisis has raised a broader series of questions about the sensitivity of aid flows to donor and recipient-country economic conditions. To what extent does the business cycle in donor countries influence their development aid outlays? Has this impact been large and persistent during severe economic downturns in the past? How do macroeconomic conditions in low-income countries influence their aid receipts? While output cycles in recipient countries may affect aid flows, the direction is not clear a priori. For instance, donors may increase aid outlays to insure recipient countries against large external shocks and counteract severe economic downturns. But they may also increase aid disbursements during economic booms in recipient nations as a reward for sound macroeconomic policies. Moreover, this impact may vary across different country groups.

In this paper, we address these questions empirically using a large bilateral dataset over the period 1970–2005. Our results confirm earlier findings in the literature that aid flows are on average procyclical with respect to the donor output cycle, rising during expansions and falling during periods of below-trend growth. Aid flows to low-income countries are particularly sensitive to the donor cycle, with the estimated coefficients being systematically higher than for middle-income countries. We also find that aid flows are procyclical with respect to the recipient output cycle, falling during recessions. This result, however, is driven by the presence of middle-income countries in our sample. In contrast with existing studies (e.g., Pallage and Robe, 2001), we find no clear pattern of co-movement between bilateral aid and the output cycle of low-income countries, including countries in Sub-Saharan Africa.

Our results indicate that bilateral aid becomes countercyclical when aid recipients experience large adverse shocks. Specifically, it increases substantially during prolonged episodes of negative growth and adverse terms-of-trade (TOT) movements. Middle-income countries receive higher disbursements during growth collapses than low-income countries, while the latter receive more aid in the face of adverse TOT shocks. Moreover, these effects are persistent. When both the donor and recipient country experience large negative macroeconomic fluctuations, we find no additional impact on aid flows.

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[2] In this paper, "low-income countries" refers to all countries considered eligible for the Poverty Reduction and Growth Trust (PRGT) at end-June 2010 by the IMF.

Additionally, we find evidence of a non-linear relationship between aid flows and the donor and recipient cycles, suggesting that severe recessions in donor countries lead to a more than proportional reduction in bilateral aid flows. Furthermore, high public debt levels have historically played a significant role in contracting aid flows in the aftermath of severe donor economic downturns. We find that bilateral aid rises more markedly in the wake of large negative shocks for recipient countries with stronger institutions. Moreover, IMF programs play a significant catalytic role for bilateral aid flows. All our results are robust to alternative definitions of aid flows and across different regression specifications.

A sizeable body of literature has examined the determinants of aid allocation decisions. Our paper contributes to this literature in several ways. Unlike previous studies which focus on the independent effect of the business cycle in donor and recipient countries on aid flows, our paper is the first to analyze jointly the impact of the donor and recipient business cycles by looking at robust patterns in *bilateral* country data. In this regard, our work is related to existing studies that have exploited the advantages of using bilateral data to study patterns in other flows such as trade, FDI, and remittances.[3] In particular, bilateral aid flows allow us to estimate the business cycle effects on aid disbursements in a much more precise manner, taking into account unobserved features of the donor-recipient relationship and unveiling patterns that are hidden in data aggregated at the donor or recipient level.[4]

Second, we examine the behavior of aid allocations when donors and recipients face unusually large economic fluctuations (either independently or jointly). While the effect of donor banking and financial crises in reducing aid outlays has been well documented (Dang et al., 2009; Frot, 2009), the evidence on the impact of donor economic downturns more generally is less clear-cut. Lastly, we uncover heterogeneous responses of aid in sub-samples of low- and middle-income countries and explore a large array of specifications to assess the robustness of the results.

The remainder of this paper is organized as follows. Section II presents a review of the literature. Section III describes the data and provides definitions of the variables of the analysis. Section IV describes the baseline empirical model, discusses the estimation method, and reports the main findings. Section IV presents extensions of the baseline model and robustness checks. Section V concludes.

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[3] For FDI and remittances flows see, for instance, Dabla-Norris et al. (2010) and Frankel (2009), respectively. A large literature has utilized bilateral trade data to test trade theories (for an early review, see Deardorff, 1984).

[4] Specifically, bilateral data (i) provides a rich source of variation; (ii) enables us to assess the impact of pair-level time-varying variables such as pair-wise negative shocks; (iii) minimizes endogeneity concerns as the dependent variable captures pair-level information while many covariates are country-level variables; and (iv) allow us to subsume time-invariant pair-level characteristics into a saturated set of dummies.

II. LITERATURE REVIEW

The empirical literature on aid flows is divided into two strands. The first explores the effectiveness of aid flows in spurring long-term growth in recipient nations, and has been the subject of a long-standing debate among development economists.[5] Our study is only marginally related to this strand of the literature in that our presumption is that aid flows are a key source of external capital in developing countries, both for meeting short-term liquidity needs and for sustaining social spending. The latter is likely to bring large economic benefits over the long term.

Our paper contributes primarily to the second strand of the aid literature, which investigates the determinants of aid flows. Existing studies document the relative importance of political and strategic factors characterizing the donor-recipient relationship, as well as donor commercial interests, recipient economic needs, recipient socio-political stability, and macroeconomic performance in explaining aid allocations (see, among others, Alesina and Dollar, 2000; Berthélemy and Tichit, 2004; Younas, 2008, and Nielsen, 2009). Alesina and Weder (2002) and Dollar and Levin (2006) assess the causal impact on aid of recipient governance, property rights, and rule of law and political regime, documenting the rising importance of aid selectivity in shaping allocation decisions.

The impact of donor country features on aid disbursements has been the focus of a large number of empirical studies.[6] Our paper is more closely related to the handful of studies that have singled out the role of business cycles and crises in determining aid budget allocations. Pallage and Robe (2001) find inconclusive evidence on the relationship between business cycles in donor countries and disbursements of foreign aid to Africa over 1969–1992.[7] Mold et al. (2008), however, argue that the relationship between economic growth in donor countries and their aid outlays is ambiguous. They suggest that aid flows and GDP tend to co-move over long periods, but aid often becomes 'decoupled' from economic growth in OECD countries.

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[5]Despite the abundant literature on the subject, little consensus has emerged whether aid is effective in raising economic growth. Notable contributions include, on the one hand, Burnside and Dollar (2000), who conclude that "aid has a positive effect on growth in a good policy environment." On the other hand, Easterly (2003) and Rajan and Subramanian (2008) argue that aid has historically been ineffective in spurring growth. Some recent evidence by Minoiu and Reddy (2010) and Arndt et al. (2010) suggests that aid does have an effect on growth. See Doucouliagos and Paldam (2009) for a recent survey of this literature.

[6] For example, Round and Odedokun (2004) explore the effects on aid of income, population, "peer-pressure," and political polarization and fractionalization, Tingley (2010) studies the influence of the political and economic environment on aid effort, while Ball (2010) focuses on the contribution of cultural values to foreign aid policy. Chong and Gradstein (2008) consider variables that capture support for foreign aid and satisfaction with own government performance among voters in donor countries. In an earlier study, Guillaumont and Chauvet (2001) find that aid allocation has been influenced by external vulnerabilities, including climatic shocks.

[7] The same study presents evidence of procyclicality for aid commitments.

Looking at the impact of the output gap as a measure of the cyclical position of selected OECD donors, Faini (2006) finds it to be statistically insignificant in explaining aid flows over 1980–2004. In contrast, Bertoli et al. (2008) document a robust positive relationship between this measure of the cycle and aggregate aid flows in a larger panel of donors over 1970–2004. Conflicting evidence has been put forth on the effects of fiscal deficits on aid outlays, although there is agreement that higher public debt-to-GDP ratios in donor countries are associated with lower aid flows. Allen and Giovannetti (2009) find that the output gap does not explain aid flows, but its cube has a negative and statistically significant coefficient, which they interpret as a more than proportional impact of cycles on aid allocations.

The recent crisis has also spurred new work on the link between financial crises and aid flows. Roodman (2008) shows graphically that Finland, Japan, Norway, and Sweden reduced their aid flows substantially after their systemic banking crises in the early 1990s. Mendoza et al. (2009) find that stock market volatility—a proxy for financial stress and economic uncertainty—reduces US aid flows. Frot (2009) estimates that banking crises in donor countries decrease aid by 13 percent on average (level effect) and that aid falls by 5 percent yearly after the onset of a crisis (trend effect). Finally, Dang et al. (2009) document a substantial reduction of aid outlays after banking crises despite controlling for their impact on output.

Turning to the recipient cycle, Pallage et al. (2006) theoretically document the potential of foreign aid as insurance against macroeconomic shocks in developing countries. Despite the potential of foreign aid to reduce macroeconomic volatility, which benefits long-run growth (Ramey and Ramey, 1995), there is some evidence that development aid is procyclical with respect to output and revenues in recipient countries (Bulir and Hamann, 2007; Pallage and Robe, 2001).[8] Pallage and Robe (2001) find that in two thirds of African economies and half of non-African developing countries there is a high correlation between the cyclical component of aid receipts and the cyclical component of domestic output.

The empirically established procyclicality of aid receipts can be explained theoretically in a standard moral hazard model in which the donor country ties aid disbursements to the recipient's macroeconomic performance because of her inability to distinguish whether downturns are caused by exogenous shocks or macroeconomic mismanagement. This is a second-best outcome driven by the donor's inability to perfectly monitor the use of aid (Svensson, 2000; Banerjee, 2010a), which can be mitigated, for example, by higher quality macroeconomic management institutions in the aid-receiving country.

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[8] Rand and Tarp (2002), however, find no evidence that aid is procyclical in developing countries.

III. DATA, DEFINITIONS, AND DESCRIPTIVE STATISTICS

A. Data and Definitions of Aid and Business Cycle Variables

We use the OECD-DAC bilateral dataset of aid flows from 22 donors to 113 recipients over the period 1970–2005, giving us 90,000 observations.[9] (Tables 1 and 2 define the variables used in the analysis and list the countries in our sample, respectively.) Our dependent variable is real bilateral foreign aid, defined as bilateral ODA net of principal repayments, from which we subtract humanitarian emergency aid, development food aid, and debt forgiveness grants. Figures 1 and 2 show overall and regional trends in bilateral ODA. Note in particular the positive trend in aggregate bilateral ODA since 1997, which is also present in bilateral flows to Sub-Saharan Africa.

A potential problem with using bilateral flows is that the data contain many zero entries.[10] Dropping these observations may bias our results if, for example, such entries were non-random, reflecting unobserved characteristics of the donor-recipient pair. Following Arndt et al. (2010), we retain these zeros given that a majority of these flows represent "unreported null values" rather than genuine absent data. In addition, we adopt a semi-log transformation of the form:

$$aid_{ijt}{}^{*} = sign(aid_{ijt}) \log(1+ \mid aid_{ijt} \mid),$$

where aid_{ijt} denotes real bilateral aid from donor i to recipient j at time t. With this transformation of the dependent variable, we retain information related to both zero and negative entries in the sample. Furthermore, the estimated coefficients in the ordinary least squares (OLS) regressions can be interpreted as semi-elasticities or elasticities for large values of aid (Eichengreen and Irwin, 1998).

We construct several variables that capture fluctuations in the business cycle of donors and recipients. For donor countries, proxies for the output cycle are constructed by separating the permanent from the transitory component of GDP to obtain the output gap. This is done through a log-linear regression of real output against time, and by using the OECD dating methodology for identifying the output gap as a robustness check.[11] The two output gap estimates for the sample of 22 donors have a correlation coefficient of 0.56. We also use a second proxy which captures periods of economic expansion through a binary variable for above-trend real growth.

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[9] There are 134 recipients in the database, from which we eliminate 21 economies that are currently wealthy and/or have transitioned to donor status.

[10] These reflect the absence of a financial flow or missing observations. The number of zero entries in our sample drops over time from 70 percent in 1970 to 24 percent in 2005; the average over 1970–2005 is 43 percent.

[11] The OECD methodology is based on a production function approach (see Beffy et al., 2006, for a detailed description). Throughout the paper and in the tables the output gap corresponding to the OECD methodology is referred to as "OECD."

Quantifying economic fluctuations is more difficult in recipient countries, particularly low-income countries, which are undergoing structural transformation and are subject to more frequent and severe shocks. Rand and Tarp (2002) show that short-run macroeconomic fluctuations in developing countries differ markedly from those in advanced countries. Cycles have lower duration because of frequent and large shocks, and recessions are typically deeper and longer.[12] Our first proxy for the cycle in recipient countries is the output gap calculated using the Hodrick-Prescott (HP) filter, adjusting the smoothing parameter to allow for shorter cycles ($\lambda=1$ as opposed to 10 or 100 as is customary for yearly data) and dropping endpoints (see Rand and Tarp, 2002). We add to the output gap two additional measures, namely two binary variables that capture recessions by singling out years of below-trend GDP and consumption growth, respectively.

For all countries, we also construct measures of *large* shocks to determine whether aid flows behave differently in times of extreme economic fluctuations. For donors, large shocks are captured using dummies for those years when the output gap or growth deviations from trend fall into the bottom quartile of the donor-specific distribution. For recipients, we focus on (i) large adverse movements in the TOT—measured as year-on-year growth rates that fall in the bottom decile of the recipient-specific distribution; and (ii) episodes of growth collapse representing sustained decelerations to negative growth lasting at least three years (Hausmann et al., 2008).[13] Given our definition for TOT shocks, we only capture fleeting fluctuations in international commodity prices. In contrast, growth collapses are persistent, lasting at least three years. We consider both measures of output variation because external shocks explain only a small share of output instability in low-income countries, while the rest is caused by internal factors (Raddatz, 2007).

Summary statistics for all variables used in the analysis are presented in Table 3.

B. Data Exploration: Descriptive Statistics

We start our empirical analysis by looking at some simple descriptive statistics of the cycle variables we have constructed, including their correlation with bilateral aid flows.

The 22 OECD donors in our sample have experienced relatively small fluctuations in economic activity since the 1970s (Figure 3). Box-plots for the output gap in donor countries show that the large majority of observations are between –2 and +2 percentage points, with few extreme observations (left panel). There is much more variation in the range of estimated

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[12] See Ben-David and Papell (1998), Pritchett (2000), Hausmann et al. (2008), and Reddy and Minoiu (2009) for empirical evidence on the differences between the output cycle in advanced and developing countries. Guillaumont et al. (1999) document the large explanatory power of structural instabilities (such as TOT fluctuations, climatic shocks, and political disruptions) for the growth performance of African economies during the 1970s and 1980s.

[13] As a robustness check, we considered an alternative definition of shocks defined over the full-sample distribution rather than donor-specific distributions. The main thrust of our results remained qualitatively unchanged.

output gaps for aid recipients (right panel), but both cross-sectional distributions become narrower over the decades, reflecting a general fall in aggregate volatility.

The correlation coefficients between the output gap of donors and recipients and aggregate aid flows (scaled by GDP) are shown in Figure 4, which suggests that most donors disburse aid procyclically (left panels). It is less evident how aid flows co-move with the recipient cycle, as the distribution of correlation coefficients is centered on zero for both cycle variables (right panels).

Turning to large shocks, we plot the probability that a developing nation experienced a protracted growth collapse or a temporary TOT shock over 1970–2005 in Figure 5. Over time, aid recipients have been afflicted by increasing macroeconomic volatility, with 50 and 70 percent of the countries in our sample experiencing a growth collapse in the 1980s and 1990s, respectively. Between 10 and 20 percent of countries experienced unusually large adverse TOT shocks until the 1990s, and the share of vulnerable countries has been unsteady over time. For both measures considered, the number of adverse fluctuations appears to have been on the decrease since the early 2000s.

IV. THE BASELINE MODEL AND MAIN EMPIRICAL RESULTS

A. The Baseline Model and Estimation Method

To investigate the impact of business cycle fluctuations on bilateral aid flows, we use the following specification:

$$aid_{ijt}* = \alpha_{ij} + \beta CONTROLS_{ijt} + \gamma CYCLE_{it}^{donor} + \delta CYCLE_{jt}^{rec} + \lambda_t + \varepsilon_{ijt},$$

where $aid_{ijt}*$ are real (semi-log transformed) bilateral aid flows, α_{ij} denotes country-pair time-invariant characteristics, β is a vector of coefficients on time-varying control variables that capture scale effects (such as population and GDP trend); $CYCLE^{donor}$ and $CYCLE^{rec}$ refer to variables that capture the business cycle in the donor and recipient, respectively, either contemporaneously or lagged; λ_t represents time dummies reflecting shocks common to all country-pairs, and ε_{ijt} is the error term. The country-pair fixed effects capture pair-level variables such as past colonial ties, sharing a common language, geographical distance, and other time-invariant characteristics. Note that our key covariates $CYCLE^{donor}$ and $CYCLE^{rec}$ vary only at the donor- and recipient level, respectively, while the dependent variable varies at the country-pair level. This implies that endogeneity concerns, caused by causality running from aid flows to the cycle variables, especially in the case of recipient countries, are attenuated because of the bilateral nature of the data.

We estimate this parsimonious baseline specification both for the full sample and the sub-samples of low- and middle-income countries. The estimation method is OLS (with country-pair and time fixed effects) with standard errors that are clustered at the country-pair level.

B. Aid and the Donor Cycle

Overall, expansions in donor countries, captured both by a higher output gap and above-trend real growth, are accompanied by higher aid flows (Table 4). A one percentage point increase in the donor output gap (in percentage of potential GDP) raises real aid outlays on average by between 8 and 11 percent (depending on the output gap estimate). Expansions raise aid disbursements by one fifth in the full sample. These results underscore the procyclicality of aid flows with respect to the donor cycle that has been empirically established in the literature. We find no systematic difference across income groups, with estimated semi-elasticities having similar magnitudes across sub-samples.

When donors experience unusually adverse economic conditions, aid outlays are substantially reduced (Table 5). Unusually harsh conditions are captured by dummies for the output gap or a deviation of growth from trend falling in the bottom quartile of the donor-specific distribution. In years with large negative output gap, aid outlays fall by between 32 and 89 percent in the full sample (depending on the output gap estimate). Growth recessions reduce aid disbursements by 12 percent. Furthermore, aid flows to middle-income countries appear less sensitive to the donor cycle, with the estimated coefficients being systematically lower than for low-income countries. This result suggests that, in the face of large economic downturns, donors have historically reduced aid outlays to low-income countries by more than to middle-income countries.[14]

C. Aid and the Recipient Cycle

Table 6 presents the baseline specification that includes measures of the output cycle in recipient countries. These are akin to our previous regressions, except that now we control for the donor output gap and sequentially add proxies for the recipient cycle. We find that on average, bilateral aid disbursements are procyclical vis-à-vis the recipient cycle, with decreases of 15-21 percent in years of below-trend growth. Here, aid flows respond mostly to the output cycle in middle-income countries, with recessions triggering severe reductions in aid (by around one third). Middle-income countries drive the results for the full sample—as low-income countries' output has a statistically zero effect on flows. These confirm earlier findings regarding the average procyclicality of aid flows with respect to the recipient cycle, but we provide a more nuanced finding, as the effects appear to be strongest for middle-

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[14] An interesting question that arises is whether aid flows respond in the same way to symmetric positive shocks. Do economic booms in donor countries prompt correspondingly larger aid disbursements? In results not reported, we proxied for economic booms with dummy variables for the output gap and the growth deviation from trend falling into the top quartile of the donor-specific distribution, and found that the estimates semi-elasticities were remarkably close in magnitude (and of opposite sign) to those for large negative shocks. Specifically, large positive output gap years witness aid increases by 38 or 73 percent (depending on the output gap estimate), while growth expansions raise aid outlays by almost one fifth. The results by sub-sample suggest that all aid recipients benefit equally from economic expansions in donor countries regardless of income level.

rather than low-income countries.[15] Similar results are obtained for the sub-sample of low-income countries in Sub-Saharan Africa.[16]

Does this pattern hold up when we focus on the effect on development aid of *large* negative shocks experienced by aid-receiving countries? To answer this question, we construct two binary variables, which capture TOT growth rates falling into the bottom decile of each recipient's distribution (of TOT growth rates); and episodes of sustained deceleration to negative income growth. Notably, these variables alleviate measurement concerns that plague output gap estimates based on output smoothing techniques. Furthermore, they are arguably exogenous since it is difficult to conceive, e.g., that aid flows from any particular donor can trigger a multi-year growth collapse. In fact, entry of countries into such episodes is typically associated with wars, dramatic falls in exports, sudden stops, and political transitions (Hausmann et al., 2008)—variables that can also be treated as exogenous with respect to pair-wise aid flows.[17] As for TOT shocks, they are exogenous insofar as commodity export prices are not driven by individual country actions that may also affect bilateral aid flows (Deaton and Miller, 1996).

We find that aid recipients attract higher aid disbursements in the face of large negative economic shocks (Table 7). Bilateral aid to countries afflicted by large TOT shocks increases on average by 16 percent for the full-sample. These effects are driven by low-income countries, with TOT shocks resulting in a 28 percent increase in aid outlays. Similarly, growth collapses attract significantly higher bilateral aid flows—43 percent on average in the full sample. But they are mostly explained by middle-income countries for which bilateral aid disbursements increase by 65 percent. That growth collapses in low-income countries do not attract higher bilateral aid may be explained by many of these episodes being caused by conflict or political strife. This often leads bilateral donors to limit their engagement to existing bilateral aid activities and to postpone new projects until volatility subsides. Furthermore, insofar as growth collapses in low-income countries are seen as the result of domestic causes, bilateral donors may be hesitant to disburse countercyclically because of concerns over the quality of macroeconomic policies and the effectiveness of aid.

The finding that bilateral aid increases substantially in the face of TOT shocks and growth collapses are novel in the aid allocation literature and underscore the potential of development aid in mitigating the effects of adverse shocks. For instance, Collier and Dehn (2001) and Collier and Goderis (2009) have shown that negative commodity export price shocks reduce short-term growth but aid can substantially lower that effect, and have called for aid to be better targeted at shock-prone countries. In line with these policy

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[15] A note of caution is needed, however, in interpreting these results. Given that output fluctuations are difficult to measure in low-income countries, our cycle proxies may be mismeasured, causing a downward bias on the estimated coefficients in this sub-sample.

[16] The regression output is omitted for brevity, but is available upon request.

[17] Overall, 45 percent of the recipient-year observations in our sample belong to a growth collapse episode.

recommendations, our findings suggest that bilateral donors have historically increased financing to all countries in the wake of unusually adverse macroeconomic fluctuations.

D. Dynamic Effects

So far we have explored the *contemporaneous* cyclical properties of bilateral aid. We turn to specifications that allow for the cycle to have a *lagged* effect on foreign aid outlays. In doing so, we seek to reflect the fact that aid disbursements are typically locked into multi-year budgets and may not be easily adjustable when recipients needs increase suddenly due to unexpected shocks.

We find that large fluctuations in donor countries have a lasting effect on aid outlays, reducing them substantially during recessions (Table 8). The result is robust across different measures for the cycle, and for two of them is more pronounced in the sample of low-income countries. Overall, our results suggest that the decline of aid disbursements during episodes of severe donor economic downturns is persistent (for up to two years). Large TOT shocks for aid-receiving countries trigger higher bilateral aid flows especially to low-income countries, with aid flows almost doubling by the third year following a TOT collapse (Table 9). Growth collapses, on the other hand, attract more aid later in the episode in middle-income countries. These results suggest that while aid budgets may be somewhat rigid, recipient countries do receive more aid in the wake of large shocks, albeit to a different degree depending on their income level. [18]

E. Aid and Donor-Recipient (Pair-wise) Shocks

We have established that aid flows are on average procyclical relative to the donor cycle, with correspondingly larger effects when the donor experiences a large shock. Similarly, aid flows are on average procyclical relative to the recipient cycle, but increase markedly in the wake of large shocks that often afflict recipient countries. What happens when both the donor and the recipient are simultaneously hit by a negative shock? To address this question, we modify the specification to include interaction terms between the donor and the recipient cycle variables:

$$aid_{ijt}^* = \alpha_{ij} + \beta CONTROLS_{ijt} + \gamma CYCLE_{it}^{donor} + \delta CYCLE_{jt}^{rec} + \eta \left(CYCLE_{it}^{donor} \times CYCLE_{jt}^{rec} \right) + \lambda_t + \varepsilon_{ijt},$$

where the cycle variables for both the source and recipient country are the output gap, recession dummies, or large shock dummies.

We find that the patterns we have uncovered so far are robust to including interaction terms for the position of donors and recipients in their respective cycle (Table 10). The interaction terms themselves, however, are statistically indistinguishable from zero, leading us to

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[18] Our conclusion may be further weakened by the fact that the shocks can arrive late in the year, limiting the possibility for a simultaneous aid response (captured by aid flows in the same year); this is particularly the case for TOT shocks.

conclude that while aid outlays decrease on average during bad economic times in both the donor and the recipient, there is no added impact of this happening simultaneously.

V. EXTENSIONS AND ROBUSTNESS ANALYSIS

In this section we consider several extensions to our baseline results. The extensions include specifications that allow us to examine the effects on bilateral aid disbursements of (i) non-linear components of donor and recipient cycles, (ii) donor public debt levels, (iii) the quality of institutions in recipient countries, and (iv) the presence of an IMF program. In addition, we conduct a series of robustness checks, including (i) estimating the model with gross (instead of net) aid disbursements as the dependent variable; (ii) estimating a Tobit model to account for the censored nature of the dependent variable; and (iii) accounting for the persistence of aid by including lagged aid among the covariates.

A. Extensions

Aid and the Business Cycle: A Non-linear Relationship

To examine the possibility of a non-linear relationship between aid flows and the donor and recipient cycles noted in the literature (see Allen and Giovannetti, 2009), we modify the baseline model to include higher-order polynomial terms (quadratic and cubic) for the cycle variables. Using the statistically significant coefficient estimates from the regression (not reported here for brevity), we plot the (nonlinear) fitted relationship between the donor output gap and aid for both low- and middle-income countries (Figure 6). The relationship appears somewhat flatter for middle-income countries. While the curvature is not very pronounced for either country group, we find that aid disbursements increase with the donor output gap, but at decreasing rates. Furthermore, the turning point (beyond which aid becomes countercyclical) occurs earlier for middle-income countries.

Aid and Donor Public Debt

In the context of the current financial crisis, given the size of existing and projected debt levels (and the extent of the required fiscal consolidation) in advanced countries, it is possible that debt pressures will lead donors to reduce aid disbursements or at least restrain growth in aid budgets over the coming years. Here we examine the historical relationship between aid and donor debt by adding the donor debt-to-GDP ratio to the baseline covariates; and by interacting it with dummies for large donor shocks.

In line with the literature, high levels of public debt have a statistically significant negative effect on aid outflows (Table 11).[19] Each percentage point of GDP of public debt reduces aid flows by almost 2 percent. Furthermore, the detrimental effect of donor public debt on aid outflows is magnified during severe economic downturns. Although the added impact is not large, it is statistically significant, and appears to be somewhat persistent (up to a lag of two years).

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[19] See Faini (2006), Bertoli (2008), and Allen and Giovanetti (2009).

Aid and Institutions in Recipient Countries

A large number of studies have examined the role of institutions and political and economic regimes in developing countries in attracting aid flows. Here, we investigate whether the quality of institutions in the aid-receiving country modifies the cyclical properties of bilateral aid. As a proxy, we use the Polity IV score, which varies between −10 (autocracy) and +10 (democracy), with higher scores indicating a more democratic system. While the Polity IV score is not strictly an institutional quality indicator, it has the advantage of being available over the entire period of analysis. Its correlation with the International Country Risk Guide (ICRG) index, which is only available over 1984–2005, is 0.40.[20]

The results suggest that aid-receiving countries with better institutions attract higher aid flows, particularly in the case of low-income countries (Table 12). This is a level effect that largely reflects aid selectivity. When adding the interaction of institutional quality with TOT shocks and growth collapses, we find that aid has a stronger cushioning effect in countries with better institutions.[21] This suggests that conditional on having good institutions, aid does act as insurance for developing countries in the wake of large adverse shocks, possibly because the presence of better macroeconomic management institutions partially resolves the aid monitoring problem (Banerjee, 2010a, 2010b).

The Impact of IMF Programs and Other Regressors

In this section, we augment the baseline specifications with additional donor- and recipient-level variables. Specifically, for the donors we introduce the debt-to-GDP ratio, government revenue, and trade balance. For the recipients, we add variables which largely control for recipient needs and merit (life expectancy[22] and institutional quality, respectively) as well as a dummy variable for IMF programs. Pair-wise variables inspired from the aid allocation literature such as political allegiance (captured by voting patterns in the UNGA) and dummies for common language and a past colonial relationship are also considered (while dropping the pair-wise fixed effects and replacing them with separate donor and recipient fixed effects). Some variables (such as the donor Gini coefficient of inequality and remittances outflows) are included in separate regressions in order to maximize sample size.

The results indicate that the coefficients on our key cycle variables—i.e., the donor output gap and recipient below-trend growth variable—remain statistically significant and have

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[20] Our findings are robust to using the ICRG institutional quality index instead of the Polity IV (over the period 1984–2005 instead of 1970–2005). For a comparative discussion of the ICRG, Polity IV, and other institutional quality indices, see Glaeser et al. (2004).

[21] We also estimated specifications with interaction terms between institutional quality and the regular cycle variables (output gap, below-trend growth), and found that the estimated coefficients were statistically insignificant.

[22] We do not add the poverty rate because the data are scarce and its effect is mostly captured by the presence of the income variable (log-recipient GDP).

stable coefficient magnitudes across the specifications considered (Table 13). Most importantly, we document a significant catalytic role for IMF programs (columns 2–9): aid recipients with IMF programs receive double the amount of bilateral aid than countries without an IMF program. This effect is consistent with earlier studies which have discussed the complementarities between IMF programs and ODA (see, e.g., Bird and Rowlands, 2002, 2007).

B. Robustness Analysis

Gross Aid Flows

Our results are robust to alternative definitions of aid flows. In particular, baseline regressions with gross aid disbursements (instead of net disbursements) as the dependent variable (Table 14) reveal that the thrust of our findings are qualitatively similar, with some variation in the size of coefficients. Gross bilateral aid flows remain procyclical with respect to the business cycle in both donor and recipient countries. Moreover, gross disbursements become countercyclical when recipient countries face large adverse shocks.

Tobit with Random Effects

We also consider the fact that gross aid flows are censored at zero and re-run baseline regressions using the Tobit estimator with random effects. Our results hold up when employing this alternative estimation strategy (Table 15). A one percentage point increase in the donor output gap (in percentage of potential GDP) raises real aid outlays by between 4 and 6 percent, depending on the cycle measure, while a large recession year reduces them by 46 percent. In addition, gross disbursements are procyclical with respect to the recipient cycle, with declines of about 11 percent in years of below-trend growth. Development aid increases on average by 17 percent when recipients are afflicted by large TOT shocks and by 24 percent when they experience growth collapses.

Accounting for Aid Persistence

Accounting for the persistence of development aid flows does not materially affect our main results (Table 16).[23] The degree of persistence in pair-wise bilateral aid is substantially milder than in regressions that use aggregate aid flows at the donor or recipient level, with an estimated autoregressive coefficient of about 0.5. To some extent, even when controlling for aid persistence, bilateral aid flows show a positive response to donor and recipient cycles; and remain countercyclical when aid-receiving countries suffer growth collapses.

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[23] In estimating our dynamic panel models with the fixed effects estimator, we are assuming that the time dimension (T=36) is long enough for the dynamic panel bias to be small. (The bias is of order $O(N^{-1}T^{-3/2})$, see Kiviet, 1995.) Judson and Owen (1999) show that even with T=30, the bias of the auto-regression coefficient estimate ranges between 3 and 20 percent of the true value; however, that on the remaining regressors is small and similar across OLS and GMM-type estimators.

Post-Cold War Changes in Aid Regime

It has been argued that the end of the Cold War has changed the nature of bilateral aid, with geopolitical concerns playing a diminished role (Ball and Johnson, 1996; Meernik et al., 1998; Fleck and Kilby, 2010) and aid selectivity criteria such as growth performance or the quality of institutions and humanitarian motives acquiring a more prominent role (Berthelemy and Tichit, 2004; McGillivray, 2005; Bandyopadhyay and Wall, 2007). We check whether our core results hold up to estimating our empirical model in the pre- and post-Cold War period. To this end, we use our baseline specification and add a post-1989 indicator variable together with interaction terms between this variable and the donor and recipient measures of the output cycle. Small and statistically insignificant coefficients on the interaction terms would suggest that there is no difference in the cyclical behavior of bilateral aid flows pre- and post-1990.

We find that the interactions terms on the donor cycle variables are all zero, suggesting that bilateral aid disbursements were equally procyclical before and after 1990; the results are more mixed for the large donor shock variables (Table 17). For the recipients, we obtain 3 out of 5 statistically significant interaction coefficients, suggesting that our conclusions regarding the average procyclicality of aid with respect to the recipient output cycle and its countercyclicality in the face of large TOT shocks reflect mainly the behavior of post-Cold War bilateral aid flows. This is consistent with economic concerns becoming more important in determining aid disbursements in the post-Cold War era, as discussed in the literature.

VI. CONCLUSIONS

This paper documents the relevance of business cycles in donor and recipient countries in driving development aid flows. Using a large dataset on bilateral aid disbursements from advanced countries to developing countries, we find that aid flows are procyclical with respect to the donor and recipient business cycles. We also present new empirical evidence attesting to the countercyclical role of aid for developing countries when these experience large adverse exogenous shocks. In particular, we find that aid acts as insurance for low-countries in the presence of large terms of trade shocks. The cushioning effect of aid after large macroeconomic shocks is enhanced in better institutional environments. Additional findings relate to the importance of IMF programs in playing a catalytic role for bilateral aid.

In the context of the current economic downturn afflicting the advanced economies, what do our results imply for the likely path of aid disbursements over the next few years? Given the unprecedented severity of the current crisis and fiscal sustainability concerns for donor countries, evidence from the past decades may not necessarily serve as the best basis for projections. Nevertheless, we put forth three main empirical findings supporting the view that there are significant downside risks to the outlook for development aid.

First, severe economic downturns in donor countries have historically triggered persistent declines in aid disbursements. The strength of the rebound from the current crisis in many advanced countries has been modest to date, with prospects for a self-sustaining recovery in economic activity that are prone to important downside risks. Second, there are non-

linearities in the relationship between donor output cycles and aid outlays, which suggest disproportionate responses of aid allocations to macroeconomic fluctuations. Finally, bilateral aid flows decline more sharply in the aftermath of large output contractions in donor countries when these have higher public debt burdens—an effect that displays some persistence. Our analysis thus suggests that development aid could well fall in coming years.

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APPENDIX

Figure 1. Bilateral ODA, 1970–2008

Note: Bilateral Net ODA* excludes humanitarian aid, development food aid, and debt relief grants. All figures in 2008 US$ billion for 22 OECD donors.
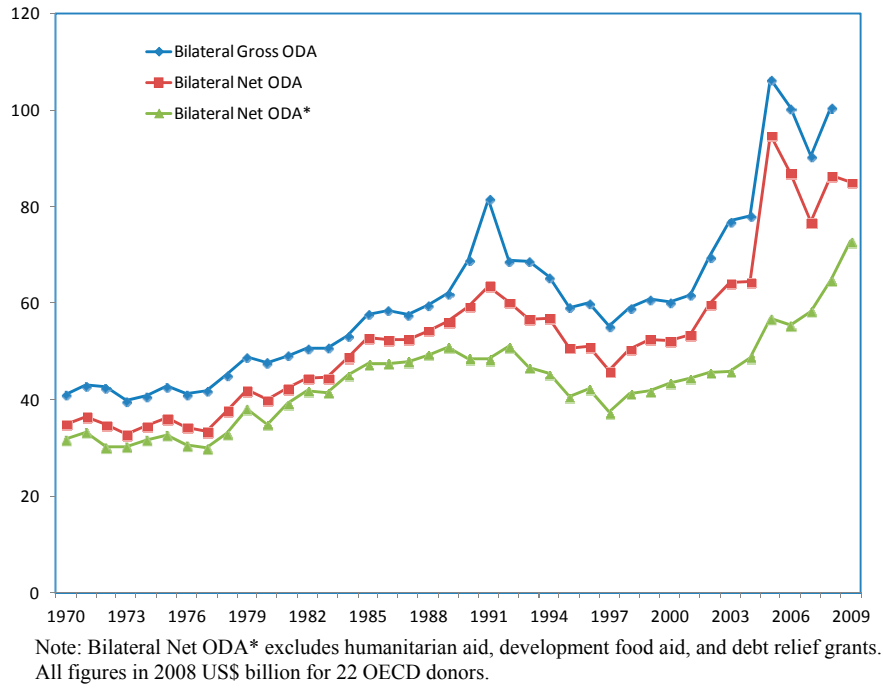
Figure 2. Geographical composition of bilateral net ODA, 1970–2007

Note: Bilateral Net ODA excludes humanitarian aid, development food aid, and debt relief grants. All figures in 2007 US$ billion.
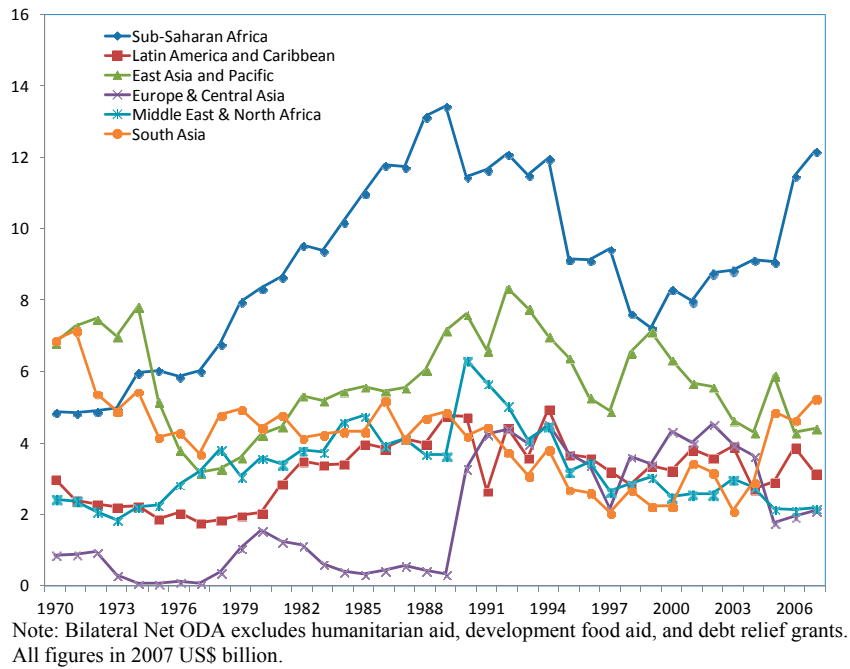
Table 1. Variable definitions and sources

Variable	Definition	Source
Dyadic variables		
Real bilateral aid (dyadic)	Bilateral aid flows, 2007 US$	OECD-DAC
Real bilateral trade (dyadic)	Real trade between the donor and recipient.	Qureshi and Tsangarides (2010), originally based on IMF's Direction of Trade statistics.
*Common language (dyadic)	Dummy for the donor-recipient sharing a common language	Qureshi and Tsangarides (2010)
*Former colony (dyadic)	Dummy for a donor-recipient former colonial relationship	Qureshi and Tsangarides (2010)
UNGA Voting variable	The fraction of times a recipient votes with the donor (as defined in Barro and Lee, 2005). Available for the following donors: Canada, France, Germany, Italy, Japan, United Kingdom, and United States.	Dreher and Sturm (2006)
Donor and recipient-level variables		
Real GDP (per capita)	Real GDP per capita (constant prices: chain series), at 2005 international US$	PWT Mark 6.3 (Heston et al., 2009)
Population		PWT Mark 6.3 (Heston et al., 2009)
Donor output gap & trend	Obtained through log-linear regression on trend	Authors' calculations.
Donor output gap (OECD)	For OECD methodology, see Beffy et al. (2006).	OECD Economic Outlook: Sources and Methods.
Donor above/below trend growth	Obtained through linear regression of growth on trend	Authors' calculations.
Donor public debt	Total public debt (% GDP)	Bertoli et al. (2008) and WEO (2009)
Donor trade balance	Trade balance (% GDP)	Bertoli et al. (2008) and WEO (2009)
Donor Gini coefficient	Gini coefficient of inequality (between 0 and 1)	Bertoli et al. (2008)
Donor remittances outflows	Remittances outflows (% GDP)	Bertoli et al. (2008)
Recipient output gap & trend	Obtained through HP filter with $\lambda=1$ (Rand and Tarp, 2002)	Authors' calculations.
*Recipient above/below trend growth	Obtained through linear regression of growth on trend	Authors' calculations.
Recipient final consumption	Consumption Share of Real GDP per capita (RGDPL) multiplied by Real GDP per capita (RGDPL).	PWT Mark 6.3 (Heston et al., 2009)
Recipient terms of trade (TOT)		WEO (2009)
Recipient terms of trade shocks	TOT growth rates in the bottom decile of the recipient-specific distribution; TOT variable smoothed using two-year moving average.	Authors' calculations.
*Recipient growth collapse	Episodes of deceleration to negative per capita GDP growth rates as defined in Hausmann, Rodriguez and Wagner (2008). We retain collapses that lasted at least three years.	Hausmann et al. (2008)
Recipient Polity IV score	Institutional quality score on a scale from -10 (autocracy) to +10 (democracy).	Polity IV project: Political Regime Characteristics and Transitions, 1800-2008.
Recipient life expectancy	Life expectancy at birth (total)	WDI (2009)
*IMF program	Dummy for at least five months of active IMF program in any given year.	Dreher (2006), updated February, 2010.

* denotes dummy variables.

Table 2. List of countries

Low income countries			Middle income countries		
(59 countries)			(54 countries)		
Afghanistan, I.R. of	Ethiopia	Nicaragua	Albania	Guatemala	Russia
Armenia	Gambia, The	Niger	Algeria	India	Seychelles
Bangladesh	Georgia	Nigeria	Angola	Indonesia	South Africa
Benin	Ghana	Papua New Guinea	Argentina	Iran, I.R. of	Sri Lanka
Bhutan	Guinea	Rwanda	Azerbaijan, Rep. of	Jamaica	Suriname
Bolivia	Guinea-Bissau	Senegal	Belarus	Jordan	Swaziland
Burkina Faso	Guyana	Sierra Leone	Belize	Kazakhstan	Syrian Arab Republic
Burundi	Haiti	Solomon Islands	Bosnia & Herzegovina	Macedonia, FYR	Thailand
Cambodia	Honduras	Sudan	Botswana	Malaysia	Tunisia
Cameroon	Kenya	Tajikistan	Brazil	Mauritius	Turkey
Cape Verde	Kiribati	Tanzania	Bulgaria	Mexico	Turkmenistan
Central African Rep.	Madagascar	Togo	Chile	Morocco	Ukraine
Chad	Malawi	Uganda	China,P.R.: Mainland	Namibia	Uruguay
Comoros	Maldives	Uzbekistan	Colombia	Pakistan	Venezuela, Rep. Bol.
Congo, Dem. Rep. of	Mali	Vanuatu	Costa Rica	Panama	
Congo, Republic of	Mauritania	Vietnam	Dominican Republic	Paraguay	
Côte d'Ivoire	Moldova	Yemen, Republic of	Ecuador	Peru	
Djibouti	Mongolia	Zambia	Egypt	Philippines	
Dominica	Mozambique	Zimbabwe	El Salvador	Poland	
Eritrea	Nepal		Gabon	Romania	

Note: List of recipient countries used in the analysis (see Section III.A).

Figure 3. Distribution of output gap estimates

Panel 1. Donors (N=22)   **Panel 2. Recipients (N=111)[1]**
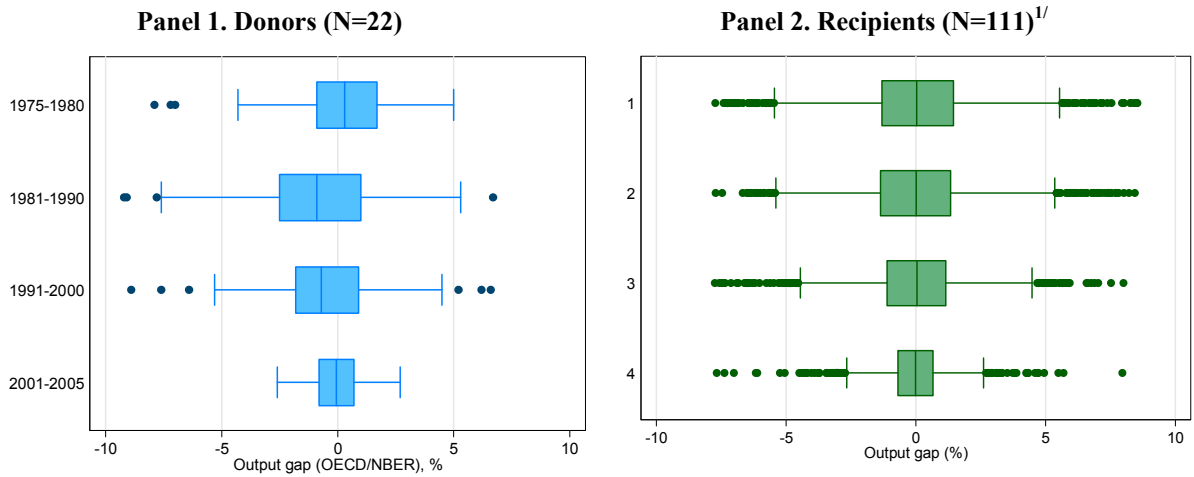
1/ Extreme output gap observations—the top and bottom ten percent—have been dropped.

Table 3. Summary statistics

	# obs.	Mean	St. Dev.	Min	Max
Donor variables					
Output gap (% PGDP)	89,496	0.1	5.3	-19.1	21.8
Output gap (OECD) (% PGDP)	78,987	-0.4	2.3	-9.2	6.7
1=Above-trend growth	87,010	0.5	0.5	0.0	1.0
Log-GDP trend	89,496	26.5	1.4	22.7	30.2
Log-population	89,496	16.5	1.4	12.8	19.5
Government revenue (% GDP)	77,066	40.9	8.7	20.6	62.2
Public debt (% GDP)	74,354	54.7	29.5	4.1	191.6
Trade balance (% GDP)	89,496	-0.7	13.1	-21.4	32.0
1=Currency crisis	89,496	0.008	0.087	0.0	1.0
Income inequality (Gini coeff.)	61,698	33.7	4.8	20.3	45.5
Remittances outflows (% GDP)	69,947	0.6	1.7	0.0	17.8
Recipient variables					
Output gap* (% PGDP) 1/	79,662	0.7	12.0	-40.9	19.2
1=Growth collapse	89,496	0.5	0.5	0.0	1.0
1=Large TOT shock	84,744	0.1	0.3	0.0	1.0
1=Below-trend GDP growth	78,804	0.5	0.5	0.0	1.0
1=Below-trend consumption growth	71,896	0.5	0.5	0.0	1.0
Log-GDP trend	81,290	23.7	2.0	18.3	29.8
Log-population	82,786	15.7	1.9	10.8	21.0
Polity IV score	73,980	-0.9	6.8	-10.0	10.0
1=IMF program	87,010	0.3	0.5	0.0	1.0
Life expectancy at birth (years)	38,104	60.6	10.2	23.6	78.5
Donor-recipient variables					
Log-real aid (net flows)	89,496	7.6	8.3	-20.8	21.8
Log-real aid (gross flows)	89,496	8.3	7.6	-18.3	22.8
Log-real bilateral trade	72,451	16.1	2.9	-7.1	25.6
Share of favorable UNGA votes	21,707	0.4	0.2	0.0	1.0
1=Common language	89,388	0.1	0.3	0.0	1.0
1=Former colony	89,388	0.0	0.2	0.0	1.0

1/ The minimum value for the output gap of aid recipients is –40.9 (Rwanda, 1994).

Figure 4. Correlation coefficients between the business cycle and aid

DONORS (N=22) **RECIPIENTS (N=111)**

Panel 1A. Output gap[1] **Panel 1B. Output gap[2]**
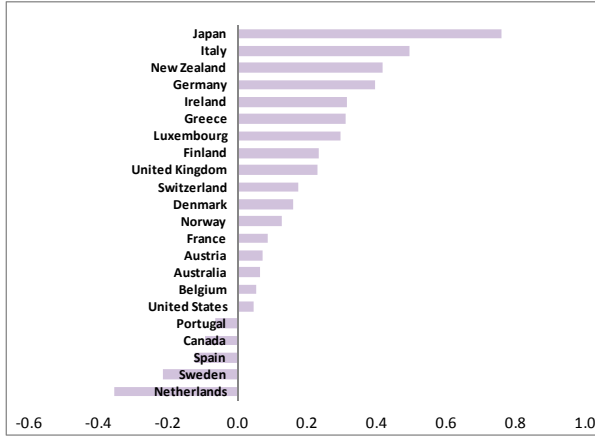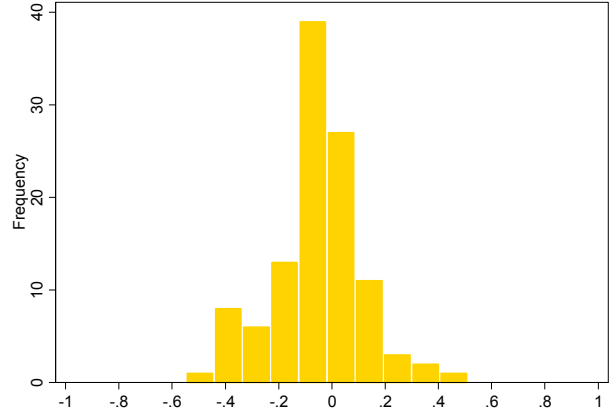
Panel 2A. Above-trend growth[3] **Panel 2B. Below-trend growth**
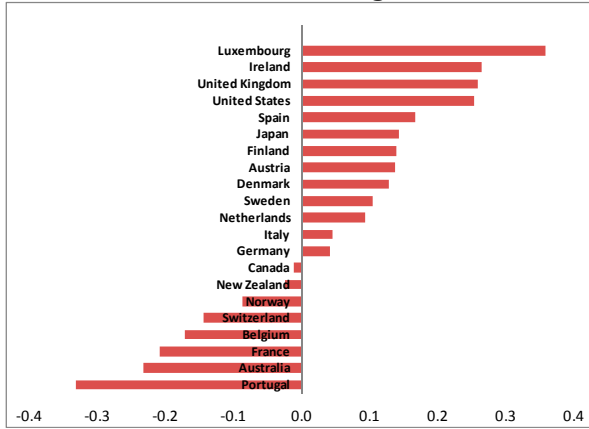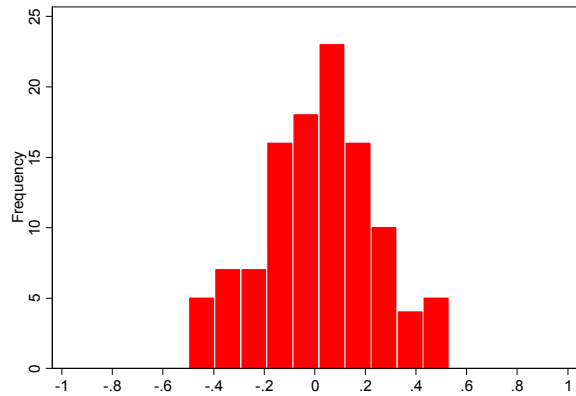
1/ Donors-specific contemporaneous correlation coefficients between the aid-to-GDP ratio and the donor cycle variable.
2/ Histogram of recipient-level contemporaneous correlation coefficients between the aid-to-GDP ratio and the cycle variable gap. Extreme output gap observations (below the 10th percentile and above the 90th percentile) have been dropped.
3/ Excluding Greece.

Figure 5. Yearly probability of a large shock in aid-receiving countries, 1970–2004

Panel 1. Growth collapses

Panel 2. Terms-of-trade shocks

See Table 1 and Section III.A for definitions.
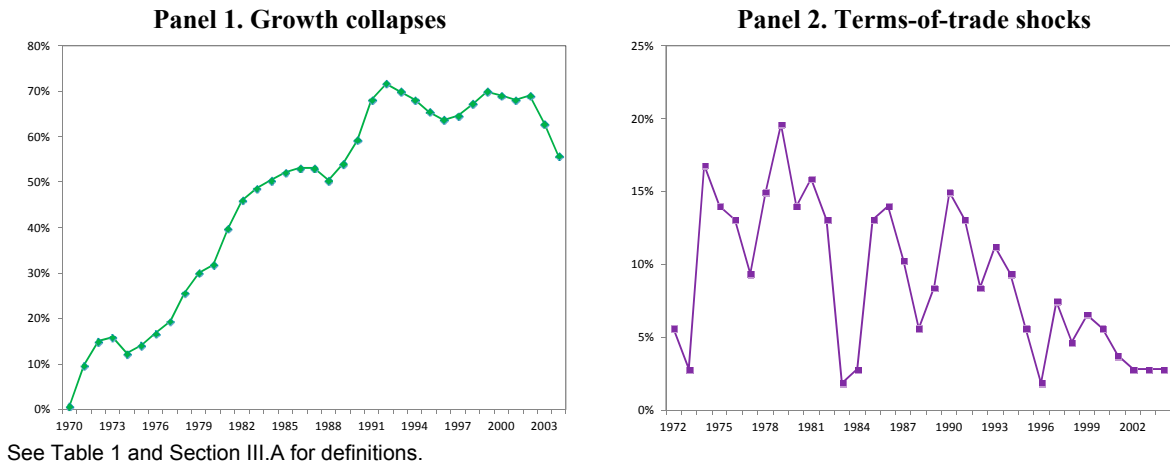
Figure 6. Conditional empirical relationship between the donor output gap and aid flows

Panel 1. LICs

Panel 2. MICs
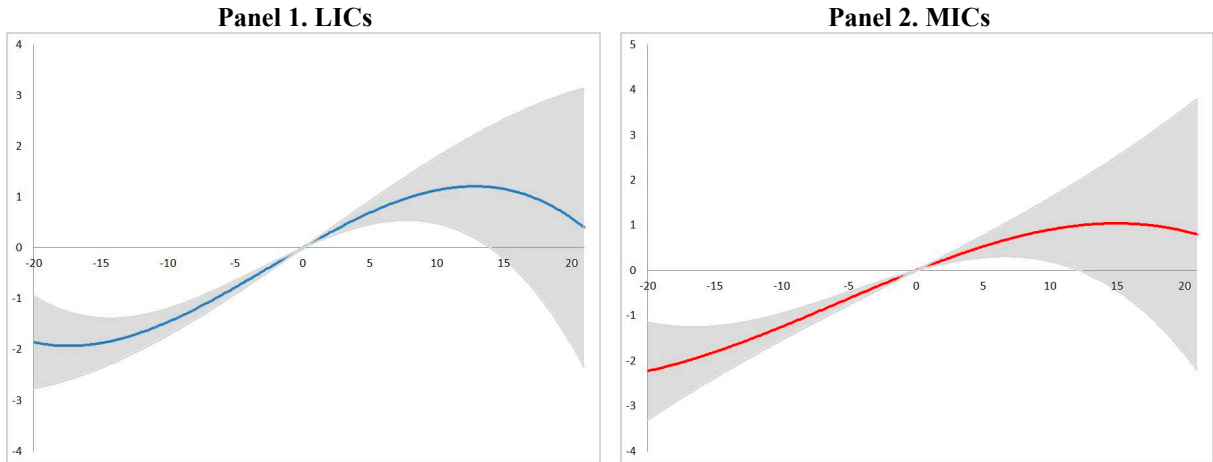
Notes: The coefficient curves, along with 95 percent confidence intervals, are based on estimates not reported in the paper, but available upon request.

Table 4. Baseline regressions: Aid flows and the donor cycle

	Full sample			LICs			MICs		
Log-Recipient population	-0.76***	-0.88***	-0.76***	0.64**	0.66**	0.62**	-2.13***	-2.61***	-2.24***
	(0.26)	(0.30)	(0.26)	(0.28)	(0.32)	(0.28)	(0.51)	(0.57)	(0.52)
Log-Recipient GDP	-3.14***	-3.79***	-3.38***	-1.17	-1.50*	-1.25	-6.12***	-6.88***	-6.37***
	(0.64)	(0.73)	(0.65)	(0.75)	(0.88)	(0.77)	(1.12)	(1.26)	(1.15)
Log-Donor population	-0.60	1.10	1.92	-3.84**	-1.94	-1.29	3.03	4.48	5.50*
	(1.70)	(1.93)	(1.77)	(1.83)	(2.13)	(1.90)	(2.94)	(3.28)	(3.07)
Log-Donor GDP trend	5.30***	3.99***	5.27***	6.34***	5.85***	6.38***	4.14***	1.92	4.03***
	(0.74)	(1.00)	(0.77)	(0.94)	(1.27)	(0.97)	(1.17)	(1.56)	(1.21)
Donor output gap	0.11***			0.12***			0.10***		
	(0.01)			(0.01)			(0.01)		
Donor output gap (OECD)		0.08***			0.07***			0.08***	
		(0.02)			(0.02)			(0.03)	
1=Donor above-trend growth			0.21***			0.16***			0.27***
			(0.05)			(0.06)			(0.09)
Observations	81290	72344	79178	42636	37891	41514	38654	34453	37664
Within R-squared	0.09	0.07	0.08	0.13	0.09	0.11	0.07	0.06	0.07
Number of pairid	2486	2486	2486	1298	1298	1298	1188	1188	1188

*** p<0.01, ** p<0.05, * p<0.1
Notes: The dependent variable is given by semi-log transformed real aid flows (see Section III.A). All specifications are estimated with country-pair and time fixed effects. The standard errors are clustered at the country-pair level.

Table 5. Baseline regressions: Aid flows and the donor cycle (large shocks)

	Full sample			LICs			MICs		
Log-Recipient population	-0.76***	-0.76***	-0.76***	0.64**	0.64**	0.64**	-2.13***	-2.13***	-2.13***
	(0.26)	(0.26)	(0.26)	(0.28)	(0.28)	(0.28)	(0.51)	(0.51)	(0.51)
Log-Recipient GDP	-3.14***	-3.14***	-3.14***	-1.17	-1.17	-1.17	-6.12***	-6.12***	-6.12***
	(0.64)	(0.64)	(0.64)	(0.76)	(0.76)	(0.76)	(1.12)	(1.12)	(1.12)
Log-Donor population	0.65	1.58	1.51	-2.46	-1.48	-1.55	4.13	5.00*	4.94*
	(1.70)	(1.71)	(1.71)	(1.83)	(1.85)	(1.85)	(2.93)	(2.95)	(2.95)
Log-Donor GDP trend	5.23***	4.90***	4.92***	6.24***	5.89***	5.91***	4.10***	3.79***	3.81***
	(0.74)	(0.74)	(0.74)	(0.95)	(0.94)	(0.94)	(1.17)	(1.16)	(1.16)
1=Output gap in bottom quartile	-0.89***			-0.95***			-0.82***		
	(0.09)			(0.10)			(0.14)		
1=Output gap in bottom quartile (OECD)		-0.32***			-0.35***			-0.28**	
		(0.08)			(0.09)			(0.14)	
1=Growth deviation in bottom quartile			-0.12*			-0.13*			-0.11
			(0.07)			(0.08)			(0.11)
Observations	81290	81290	81290	42636	42636	42636	38654	38654	38654
Within R-squared	0.09	0.08	0.08	0.12	0.12	0.12	0.07	0.07	0.07
Number of pairid	2486	2486	2486	1298	1298	1298	1188	1188	1188

*** p<0.01, ** p<0.05, * p<0.1
Notes: The dependent variable is given by semi-log transformed real aid flows (see Section III.A). All specifications are estimated with country-pair and time fixed effects. The standard errors are clustered at the country-pair level.

Table 6. Baseline regressions: Aid flows and the recipient cycle

	Full sample			LICs			MICs		
Log-Recipient population	-3.15***	-3.13***	-3.14***	-1.16	-0.90	-0.49	-6.09***	-6.11***	-6.05***
	(0.64)	(0.66)	(0.73)	(0.75)	(0.76)	(0.80)	(1.12)	(1.16)	(1.28)
Log-Donor population	-0.60	-0.04	0.28	-3.84**	-3.45*	-3.37*	3.03	3.80	4.20
	(1.70)	(1.77)	(1.89)	(1.83)	(1.89)	(2.01)	(2.94)	(3.07)	(3.24)
Log-Donor GDP trend	5.30***	5.48***	5.63***	6.34***	6.62***	6.80***	4.14***	4.21***	4.37***
	(0.74)	(0.77)	(0.82)	(0.94)	(0.97)	(1.04)	(1.17)	(1.21)	(1.29)
Donor output gap	0.11***	0.11***	0.11***	0.12***	0.13***	0.12***	0.10***	0.10***	0.09***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log-Recipient GDP trend	-0.78***	-0.78***	-1.25***	0.71**	0.70**	0.58*	-2.23***	-2.36***	-3.15***
	(0.27)	(0.28)	(0.30)	(0.29)	(0.29)	(0.31)	(0.53)	(0.54)	(0.58)
Recipient output gap	0.00			-0.01**			0.02**		
	(0.00)			(0.01)			(0.01)		
1=Rec. below-trend GDP growth		-0.15***			0.06			-0.38***	
		(0.05)			(0.05)			(0.08)	
1=Rec. below-trend cons. growth			-0.21***			-0.04			-0.37***
			(0.05)			(0.06)			(0.09)
Observations	81290	78804	71742	42636	41338	36850	38654	37466	34892
Within R-squared	0.09	0.08	0.08	0.13	0.12	0.11	0.07	0.07	0.07
Number of pairid	2486	2486	2354	1298	1298	1188	1188	1188	1166

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is given by semi-log transformed real aid flows (see Section III.A). All specifications are estimated with country-pair and time fixed effects. The standard errors are clustered at the country-pair level.

Table 7. Aid flows and the recipient cycle (large shocks)

	Full sample		LICs		MICs	
Log-Recipient population	-2.52***	-3.26***	-0.99	-1.23	-4.74***	-6.42***
	(0.64)	(0.63)	(0.76)	(0.76)	(1.13)	(1.12)
Log-Donor population	-0.50	-0.60	-3.90**	-3.84**	3.15	3.03
	(1.72)	(1.70)	(1.86)	(1.83)	(2.94)	(2.93)
Log-Donor GDP trend	5.20***	5.30***	6.18***	6.34***	4.14***	4.14***
	(0.75)	(0.74)	(0.97)	(0.95)	(1.17)	(1.17)
Donor output gap	0.11***	0.11***	0.13***	0.12***	0.10***	0.10***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log-Recipient GDP trend	-1.14***	-0.66**	0.60**	0.72**	-2.79***	-1.87***
	(0.29)	(0.27)	(0.30)	(0.29)	(0.54)	(0.53)
1=Recipient Large terms of trade shock	0.16*		0.28***		-0.05	
	(0.09)		(0.10)		(0.14)	
1=Recipient Growth collapse		0.43***		0.15		0.65***
		(0.12)		(0.15)		(0.20)
Observations	78672	81290	40370	42636	38302	38654
Within R-squared	0.09	0.09	0.13	0.13	0.08	0.08
Number of pairid	2354	2486	1188	1298	1166	1188

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is given by semi-log transformed real aid flows (see Section III.A). All specifications are estimated with country-pair and time fixed effects. The standard errors are clustered at the country-pair level.

Table 8. Aid flows and the donor business cycle (dynamic effects)

	Full sample			LICs			MICs		
Log-Recipient GDP	-0.782***	-0.782***	-0.782***	0.594**	0.594**	0.594**	-2.346***	-2.346***	-2.346***
	(0.27)	(0.27)	(0.27)	(0.28)	(0.28)	(0.28)	(0.53)	(0.53)	(0.53)
Log-Recipient population	-3.589***	-3.589***	-3.589***	-1.285	-1.285	-1.285	-6.616***	-6.616***	-6.616***
	(0.67)	(0.67)	(0.67)	(0.79)	(0.79)	(0.79)	(1.19)	(1.19)	(1.19)
Log-Donor population	1.368	2.859	2.681	-2.131	-0.488	-0.704	5.282*	6.600**	6.464**
	(1.83)	(1.84)	(1.84)	(1.95)	(1.97)	(1.96)	(3.16)	(3.18)	(3.18)
Log-Donor GDP trend	6.068***	5.579***	5.606***	7.297***	6.761***	6.791***	4.692***	4.257***	4.279***
	(0.81)	(0.80)	(0.80)	(1.02)	(1.01)	(1.00)	(1.26)	(1.25)	(1.26)
Large shock 1/	-0.464***			-0.531***			-0.390***		
	(0.08)			(0.09)			(0.13)		
Large shock, one year lag	-0.307***			-0.378***			-0.228**		
	(0.06)			(0.07)			(0.11)		
Large shock, two year lag	-0.462***			-0.453***			-0.471***		
	(0.07)			(0.09)			(0.12)		
Large shock 2/		-0.305***			-0.365***			-0.239**	
		(0.07)			(0.08)			(0.12)	
Large shock, one year lag		-0.113*			-0.057			-0.174*	
		(0.06)			(0.07)			(0.10)	
Large shock, two year lag		-0.310***			-0.278***			-0.345***	
		(0.07)			(0.08)			(0.11)	
Large shock 3/			-0.095			-0.121			-0.065
			(0.07)			(0.08)			(0.11)
Large shock, one year lag			-0.162***			-0.146**			-0.180*
			(0.06)			(0.06)			(0.10)
Large shock, two year lag			-0.283***			-0.401***			-0.153
			(0.07)			(0.07)			(0.11)
Observations	77066	77066	77066	40392	40392	40392	36674	36674	36674
Within R-squared	0.08	0.07	0.07	0.10	0.10	0.10	0.07	0.07	0.07
Number of pairid	2486	2486	2486	1298	1298	1298	1188	1188	1188

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is given by semi-log transformed real aid flows (see Section III.A). All specifications are estimated with country-pair and time fixed effects. The standard errors are clustered at the country-pair level. The donor country shocks are dummies for the output gap falling into the bottom quartile of the donor-specific distribution (1/ log-linear; and 2/ OECD); and 3/ deviations of growth from trend falling in the bottom quartile of the donor-specific distribution.

Table 9. Aid flows and the recipient business cycle (dynamic effects)

	Full sample		LICs		MICs	
Log-Recipient population	-2.91***	-3.78***	-1.14	-1.41*	-5.01***	-7.10***
	(0.68)	(0.67)	(0.79)	(0.79)	(1.21)	(1.20)
Log-Donor population	0.79	0.61	-2.88	-2.96	4.74	4.59
	(1.86)	(1.83)	(1.98)	(1.95)	(3.17)	(3.16)
Log-Donor GDP trend	5.45***	5.58***	6.57***	6.77***	4.24***	4.25***
	(0.81)	(0.80)	(1.02)	(1.00)	(1.26)	(1.25)
Donor output gap	0.11***	0.11***	0.12***	0.12***	0.10***	0.10***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log-Recipient GDP trend	-1.15***	-0.57**	0.62**	0.71**	-3.11***	-1.85***
	(0.30)	(0.28)	(0.30)	(0.29)	(0.57)	(0.59)
1=Large shock 1/	0.13		0.25**		-0.08	
	(0.08)		(0.10)		(0.13)	
1=Large shock, one year lag	0.13*		0.18**		0.05	
	(0.07)		(0.09)		(0.11)	
1=Large shock, two year lag	0.38***		0.56***		0.06	
	(0.08)		(0.10)		(0.12)	
1=Large shock 2/		0.23**		0.18		0.22
		(0.10)		(0.12)		(0.16)
1=Large shock, one year lag		0.04		-0.11		0.16
		(0.10)		(0.12)		(0.16)
1=Large shock, two year lag		0.37***		0.22		0.49***
		(0.11)		(0.14)		(0.18)
Observations	74536	77066	38214	40392	36322	36674
Within R-squared	0.08	0.08	0.11	0.11	0.07	0.07
Number of pairid	2354	2486	1188	1298	1166	1188

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is given by semi-log transformed real aid flows (see Section III.A). All specifications are estimated with country-pair and time fixed effects. The standard errors are clustered at the country-pair level. The recipient country shocks are dummies for 1/ the TOT growth rate falling in the bottom decile of the recipient-specific distribution; 2/ growth collapse.

Table 10. Aid flows and simultaneous shocks (contemporaneous effects)

	Full sample			LICs			MICs		
Log-Recipient population	-3.147***	-3.127***	-3.261***	-1.155	-0.903	-1.232	-6.086***	-6.109***	-6.419***
	(0.64)	(0.66)	(0.63)	(0.75)	(0.76)	(0.76)	(1.12)	(1.16)	(1.12)
Log-Donor population	-0.602	2.019	0.646	-3.843**	-1.207	-2.461	3.033	5.631*	4.128
	(1.70)	(1.78)	(1.70)	(1.83)	(1.90)	(1.83)	(2.94)	(3.07)	(2.92)
Log-Donor GDP trend	5.305***	5.300***	5.231***	6.345***	6.410***	6.246***	4.141***	4.053***	4.093***
	(0.74)	(0.77)	(0.75)	(0.94)	(0.97)	(0.95)	(1.17)	(1.21)	(1.17)
Log-Recipient GDP trend	-0.778***	-0.777***	-0.656**	0.706**	0.700**	0.717**	-2.230***	-2.357***	-1.869***
	(0.27)	(0.28)	(0.27)	(0.29)	(0.29)	(0.29)	(0.53)	(0.54)	(0.53)
Donor output gap, log-linear	0.113***			0.124***			0.100***		
	(0.01)			(0.01)			(0.01)		
Recipient output gap	0.000			-0.013**			0.022**		
	(0.00)			(0.01)			(0.01)		
Donor x Recipient output gap	0.001			0.002***			-0.001		
	(0.00)			(0.00)			(0.00)		
1=Donor below-trend growth		-0.207***			-0.150*			-0.228**	
		(0.07)			(0.08)			(0.11)	
1=Recipient below-trend growth		-0.149**			0.066			-0.346***	
		(0.06)			(0.07)			(0.11)	
1=Donor x Rec. below-trend growth		-0.004			-0.021			-0.071	
		(0.09)			(0.11)			(0.15)	
1=Large donor shock			-0.895***			-0.971***			-0.806***
			(0.11)			(0.13)			(0.18)
1=Large recipient shock			0.430***			0.138			0.653***
			(0.13)			(0.15)			(0.21)
1=Large donor x recipient shock			0.010			0.037			-0.030
			(0.14)			(0.16)			(0.23)
Observations	81290	78804	81290	42636	41338	42636	38654	37466	38654
Within R-squared	0.09	0.08	0.09	0.13	0.11	0.12	0.07	0.07	0.07
Number of pairid	2486	2486	2486	1298	1298	1298	1188	1188	1188

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is given by semi-log transformed real aid flows (see Section III.A). All specifications are estimated with country-pair and time fixed effects. The standard errors are clustered at the country-pair level. The shocks refer to the donor output gap falling into the bottom quartile of the distribution; and the recipient experiencing a growth collapse.

Table 11.Aid flows and donor public debt (dynamic effects)

VARIABLES	Output gap in bottom quartile		Output gap in bottom quartile (OECD)		Growth deviation from trend in bottom quartile	
Log-Recipient GDP	-0.932***	-1.003***	-0.932***	-1.003***	-0.932***	-1.003***
	(0.32)	(0.33)	(0.32)	(0.33)	(0.32)	(0.33)
Log-Recipient population	-4.640***	-5.097***	-4.640***	-5.097***	-4.640***	-5.097***
	(0.80)	(0.85)	(0.80)	(0.85)	(0.80)	(0.85)
Log-Donor population	4.181	8.288***	5.418**	9.921***	5.407**	9.993***
	(2.61)	(2.88)	(2.60)	(2.84)	(2.60)	(2.84)
Log-Donor GDP trend	8.597***	7.951***	8.094***	7.256***	8.037***	7.378***
	(1.30)	(1.47)	(1.29)	(1.44)	(1.29)	(1.42)
Public debt (% GDP)	-0.012**	-0.014**	-0.016***	-0.017***	-0.017***	-0.016***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
1=Large shock	-0.497***	-0.281***	-0.154*	-0.118	-0.236***	-0.213***
	(0.10)	(0.09)	(0.09)	(0.09)	(0.08)	(0.08)
Public debt x Large shock	-0.005***	-0.003	-0.004***	-0.003	-0.006***	-0.010***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
1=Large shock, one year lag		-0.239***		-0.102		-0.258***
		(0.08)		(0.07)		(0.07)
Public debt x Large shock, one year lag		-0.006***		-0.003***		-0.004***
		(0.00)		(0.00)		(0.00)
1=Large shock, two year lag		0.146		0.070		0.362**
		(0.21)		(0.17)		(0.14)
Public debt x Large shock, two year lag		0.004		-0.002*		-0.001
		(0.83)		(0.00)		(0.00)
Observations	64150	59896	64150	59896	64150	59896
Within R-squared	0.05	0.04	0.05	0.04	0.05	0.04
Number of pairid	2486	2486	2486	2486	2486	2486

Notes: The dependent variable is given by semi-log transformed real aid flows (see Section III). All specifications are estimated with country-pair and time fixed effects. The standard errors are clustered at the country-pair level. Full sample.

Table 12. Aid and institutions in recipient countries

VARIABLES	Full sample		LICs		MICs	
	1/	2/	1/	2/	1/	2/
Log-Recipient population	-4.12***	-4.33***	-2.87***	-3.25***	-6.01***	-6.27***
	(0.74)	(0.73)	(1.01)	(0.99)	(1.19)	(1.20)
Log-Donor population	-1.05	-1.08	-5.18***	-5.03***	3.09	3.09
	(1.84)	(1.82)	(1.95)	(1.93)	(3.09)	(3.09)
Log-Donor GDP trend	5.83***	5.94***	7.14***	7.29***	4.51***	4.51***
	(0.79)	(0.78)	(1.01)	(0.99)	(1.20)	(1.19)
Donor output gap	0.11***	0.11***	0.13***	0.12***	0.10***	0.10***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log-Recipient GDP trend	-1.12***	-0.88***	0.66*	0.80**	-1.76***	-1.58***
	(0.34)	(0.31)	(0.38)	(0.36)	(0.57)	(0.58)
1=Large recipient shock	0.10***	0.07***	0.06***	0.03	0.14***	0.10***
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
Recipient Polity IV score	0.15	0.42***	0.31***	0.36**	-0.13	0.36*
	(0.09)	(0.13)	(0.12)	(0.17)	(0.15)	(0.21)
1=Large shock x Polity IV score	0.04***	0.03**	0.03*	0.02	0.05**	0.07***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	70664	72886	35310	37466	35354	35420
Within R-squared	0.09	0.09	0.12	0.12	0.08	0.08
Number of pairid	2178	2288	1078	1166	1100	1122

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: The dependent variable is given by semi-log transformed real aid flows (see Section III.A). All specifications are estimated with country-pair and time fixed effects. The standard errors are clustered at the country-pair level. The recipient country shocks are dummies for 1/ the TOT growth rate falling in the bottom decile of the recipient-specific distribution; 2/ growth collapse.

Table 13. Aid flows and the business cycle: Augmented specifications

VARIABLES	1	2	3	4	5	6	7	8	9
Log-Recipient population	-4.42***	-4.64***	-4.36***	-4.68***	-3.13*	-4.18***	-4.85***	-3.75***	-3.26***
	(0.86)	(0.84)	(1.14)	(0.96)	(1.76)	(0.91)	(0.94)	(0.93)	(0.90)
Log-Donor population	5.97**	5.97**	5.12	6.18*	8.10	4.99*	4.65	5.69*	-4.21***
	(2.67)	(2.65)	(3.21)	(3.64)	(7.31)	(2.87)	(3.00)	(3.30)	(0.58)
Log-Donor GDP trend	6.30***	6.30***	4.31**	4.68***	23.87***	4.76***	4.00***	2.83*	4.90***
	(1.25)	(1.24)	(1.87)	(1.53)	(8.97)	(1.38)	(1.44)	(1.56)	(0.61)
Output gap (donor)	**0.12*****	**0.12*****	**0.08*****	**0.11*****	**0.21*****	**0.11*****	**0.12*****	**0.10*****	**0.13*****
	(0.01)	**(0.01)**	**(0.01)**	**(0.01)**	**(0.01)**	**(0.01)**	**(0.01)**	**(0.01)**	**(0.01)**
Log-Recipient GDP trend	-1.01***	-0.93***	-1.08***	-1.20***	-1.33**	-1.77***	-1.80***	-1.43***	-2.03***
	(0.34)	(0.34)	(0.45)	(0.37)	(0.65)	(0.38)	(0.42)	(0.45)	(0.45)
1=Below-trend growth (recipient)	**-0.24*****	**-0.19*****	**-0.23*****	**-0.21*****	**-0.21***	**-0.16*****	**-0.18*****	**-0.22****	**-0.21****
	(0.05)	**(0.05)**	**(0.06)**	**(0.06)**	**(0.12)**	**(0.06)**	**(0.06)**	**(0.09)**	**(0.09)**
Donor government revenue	0.14***	0.14***	0.17***	0.10***	-0.10	0.13***	0.14***	0.13***	0.14***
	(0.02)	(0.02)	(0.02)	(0.03)	(0.07)	(0.03)	(0.03)	(0.03)	(0.01)
Donor public debt	-0.01	-0.01	-0.02***	-0.01*	0.03***	-0.01	-0.01**	-0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Donor trade balance	0.04***	0.04***	0.02	0.01	0.03	0.04***	0.05***	0.04***	0.13***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.05)	(0.01)	(0.01)	(0.01)	(0.01)
1=IMF program		1.07***	0.82***	1.05***	1.44***	1.03***	0.94***	0.98***	0.90***
		(0.10)	(0.11)	(0.11)	(0.20)	(0.10)	(0.10)	(0.12)	(0.12)
Donor inequality (Gini coefficient)			-0.09*						
			(0.05)						
Donor remittances outflows				1.13***					
				(0.15)					
Recipient --> donor favorable UNGA voting					13.48***				
					(1.43)				
Log-Real bilateral trade						0.36***	0.35***	0.38***	0.98***
						(0.05)	(0.05)	(0.06)	(0.06)
Recipient Polity IV score							0.10***	0.11***	0.11***
							(0.02)	(0.02)	(0.02)
Recipient life expectancy at birth (total)								-0.07**	-0.07***
								(0.03)	(0.03)
1=Common language									2.11***
									(0.36)
1=Former colony									1.44**
									(0.61)
Observations	63518	63518	41140	53914	18507	57886	53158	24143	24143
Within R-squared	0.06	0.06	0.05	0.05	0.07	0.05	0.06	0.08	0.27
Number of pairid	2486	2486	2310	2373	777	2484	2283	2240	2240

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is given by semi-log transformed real aid flows (see Section III). All specifications (except the last column) are estimated with country-pair and time fixed effects. Estimates in the last column are based on a specification that includes donor, recipient, and time fixed effects. The standard errors are clustered at the country-pair level. The coefficient estimates for the donor and recipient cycle variables are in boldface.

Table 14. Robustness: Gross aid flows

VARIABLES	Donor cycle						Recipient cycle				
	Output gap	Output gap (OECD)	1 = Above-trend grow th	Output gap bottom quartile	Output gap bottom quartile (OECD)	Deviation from trend grow th in bottom quartile	Output gap (HP)	1=Below - trend GDP grow th	1=Below - trend cons. grow th	TOT grow th rate in bottom decile	Grow th collapse
Log-Recipient GDP	-0.26	-0.35	-0.28	-0.26	-0.26	-0.26					
	(0.22)	(0.24)	(0.22)	(0.22)	(0.22)	(0.22)					
Log-Rec GDP trend							-0.27	-0.27	-0.62**	-0.54**	-0.20
							(0.22)	(0.23)	(0.25)	(0.24)	(0.22)
Log-Recipient population	-3.76***	-4.52***	-4.05***	-3.76***	-3.76***	-3.76***	-3.76***	-3.82***	-4.13***	-3.29***	-3.83***
	(0.56)	(0.62)	(0.57)	(0.56)	(0.56)	(0.56)	(0.56)	(0.57)	(0.64)	(0.56)	(0.56)
Log-Donor population	-5.00***	-4.60***	-3.75***	-3.98***	-3.38**	-3.43**	-5.00***	-5.18***	-5.70***	-4.87***	-5.00***
	(1.39)	(1.55)	(1.43)	(1.39)	(1.39)	(1.39)	(1.39)	(1.44)	(1.53)	(1.41)	(1.39)
Log-Donor GDP trend	5.14***	4.76***	5.25***	5.05***	4.84***	4.86***	5.14***	5.42***	5.59***	5.05***	5.14***
	(0.71)	(0.92)	(0.73)	(0.71)	(0.71)	(0.71)	(0.71)	(0.74)	(0.78)	(0.72)	(0.71)
Donor cycle	0.08***	0.06***	0.31***	-0.56***	-0.26***	-0.17***	0.08***	0.08***	0.08***	0.08***	0.08***
	(0.01)	(0.01)	(0.04)	(0.06)	(0.06)	(0.05)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Recipient cycle							-0.00	-0.15***	-0.14***	0.13*	0.26***
							(0.00)	(0.03)	(0.04)	(0.07)	(0.09)
Observations	81290	72344	79178	81290	81290	81290	81290	78804	71742	78672	81290
Within R-squared	0.20	0.16	0.18	0.19	0.19	0.19	0.20	0.19	0.18	0.20	0.20
Number of pairid	2486	2486	2486	2486	2486	2486	2486	2486	2354	2354	2486

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is given by semi-log transformed real *gross* aid flows. All specifications are estimated with country-pair and time fixed effects. The standard errors are clustered at the country-pair level. Full sample.

Table 15. Robustness: Tobit with Random Effects

VARIABLES	Donor cycle						Recipient cycle				
	Output gap	Output gap (OECD)	1 = Above-trend grow th	Output gap bottom quartile	Output gap bottom quartile (OECD)	Deviation from trend grow th in bottom quartile	Output gap (HP)	1=Below - trend GDP grow th	1=Below - trend cons. grow th	TOT grow th rate in bottom decile	Grow th collapse
Log-Recipient GDP	0.41	0.01	0.04	0.04	0.04	0.04					
	(0.49)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)					
Log-Rec GDP trend							0.06	0.04	-0.17***	-0.17***	0.10**
							(0.05)	(0.05)	(0.06)	(0.05)	(0.05)
Log-Recipient population	0.48***	0.58***	0.48***	0.48***	0.48***	0.48***	0.47***	0.49***	0.70***	0.68***	0.41***
	(0.06)	(0.07)	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)
Log-Donor population	-6.44***	-5.08***	-6.56***	-6.63***	-6.47***	-6.48***	-6.43***	-6.53***	-6.73***	-6.36***	-6.43***
	(0.21)	(0.24)	(0.21)	(0.21)	(0.21)	(0.21)	(0.21)	(0.21)	(0.22)	(0.21)	(0.21)
Log-Donor GDP trend	8.26***	6.83***	8.40***	8.47***	8.31***	8.32***	8.26***	8.37***	8.58***	8.19***	8.25***
	(0.21)	(0.25)	(0.22)	(0.21)	(0.21)	(0.21)	(0.21)	(0.22)	(0.23)	(0.21)	(0.21)
Donor cycle	0.06***	0.04***	0.28***	-0.46***	-0.19***	-0.20***	0.06***	0.06***	0.06***	0.06***	0.06***
	(0.00)	(0.01)	(0.03)	(0.03)	(0.04)	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Recipient cycle							-0.01***	-0.11***	-0.11***	0.17***	0.24***
							(0.00)	(0.03)	(0.03)	(0.05)	(0.04)
Observations	81290	72344	79178	81290	81290	81290	81290	78804	71742	78672	81290
Number of pairid	2486	2486	2486	2486	2486	2486	2486	2486	2354	2354	2486

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is given by semi-log transformed real *gross* aid flows. All specifications are estimated with country-pair (random) effects and time effects. Full sample.

Table 16. Robustness: Accounting for aid persistence

VARIABLES	Donor cycle						Recipient cycle				
	Output gap	Output gap (OECD)	1 = Above-trend growth	Output gap bottom quartile	Output gap bottom quartile (OECD)	Deviation from trend growth in bottom quartile	Output gap (HP)	1=Below-trend GDP growth	1=Below-trend cons. growth	TOT growth rate in bottom decile	Growth collapse
Log-Real aid, one year lag	0.52***	0.51***	0.52***	0.52***	0.52***	0.52***	0.52***	0.52***	0.51***	0.52***	0.52***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log-Recipient GDP	-0.41***	-0.45***	-0.41***	-0.41***	-0.41***	-0.41***					
	(0.13)	(0.15)	(0.13)	(0.13)	(0.13)	(0.13)					
Log-Rec GDP trend							-0.41***	-0.42***	-0.70***	-0.59***	-0.34**
							(0.14)	(0.14)	(0.15)	(0.14)	(0.14)
Log-Recipient population	-1.34***	-1.63***	-1.33***	-1.33***	-1.33***	-1.32***	-1.34***	-1.25***	-1.56***	-1.03***	-1.41***
	(0.32)	(0.37)	(0.32)	(0.32)	(0.32)	(0.32)	(0.32)	(0.32)	(0.38)	(0.32)	(0.32)
Log-Donor population	0.57	1.91*	1.60*	1.03	1.65*	1.60*	0.57	0.65	1.11	0.63	0.57
	(0.88)	(1.01)	(0.87)	(0.87)	(0.87)	(0.87)	(0.88)	(0.88)	(0.97)	(0.89)	(0.88)
Log-Donor GDP trend	2.84***	2.07***	2.73***	2.92***	2.72***	2.74***	2.84***	2.86***	2.95***	2.79***	2.84***
	(0.39)	(0.52)	(0.38)	(0.39)	(0.38)	(0.38)	(0.39)	(0.39)	(0.43)	(0.39)	(0.39)
Donor cycle	0.06***	0.05***	0.14***	-0.50***	-0.20***	-0.13**	0.06***	0.06***	0.06***	0.06***	0.06***
	(0.00)	(0.01)	(0.04)	(0.05)	(0.05)	(0.05)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Recipient cycle							-0.01	-0.06	-0.13***	0.07	0.23***
							(0.01)	(0.04)	(0.04)	(0.06)	(0.07)
Observations	79178	71480	79178	79178	79178	79178	79178	78804	71742	76604	79178
Within R-squared	0.33	0.30	0.33	0.33	0.33	0.33	0.33	0.33	0.32	0.33	0.33
Number of pairid	2486	2486	2486	2486	2486	2486	2486	2486	2354	2354	2486

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is given by semi-log transformed real aid flows (see Section III.A). All specifications are estimated with country-pair and time fixed effects. The standard errors are clustered at the country-pair level. Full sample.

Table 17. Robustness: Post-Cold War aid regime

	Donor cycle						Recipient cycle				
	Output gap	Output gap (OECD)	1 = Above-trend growth	Output gap bottom quartile	Output gap bottom quartile (OECD)	Deviation from trend growth in bottom quartile	Output gap (HP)	1=Below-trend GDP growth	1=Below-trend cons. growth	TOT growth rate in bottom decile	Growth collapse
Log-Recipient GDP	-0.76***	-0.88***	-0.76***	-0.76***	-0.76***	-0.76***					
	(0.26)	(0.30)	(0.26)	(0.26)	(0.26)	(0.26)					
Log-Rec GDP trend							-0.78***	-0.75***	-1.23***	-1.14***	-0.67**
							(0.27)	(0.28)	(0.30)	(0.29)	(0.27)
Log-Recipient population	-3.14***	-3.79***	-3.38***	-3.14***	-3.14***	-3.14***	-3.15***	-3.11***	-3.14***	-2.52***	-3.25***
	(0.64)	(0.73)	(0.65)	(0.64)	(0.64)	(0.64)	(0.64)	(0.65)	(0.73)	(0.64)	(0.63)
Log-Donor population	-0.59	1.09	1.96	0.67	1.63	1.48	-0.60	-0.04	0.28	-0.50	-0.60
	(1.70)	(1.93)	(1.77)	(1.70)	(1.71)	(1.71)	(1.70)	(1.77)	(1.89)	(1.72)	(1.70)
Log-Donor GDP trend	5.33***	3.99***	5.26***	5.26***	4.86***	4.92***	5.30***	5.48***	5.63***	5.20***	5.30***
	(0.76)	(1.00)	(0.77)	(0.75)	(0.74)	(0.74)	(0.74)	(0.77)	(0.82)	(0.75)	(0.74)
Donor cycle	0.11***	0.08***	0.25***	-0.98***	-0.14	-0.01	0.11***	0.11***	0.11***	0.11***	0.11***
	(0.01)	(0.02)	(0.07)	(0.10)	(0.10)	(0.07)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Donor cycle x (1=Post-Cold War)	-0.00	0.00	-0.07	0.19	-0.37**	-0.22*					
	(0.01)	(0.03)	(0.11)	(0.16)	(0.16)	(0.12)					
Recipient cycle							-0.00	0.03	-0.09	0.02	0.45***
							(0.01)	(0.06)	(0.07)	(0.10)	(0.15)
Recipient cycle x (1=Post-Cold War)							0.01	-0.38***	-0.26**	0.39**	-0.04
							(0.01)	(0.10)	(0.11)	(0.17)	(0.20)
1=Post-Cold War	2.98***	5.22***	1.59***	3.04***	0.70	2.79***	3.03***	0.79***	0.79***	2.95***	2.99***
	(0.95)	(0.69)	(0.31)	(0.95)	(0.62)	(0.79)	(0.94)	(0.15)	(0.16)	(0.96)	(0.94)
Observations	78474	70076	76494	78474	78474	78474	78474	76208	69432	75944	78474
Within R-squared	0.08	0.05	0.06	0.07	0.07	0.07	0.08	0.07	0.06	0.07	0.08
Number of pairid	2486	2486	2486	2486	2486	2486	2486	2486	2354	2354	2486