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Aid, Policies, and Growth: Comment

By WILLIAM EASTERLY, ROSS LEVINE, AND DAVID ROODMAN*

In an extraordinarily influential paper, Craig Burnside and David Dollar (2000, p. 847) find that "... aid has a positive impact on growth in developing countries with good fiscal, monetary, and trade policies but has little effect in the presence of poor policies." This finding has enormous policy implications. The Burnside and Dollar (2000, henceforth BD) result provides a role and strategy for foreign aid. If aid stimulates growth only in countries with good policies, this suggests that (1) aid can promote economic growth, and (2) it is crucial that foreign aid be distributed selectively to countries that have adopted sound policies. International aid agencies, public policy makers, and the press quickly recognized the importance of the BD findings.¹

This paper reassesses the links between aid, policy, and growth using more data. The BD data end in 1993. We reconstruct the BD database from original sources and thus (1) add additional countries and observations to the BD data set because new information has become

available since they conducted their analyses, and (2) extend the data through 1997. Thus, using the BD methodology, we reexamine whether aid influences growth in the presence of good policies.

Given our focus on retesting BD, we do not summarize the vast pre-BD literature on aid and growth. We just note that there was a long and inconclusive literature that was hampered by limited data availability, debates about the mechanisms through which aid would affect growth, and disagreements over econometric specification (see Gustav F. Papanek, 1972; Robert Cassen, 1986; Paul Mosley et al., 1987; Peter Boone, 1994, 1996; and Henrik Hansen and Finn Tarp's 2000 review).

Since BD found that aid boosts growth in good policy environments, there have been a number of other papers reacting to their results, including Paul Collier and Jan Dehn (2001), Carl-Johan Dalgaard and Hansen (2001), Patrick Guillaumont and Lisa Chauvet (2001), Hansen and Tarp (2001), Robert Lensink and Howard White (2001), and Collier and Dollar (2002). These papers conduct useful variations and extensions (some of which had already figured in the pre-BD literature), such as introducing additional control variables, using nonlinear specifications, etc. Some of these papers confirm the message that aid only works in a good policy environment, while others drive out the aid*policy interaction term with other variables. This literature has the usual limitations of choosing a specification without clear guidance from theory, which often means there are more plausible specifications than there are data points in the sample.

We differentiate our paper from these others by NOT deviating from the BD specification. Thus, we do not test the robustness of the results to an unlimited number of variations, but instead maintain the BD methodology. This paper conducts a very simple robustness check by adding new data that were unavailable to BD. Thus, we expand the sample used over their time period and extend the data from 1993 to 1997.

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¹ See, for instance, the World Bank (1994, 2001, 2002), the U.K. Department for International Development (2000), President George W. Bush's speech (March 16, 2002), the announcement by the White House on creating the Millennium Challenge Corporation (White House, 2002), as well as a *Washington Post* editorial (February 9, 2002), a *Financial Times* column by Alan Beattie (March 11, 2002), and *The Economist* (March 16, 2002).

I. Robustness Checks on the Aid-Policy-Growth Relationship

BD's preferred specification is a growth regression with several control variables common to the literature, plus terms for the amount of international aid provided to a country (Aid), an index of the quality of the policy environment (Policy), and an aid*policy interaction term (Aid*Policy). As control variables, BD include the logarithm of initial Gross Domestic Product per capita (Log initial GDP), a measure of ethnic fractionalization (Ethnic), the rate of political assassinations (Assassinations), the interaction between ethnic fractionalization and political assassinations (Ethnic*Assassinations), regional dummy variables for Sub-Saharan Africa and fast-growing East Asian countries (Sub-Saharan Africa and Fast-growing E. Asia, respectively), an index of institutional quality (Institutional Quality), and a measure of financial depth (M2/GDP lagged). The BD policy index, Policy, is constructed from measures of budget balance, inflation, and the Sachs-Warner openness index. This specification corresponds to regressions 5 (all developing countries) and 8 (low-income countries only) in the BD paper. In Table 1, we first show regression 5 from BD using ordinary least squares (OLS). The sample here is middle-income and low-income developing countries, and five outliers are omitted. These are the five outliers omitted by BD. We reproduce exactly their results in column (1).

Since BD exclude observations that they consider outliers and since we want to follow the BD methodology as closely as possible, we adopt the Hadi method for identifying and eliminating outliers as we add new data. The Hadi method measures the distance of data points from the main body of data and then iteratively reduces the sample to exclude distant data points. Critically, when we apply the Hadi method to the BD data, we confirm their results. We will continue to use the Hadi procedure in all the regressions in this paper except where we explicitly note otherwise. In the spirit of the original BD methodology, we choose a Hadi significance level of 0.05 that excludes only a handful of outliers (between 5 and 11). (See Table 2.) Note, however, that keeping the outliers in the regressions does not change this paper's conclusion.

To test the robustness of the BD results, we undertook an extensive data-gathering exercise. We collected annual data on all the variables in the BD sample. We went back to the original sources and reconstructed the entire database and extended the data through 1997. As part of this exercise, we updated the Sachs and Warner openness index. To construct the policy index, we follow the BD regression procedure and we always include the budget balance, inflation, and Sachs-Warner openness as components of Policy. In addition to extending the sample through to 1997, we were able to expand the original BD data. For example, we found broader coverage on International Country Risk Guide institutional quality for 1982 by using the original source of the data. Considering both the cross-section and the time-series expansion, we have increased the sample size from their original 275 observations in 56 countries to 356 observations in 62 countries (before excluding outliers). An Appendix describing the methodology we used and the new data set itself are available on the Internet at www.cgdev.org. Although our data did not match up exactly with theirs (there are inevitably data revisions, where values change, new data become available, and some values are reclassified as missing), the correlations are all above 0.95 within their sample, except for budget balance, which is 0.92, and institutional quality, which is 0.90. Moreover, we are able to reproduce their results with our data when we restrict the sample to their time period and their countries as discussed below.

The BD results do not hold when we use new data that includes additional countries and extends the coverage through 1997. The aid*policy interaction term enters insignificantly when using data from 1970–1997 [column (2)]. Not only that, but the coefficient on the aid*policy term changes markedly, turning negative, with a *t*-statistic of -1.09 . Figure 1 shows both the partial scatterplot of the original BD sample between growth and aid*policy and the partial scatterplot using our new, expanded data. As shown, the positive relationship between growth and aid*policy vanishes when using new data. In these analyses, we continue to use the Hadi method for eliminating outliers since this method reproduced the original BD results. However, when we do not use Hadi and run the results on the full sample, we again find that the aid*policy

TABLE 1—TESTING THE ROBUSTNESS OF BURNSIDE AND DOLLAR PANEL REGRESSIONS 5 AND 8 TO MORE DATA (DEPENDENT VARIABLE: GROWTH OF GDP/CAPITA)

Sampling universe: Burnside-Dollar regression: Right-hand-side variable:	(1)	(2)	(3)	(4)
	All developing countries, outliers omitted		Only low-income countries, outliers omitted	
	Regression 5, OLS		Regression 8, 2SLS	
	BD data, BD sample, 1970–1993	New data set, full sample, 1970–1997	BD data, BD sample, 1970–1993	New data set, full sample, 1970–1997
Aid	–0.02 (0.13)	0.20 (0.75)	–0.24 (–0.89)	–0.16 (–0.26)
Aid*policy	0.19** (2.61)	–0.15 (–1.09)	0.25* (1.99)	–0.20 (–0.65)
Log initial GDP per capita	–0.60 (–1.02)	–0.40 (–1.06)	–0.83 (–1.02)	–1.21* (–2.02)
Ethnic	–0.42 (–0.57)	–0.01 (–0.02)	–0.67 (–0.76)	–0.74 (–0.82)
Assassinations	–0.45 (–1.68)	–0.37 (–1.43)	–0.76 (–1.63)	–0.69 (–1.68)
Ethnic*Assassinations	0.79 (1.74)	0.18 (0.29)	0.63 (0.67)	0.69 (0.78)
Sub-Saharan Africa	–1.87* (–2.41)	–1.68** (–3.07)	–2.11** (–2.77)	–1.20 (–1.79)
Fast-growing E. Asia	1.31* (2.19)	1.18* (2.33)	1.46 (1.95)	1.01 (1.40)
Institutional quality	0.69** (3.90)	0.31* (2.53)	0.85** (4.17)	10.38* (2.46)
M2/GDP lagged	0.01 (0.84)	0.00 (0.16)	0.03 (1.39)	10.02 (1.00)
Policy	0.71** (3.63)	1.22** (5.51)	0.59 (1.49)	1.61** (2.93)
Observations	270	345	184	236
R ²	0.39	0.33	0.47	0.35

Notes: *T*-statistics are given in parentheses. The regressions omit outliers, either as described in Burnside and Dollar (2000) or using the Hadi method as discussed in the text. Variable definitions: Aid is Development Assistance/real GDP; Policy is a regression-weighted average of macroeconomic policies described in BD; Ethnic is ethnic fractionalization from Easterly and Levine, 1997; Assassinations is per million population; Sub-Saharan Africa and Fast-growing E. Asia are dummy variables; Institutional quality is from Stephen Knack and Philip Keefer (1995). Other data sources are described in the Data Appendix available at www.cgdev.org.

* Significant at the 5-percent level.

** Significant at 1-percent level.

variable enters insignificantly (we will show these results below).

We perform the same exercise with BD regression 8 for the sample of low-income countries (also following them in omitting outliers). BD note that low-income countries might be a preferred sample to detect the effects of aid, and indeed their aid*policy interaction term is significant in both OLS and two-stage least squares (2SLS) in their regression 8. In order to check the robustness of the estimates of the instrumental variables estimates, we do the exercise in two-

stage least squares as shown in columns (3) and (4) of Table 1. We use the same set of instruments as BD. We are again able to reproduce their results with our data set (see Table 2 below).

The aid*policy term is insignificant in their regression 8 when we simply add all the data for low-income countries that we can collect for 1970–1993 and the data for 1994–1997 [column (4)]. The coefficient not only becomes insignificant, but changes sign. Our sample is 52 observations larger than the BD sample for regression 8.

TABLE 2—COEFFICIENT ON AID*POLICY IN ALTERNATIVE REGRESSIONS FOR GROWTH OF GDP/CAPITA

	5/OLS	5/2SLS	8/OLS	8/2SLS
Burnside and Dollar original	0.19**	0.18	0.26**	0.25*
Observations	(2.61) 270	(1.63) 270	(2.97) 184	(1.99) 184
ELR data, BD countries, 1970–1993	0.34*	0.56**	0.38*	0.56*
Observations	(2.41) 268	(2.87) 268	(2.36) 178	(2.28) 178
ELR data, full sample, 1970–1993	−0.08	0.11	−0.13	0.01
Observations	(−0.65) 291	(0.52) 291	(−0.90) 199	(0.05) 199
ELR data, BD countries, 1970–1997	0.30	0.38	0.40*	0.47
Observations	(1.96) 310	(1.75) 310	(2.38) 207	(1.52) 207
ELR data, full sample, 1970–1997	−0.15	0.01	−0.20	−0.20
Observations	(−1.09) 345	(0.05) 345	(−1.26) 236	(−0.65) 236
ELR data, full sample, outliers included, 1970–1993	0.05	0.07	0.00	−0.06
Observations	(0.82) 300	(0.86) 300	(0.03) 205	(−0.52) 205
ELR data, full sample, outliers included, 1970–1997	0.05	0.06	−0.01	−0.08
Observations	(0.81) 356	(0.79) 356	(−0.06) 244	(−0.73) 244

Notes: ELR data refers to the data set constructed for this paper as described in the text. All regressions omit outliers, either in the original Burnside and Dollar results as described in their paper, or in the ELR results using the Hadi method, except where otherwise noted. *T*-statistics are in parentheses. The number of observations is given below the *t*-statistics.

* Significant at the 5-percent level.

** Significant at the 1-percent level.

The fragile results on aid effectiveness remain evident when varying the sample. For brevity, Table 2 shows only the aid*policy coefficients, *t*-statistics, and number of observations for OLS and 2SLS for regressions 5 and 8 for various combinations of sample periods, country samples, and when including and excluding outliers. We reproduce statistical significance when restricting our data to the Burnside-Dollar sample period and sample of countries, though the coefficient sizes are larger when using the new data. The significance of the relationship between growth and the aid*policy interaction term vanishes, however, if we relax either the sample period constraint or the country selection constraint for either regression 5 or 8 (i.e., the whole sample and only the low-income sample). The significance vanishes for both OLS and 2SLS in either regres-

sion, for using their countries but the whole period sample or for their sample period but all countries, and for samples excluding outliers and for samples including outliers. Not only does significance vanish, but the magnitude of the coefficient changes greatly across the different permutations.

The only significant coefficient out of our various permutations was for OLS for regression 8 (the low-income sample) using the Burnside-Dollar countries for the full sample period. Since this is one significant coefficient at the 5-percent level out of 20 permutations, we do not think this provides strong support for the robustness of the Burnside-Dollar results.

We tried all of these same exercises for the other aid*policy regressions that BD report in the paper. Burnside and Dollar found the aid*policy term to be significant and positive

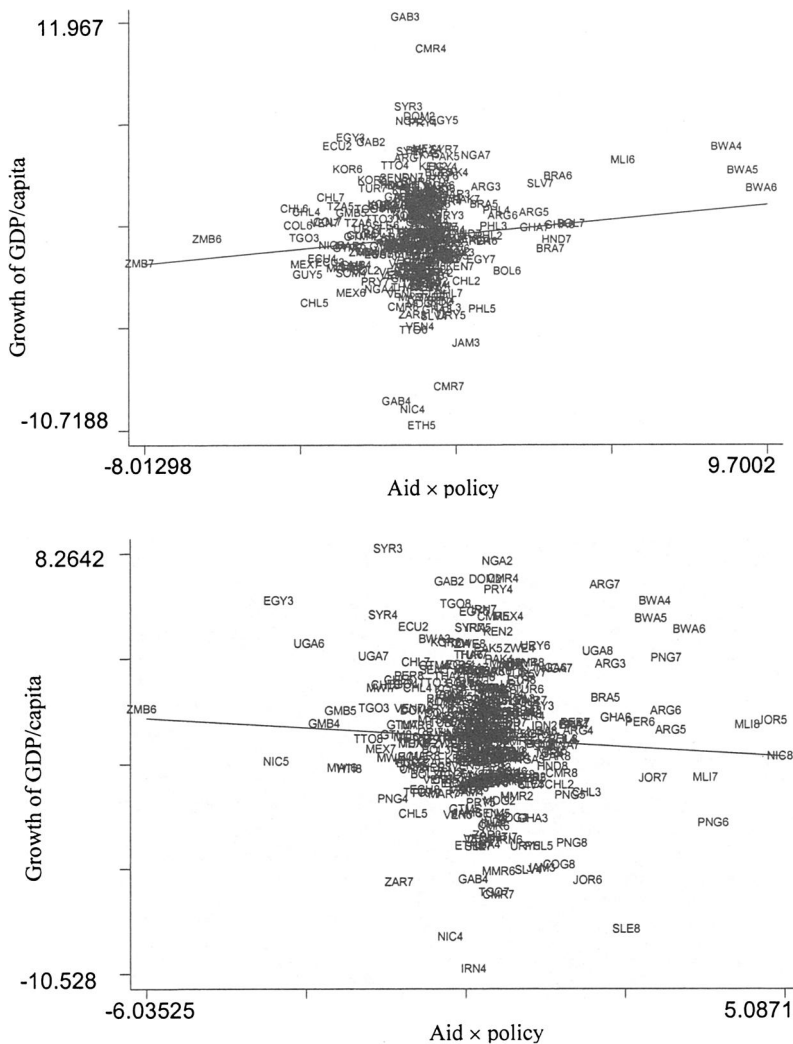


FIGURE 1. PARTIAL SCATTERPLOTS OF GROWTH AGAINST AID*POLICY

Notes: These partial scatterplots are from regressions 1 and 3 in Table 1. The top graph represents Burnside-Dollar original results; the bottom graph shows results using the new data set. The partial scatterplot involves the two-dimensional representation of the relationship between growth and aid*policy controlling for the other regressors. Thus, we regress growth against all of the regressors listed in Table 1 except aid*policy and collect these growth residuals. Then we regress aid*policy against the same regressors and collect these aid*policy residuals. The figures plot the growth residuals against the aid*policy residuals along with the regression line. Point labels are three-letter ISO country codes followed by a digit for the time period (2 = 1970–1973; 3 = 1974–1977, etc.).

when they did NOT exclude outliers but added another term $aid^2*policy$ (which was significant and negative). Their results were significant in OLS for the whole sample and the low-income sample, but not in 2SLS, so we report only the OLS results. We are able to reproduce their

results with our data set using their sample period and sample of countries (Table 3). When we try these specifications with our expanded data set, the previous pattern holds: the $aid*policy$ interaction term is not robust to the use of new data, including various permuta-

TABLE 3—TESTING BURNSIDE-DOLLAR SPECIFICATION OF GROWTH OF GDP/CAPITA
REGRESSIONS ADDING AID²*POLICY

		4/OLS	7/OLS
Burnside and Dollar original	aid*policy	0.20* (2.07)	0.27* (2.03)
	aid ² *policy	-0.02* (-2.22)	-0.02* (-2.45)
	Observations	275	189
ELR data, BD countries, 1970–1993	aid*policy	0.31* (2.30)	0.28 (1.81)
	aid ² *policy	-0.05* (-2.35)	-0.05* (-2.41)
	Observations	274	183
ELR data, full sample, 1970–1993	aid*policy	-0.11 (-1.10)	-0.27 (-1.94)
	aid ² *policy	0.02 (1.92)	0.03* (2.34)
	Observations	300	205
ELR data, BD countries, 1970–1997	aid*policy	0.19 (1.64)	0.15 (1.11)
	aid ² *policy	-0.03 (-1.58)	-0.03 (-1.56)
	Observations	322	216
ELR data, full sample, 1970–1997	aid*policy	-0.14 (-1.31)	-0.27 (-1.89)
	aid ² *policy	0.03* (2.25)	0.03* (2.35)
	Observations	356	244

Notes: ELR data refers to data set constructed for this paper as described in text. *T*-statistics are in parentheses; Observations are below *t*-statistics.

* Significant at the 5-percent level.

** Significant at the 1-percent level.

tions of period and country selection. In our full sample and in some of the other permutations, the coefficients on the aid*policy and aid²*policy reverse sign from the BD results.

Thus, the result of our paper is as follows: adding new data creates new doubts about the BD conclusion. When we extend the sample forward to 1997, we no longer find that aid promotes growth in good policy environments. Similarly, when we expand the BD data by using the full set of data available over the original BD period, we no longer find that aid promotes growth in good policy environments. Our findings regarding the fragility of the aid-policy-growth nexus is unaffected by excluding or including outliers.

We also experimented with alternative definitions of “aid” and “good policies,” as well as trying different period lengths (from annual

data all the way up to the cross-section for the full sample). These exercises (available upon request) did not change our conclusion about the fragility of the aid*policy term—the aid*policy term is not robust to alternative equally plausible definitions of aid and policy, or to alternative period lengths.

II. Conclusions

This paper reduces the confidence that one can have in the conclusion that aid promotes growth in countries with sound policies. The paper does not argue that aid is ineffective. We make a much more limited claim. We simply note that adding additional data to the BD study of aid effectiveness raises new doubts about the effectiveness of aid and suggests that economists and policy makers should be less sanguine

about concluding that foreign aid will boost growth in countries with good policies. We believe that BD should be a seminal paper that stimulates additional work on aid effectiveness, but not yet the final answer on this critical issue. We hope that further research will continue to explore pressing macroeconomic and microeconomic questions surrounding foreign aid, such as whether aid can foment reforms in policies and institutions that in turn foster economic growth, whether some foreign aid delivery mechanisms work better than others, and what is the political economy of aid in both the donor and the recipient.

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