AID, POLICIES, AND GROWTH: BAUER WAS RIGHT
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The late Peter Bauer was a giant in development economics. By the end of his life he had convinced many in the economics profession that it is simply untrue that developing countries can break out of the poverty trap only by receiving foreign aid from the more prosperous industrial nations. In fact, Bauer (2000: 46) went one step further:

> Development aid is . . . not necessary to rescue poor societies from a vicious circle of poverty. *Indeed it is far more likely to keep them in that state* [italics added]. It promotes dependence on others. It encourages the idea that emergence from poverty depends on external donations rather than on people's own efforts, motivation, arrangements, and institutions.

Although Bauer's influence has been powerful, it has not been pervasive. There appear to be some in the economic development community on whom his message seems not to have made even a dent. A case in point is the much-acclaimed study by two World Bank economists, Craig Burnside and David Dollar (2000, henceforth BD). Relying on a panel data set of 56 countries over six 4-year periods (beginning with 1970–73 and ending with 1990–93), the authors use regression analysis techniques to examine the relationship between national economic growth, national economic policy, and foreign aid received. More precisely, they regress the growth rate of real GDP per capita on various combinations of regressors, with the basic specification including an index of the quality of national economic policy, a measure of foreign aid, and an aid-policy interaction term. Their two principal findings are (1) the estimated coefficient of aid is negative but not statistically significant, and (2) the estimated coefficient of the aid-policy interaction term is positive and signifi-

cantly different from zero. From these two results, BD (2000: 847) conclude: "We 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." William Easterly (2003: 24) reports that BD's study has been extraordinarily influential: "Their general finding was passed on from one media report to another and was cited by international agencies advocating an increase in foreign aid."

In all the folderol over BD's study, the trenchant insights of Bauer appear to have been lost. The purpose of this study is to reaffirm empirically Bauer's position on the relationship between foreign aid and economic growth.

Sober Second Thoughts

BD's conclusion has been challenged by William Easterly, Ross Levine, and David Roodman (2003, henceforth ELR). They use the exact same regression specification as BD, but expand BD's set of observations to include data that were not available to BD. ELR were able to augment BD's 56-country sample with 6 additional countries and one additional 4-year period (1994–97).[1] Using their expanded data set, ELR find that the aid-policy interaction term is not significantly different from zero, indicating no support for BD's conclusion that in a good policy environment foreign aid has a *positive* effect on economic growth. This study goes one step further: empirical evidence presented below suggests that foreign aid has a *negative* growth effect even where economic policy is sound.

The first two columns in Table 1 provide a comparison of BD's and ELR's ordinary least squares (OLS) results (ELR 2003: 7). The regressand is the average real per capita GDP growth rate (GDPG) over the six 4-year periods 1970–73 through 1990–93. The regressors are the natural logarithm of real GDP per capita (LGDP) in the last year preceding the period for which the growth rate is calculated; the extent of ethnolinguistic fractionalization (ETHNF), whether assassinations occurred (ASSAS), and their interaction (ETHNF*ASSAS); regional dummies for sub-Saharan Africa (SSA) and East Asia (ESIA); a measure of national institutional quality (ICRGE); a measure of the quality of national financial markets (M2); foreign aid (AID), defined as the sum of grants and the grant equivalents of official loans; a measure of the quality of national economic policy (POLICY), an

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[1] BD's and ELR's data are available on the Internet at www.cgdev.org.

TABLE 1
OLS REGRESSION RESULTS

Regressor	BD's Panel Results	ELR's Panel Results	Long-Run Results Based on 44-Country Sample	Long-Run Results Based on 53-Country Sample
AID	−0.02 (0.13)	0.20 (0.75)	−0.54 (2.60)	−0.12 (0.50)
AID*POLICY	0.19 (2.61)	−0.15 (1.09)	0.47 (2.03)	−0.17 (1.19)
LGDP	−0.60 (1.02)	−0.40 (1.06)	−0.65 (1.16)	−0.44 (1.00)
ETHNF	−0.42 (0.57)	−0.01 (0.02)	−0.16 (0.14)	0.32 (0.28)
ASSAS	−0.45 (1.68)	−0.37 (1.43)	−0.01 (0.03)	0.16 (0.34)
ETHNF*ASSAS	0.79 (1.74)	0.18 (0.29)	−0.22 (0.23)	−0.73 (0.85)
SSA	−1.87 (2.41)	−1.68 (3.07)	−1.20 (1.17)	−1.16 (1.71)
EASIA	1.31 (2.19)	1.18 (2.33)	1.95 (2.10)	1.49 (1.54)
ICRGE	0.69 (3.90)	0.31 (2.53)	0.63 (3.00)	0.23 (1.51)
M2	0.01 (0.84)	0.00 (0.16)	0.05 (2.14)	0.00 (0.13)
POLICY	0.71 (3.63)	1.22 (5.51)	0.36 (1.17)	1.01 (2.00)
Adj. R^2	0.39	0.33	0.36	0.37

NOTE: Absolute value of t-statistics in parentheses.

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index covering measures of fiscal, monetary, and trade policies; and the interaction between aid and policy (AID*POLICY). The measures of fiscal, monetary, and trade policies are budget surplus (BB), the level of inflation (INFL), and Sachs and Warner's (1995) measure of trade openness (SACW), respectively. In the first column, BD's most important results are the estimated coefficients of AID and AID*POLICY. The first is not significantly different from zero; the second is positive and significant at the .01 level. By contrast, as shown in the second column, ELR find that both estimated coefficients are statistically insignificant, a finding which leads them to conclude that one should not accept uncritically the notion that aid necessarily has a positive effect on growth in recipient countries with sound economic policies.

ELR's findings, too, should not be accepted uncritically. Economic growth is a long-run phenomenon. Wacziarg (2002: 915) and Easterly (2003: 29–30) argue that the use of relatively high frequency data, such as BD's panels of four-year periods, is not appropriate for examining the determinants of growth: "panelizing" annual data runs the risk of obtaining empirical results that reflect short-term business cycle effects rather than long-term economic growth effects.

To examine the growth effects (as opposed to the business cycle effects) of the regressors listed in Table 1, long-run averages were computed for the regressand and regressors.[2] Countries in both BD's sample and ELR's expanded sample having three or fewer four-year periods of data were excluded from the computation of these averages. This left 44 of BD's 56 countries, and 53 of ELR's 62.

The results of the OLS regressions run on these two new sets of long-run data are presented in columns three and four of Table 1. The long-run results based on the 44-country sample (shown in column three) are mostly consistent with BD's original results. In particular, the estimated coefficient of AID*POLICY is positive and significantly different from zero, while the estimated coefficient of AID is negative (although now it is statistically significant). Similarly, the long-run results based on the 53-country sample (shown in column four) are generally consistent with ELR's original results. Most notably, the estimated coefficient of AID*POLICY is not statistically significant.

It should be noted that the estimates of the adjusted R^2 statistic are relatively low for all of the samples, indicating that the basic BD and

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[2]The use of long-run averages to examine the determinants of growth was pioneered by Robert Barro (1992).

ELR regression specification fits the data poorly. However, there is a more fundamental reason for rejecting these OLS regression results. That issue is discussed in the next section.

Addressing the Measurement Error in POLICY

The inferential consequences of a regressor afflicted with measurement error are well known. Most important, Peter Bentler (1983: 15) has warned: "Errors of measurement can *totally alter* conclusions that might be drawn from . . . models that do not take such errors into account" (italics added).[3]

As mentioned, both BD and ELR construct POLICY as a weighted index of BB, INFL, and SACW. It is safe to say that none of these three proxies perfectly measures the factor it is supposed to represent—BB for fiscal policy, INFL for monetary policy, and SACW for trade policy. If all three proxies are contaminated with measurement error, as they surely are, then POLICY—which is a linear combination of BB, INFL, and SACW—is itself contaminated with measurement error. Obviously the same can be said of AID*POLICY. To tackle this measurement error problem directly, an econometric methodology other than OLS regression is required. One such alternative is provided by analysis of covariance structures (Aigner et al. 1984: 1370, Bollen 1989a: 21). In the implementation of this alternative approach, POLICY no longer will be defined as BD's and ELR's linear combination of BB, INFL, and SACW. Instead, BB, INFL, and SACW will be used as economic policy indicators in three measurement equations (Bollen 1989a: 320), while POLICY will be treated as a latent variable, a theoretical construct that is a formal representation of a concept which is not directly measurable (Bollen 1989a: 182). Similarly, AID*POLICY will be replaced by a latent variable, AIDPOLIC, which has three indicators: AID*BB, AID*INFL, and AID*SACW. Except for the replacement of the linear combination of BB, INFL, and SACW by the (now) latent variable POLICY, and the replacement of AID*POLICY by the latent variable AIDPOLIC, the covariance structure model's construct equation is essentially the same as BD's and ELR's regression equation:[4]

[3]For proof of this assertion, see Aiken and West (1991: 142).

[4]Although BD's and ELR's regression equation contains an intercept term—the authors do not report their estimate for its coefficient—the construct equation does not. A Windows version of *EQS* (Bentler 1989), a software package specifically designed for estimating covariance structure models (Bollen and Ting 1991), generated all of the results reported

(1)   GDPG = γ_1*AID + γ_2*AIDPOLIC + γ_3*LGDP
                        + γ_4*ETHNF + γ_5*ASSASS + γ_6*ETHNF*ASSASS
                        + γ_7*SSA + γ_8*EASIA + γ_9*ICRGE + γ_{10}*M2
                        + γ_{11}*POLICY + ε

where ε is the usual equation error. The model's measurement equations are

(2)   BB = λ_1*POLICY + δ_1
(3)   INFL = λ_2*POLICY + δ_2
(4)   SACW = λ_3*POLICY + δ_3
(5)   AID*BB = λ_4*AIDPOLIC + δ_4
(6)   AID*INFL = λ_5*AIDPOLIC + δ_5
(7)   AID*SACW = λ_6*AIDPOLIC + δ_6,

where the δs are measurement errors (Bollen 1989a: 18), and the λs are coefficients called "factor loadings" (Bollen 1989a: 3). Maximum likelihood estimates of these equations are reported in Table 2—first for the 44-country sample, and then for the 53-country sample. The entries for the construct equation (1) are the estimated coefficients of the explanatory variables; for the measurement equations (2)–(7), the entries are the estimated factor loadings.

The most important results reported in Table 2 are the estimates for AID and AIDPOLIC. For both samples, the estimated coefficient of AID is not statistically significant, while the coefficient of AIDPOLIC is *negative* and statistically significant—at the .05 level for the 53-country sample, and at the .06 level for the 44-country sample.

Various fit indexes provide measures of how well a latent variable model fits the data. Table 2 reports the values for three of these goodness-of-fit (GOF) indexes: Bentler and Bonnet's (1980) normed fit index (NFI), Bentler's (1990) comparative fit index (CFI), and Bollen's (1989b) incremental fit index (IFI). In the case of perfect fit, these indexes are equal to one; indexes with values around 0.90 imply good fit (Bollen 1989a: 274). The GOF index values reported in Table 2 fall short of this threshold, suggesting that the overall model specification fits the data poorly, a finding that mirrors the adjusted R^2 results for the regression models reported in Table 1. The model's poor overall fit does not, however, detract from the important result reported in Table 2—namely, that the estimated coefficient of AIDPOLIC is negative and statistically significant.

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below. Before implementing an estimation routine, *EQS* deviates all variables from their means, a common practice in the analysis of covariance structures (Bollen 1989a: 13).

TABLE 2

COVARIANCE STRUCTURE MODEL RESULTS

	Long-Run Results Based on 44-Country Sample	Long-Run Results Based on 53-Country Sample
Construct Equation's Independent Variables		
AID	0.19 (0.64)	0.17 (0.50)
AIDPOLIC	−0.91 (1.93)	−0.93 (2.02)
LGDP	−0.67 (1.60)	−0.33 (0.76)
ETHNF	0.22 (0.25)	0.21 (0.20)
ASSAS	0.11 (0.25)	0.19 (0.35)
ETHNF*ASSAS	−0.65 (0.70)	−.95 (.87)
SSA	−1.81 (2.35)	−1.40 (1.86)
EASIA	2.75 (3.98)	3.29 (3.84)
ICRGE	0.71 (4.06)	0.37 (2.44)
M2	0.05 (2.23)	0.01 (0.43)
POLICY	−0.17 (0.69)	−0.93 (2.01)
Measurement Equations' Dependent Variables		
BB	0.03 (6.10)	0.02 (5.28)
INFL	0.02 (0.69)	−0.03 (1.80)
SACW	0.08 (2.25)	0.15 (4.13)
AID*BB	−0.14 (9.29)	−0.10 (10.19)
AID*INFL	0.21 (4.93)	0.29 (6.84)
AID*SACW	0.01 (0.19)	0.05 (0.52)
Goodness-of-Fit (GOF) Statistics		
NFI	0.74	0.68
CFI	0.78	0.70
IFI	0.81	0.73

NOTE: Absolute value of t-statistics in parentheses. NFI is the normed fit index, CFI is the comparative fit index, and IFI is the incremental fit index.

Conclusion

The motivation for the present study is the hugely influential study done by Burnside and Dollar (2000), which purports to provide empirical evidence demonstrating that foreign aid has a positive effect on recipients' economic growth, provided that those countries have sound economic policies. A key variable in their analysis is a proxy for economic policy. Because this proxy almost certainly is afflicted with measurement error, the OLS regression results reported in Burnside and Dollar (2000) are suspect.

This study makes use of analysis of covariance structures, an econometric methodology specifically designed to tackle the measurement

error that surely contaminates the economic policy proxy. The empirical results reported here suggest that foreign aid *negatively* affects economic growth even for recipient nations with sound economic policies.

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