ELSEVIER
www.elsevier.com/locate/worlddev
CrossMark
World Development Vol. 70, pp. 389–396, 2015
0305-750X/
http://dx.doi.org/10.1016/j.worlddev.2014.06.012

Comment on Lof, Mekasha, and Tarp (2014)

DIERK HERZER [a], FELICITAS NOWAK-LEHMANN [b], AXEL DREHER [c,b], STEPHAN KLASEN [b] and INMACULADA MARTINEZ-ZARZOSO [b,d,*]

[a] *Helmut Schmidt University Hamburg, Germany*
[b] *University of Göttingen, Germany*
[c] *Heidelberg University, Germany*
[d] *University Jaume I, Spain*

Summary. — In Nowak-Lehmann *et al.* (2012), we used time-series methods to investigate the impact of aid on per capita GDP. Lof, Mekasha, and Tarp (LMT, 2014) criticize our econometric approach, our interpretation, and our data-handling procedure which lead to a large share of missing observations in some specifications. Using a different time-series approach, a different aid variable, and a different sample, they claim to find a positive effect of aid on income, which contrasts with our own results. In this comment, we first explain why we disagree with LMT's critique of our econometric method and show that our results do not depend on our way of dealing with missing data. Second, we show that the methods used by LMT are unsuitable and rely on similarly problematic data-handling procedures. Supplementing their approach with appropriate cointegration and causality tests shows that there is no robust effect of aid on income.

Key words — aid, growth, time-series models, aid effectiveness

1. INTRODUCTION

The question of whether "foreign aid works" is fiercely debated. Proponents of a big push support moves to substantially increase the amount of aid (Sachs, 2006), while some skeptics go as far to propose ending aid altogether (Moyo, 2009). One reason why this important question is still unsettled is the failure of the academic literature to find a robust positive effect of aid on growth, using a large variety of econometric approaches (Easterly, Levine, & Roodman, 2004; Rajan & Subramanian, 2008; Roodman, 2007; Werker, Ahmed, & Cohen, 2009). In a recent contribution to this debate, we proposed taking account of the underlying variables' time-series properties to minimize the risk of spurious regressions, among other approaches relying on panel dynamic feasible generalized least-squares (DFGLS) to investigate the effect of aid on per-capita income (Nowak-Lehmann, Dreher, Herzer, Klasen, & Martínez-Zarzoso, 2012). In line with much of the literature, our results show no significant positive effect of aid.

Lof, Mekasha, and Tarp (2014) (henceforth LMT) criticize one of our approaches in Nowak-Lehmann *et al.* (2012) as unsuitable and for omitting a large number of observations from our sample. This occurred as a result of taking logs of covariates that sometimes take on negative or zero values. We welcome the LMT study, as it allows us to show that our results do not depend on the particular choice of countries and observations included in the sample. We also welcome the opportunity to further explain some of the methodological choices we had to deal with. While we thus appreciate the LMT study, we are surprised by their own empirical approach and conclusions which they arrive at using a different econometric method, aid variable, sample, and time period. They fail to test the key assumptions underlying their model and measure aid in per capita terms rather than relative to GDP, which could introduce an upward bias to their estimates. Lastly, even LMT's own results show the aid–income relationship to be fragile.

In the reminder of this comment, we will first test for the robustness of our results in Nowak-Lehmann *et al.* (2012) to different treatments of missing observations and provide some reflections on the methods we used. We then turn to the approach in LMT of estimating the aid–income relationship using different time-series methods and a different aid variable. To foreshadow our key findings, the results reported in Nowak-Lehmann *et al.* (2012) are robust to alternative ways of dealing with missing data. Regarding the analysis of the aid–income relationship in LMT, we show that the way they measure aid, their data-handling procedures, as well as the econometric methods they propose are deeply problematic. When we modify their approach to take account of these issues we find no evidence that aid has a positive long-run effect on income. In the conclusion, we point to some agreements between us and LMT and also emphasize the major differences.

2. TESTS FOR ROBUSTNESS IN NOWAK-LEHMANN *ET AL.* (2012)

In Nowak-Lehmann *et al.* (2012) we examine the impact of aid on per capita GDP in a Solow-type framework. In the underlying Cobb–Douglas production function, the covariates enter the income equation multiplicatively, so we log transform them to linearize the model.[1] We investigate the impact of aid as a share of GDP rather than using the absolute value of aid or aid per capita, in line with much of the literature on aid effectiveness (and being aware that this variable can both vary as a result of changes in aid in the numerator as well as GDP in the denominator).

In our econometric approach, we make use of time-series techniques with the aim of minimizing the risk of spurious regressions (which occur when non-stationary variables are regressed on each other), controlling for endogeneity of all regressors and eliminating autocorrelation, which can again lead to biased results. As discussed in detail in Nowak-Lehmann *et al.* (2012), after first providing some evidence of a potentially cointegrating relationship and Granger causality tests suggesting that aid causes income in the short and long run (while acknowledging that, in the long run, the aid–income relationship is bi-directional), we argue that DFGLS is well-suited to address these econometric issues in a time-series context.[2]

In deriving some of our specifications, particularly those including (non-aid) external savings as a covariate, we lose large parts of the potential sample mostly due to taking logs of negative external savings values, as correctly pointed out in Table 1 of LMT which is the exact replication of our results (Nowak-Lehmann *et al.*, 2012, Table 1). Our reference to the use of a "balanced sample" was thus unfortunate and misleading. However, our results do not depend on this choice. As shown in Table 1 of LMT, the coefficient of aid is scarcely affected by whether or not observations are dropped. In the first column, where hardly any observations are dropped, the coefficient of aid is negative (and significant). In the subsequent columns, where the number of dropped observations becomes larger, the coefficient is negative and of essentially identical magnitude but turns insignificant. The result thus seems hardly affected by the inclusion of further covariates and the resulting reduction of observations. Given that in Nowak-Lehmann *et al.* (2012) we also find some evidence of cointegration between aid and per capita income, and Granger causality tests suggest a relationship running from aid to income in the short and long run, we conclude that there is no evidence of a positive impact of aid on income, and some non-robust evidence of a small negative one.

To further investigate how the dropped observations might affect our results, we provide a series of robustness tests in Table 1, treating dropped observations in five different ways.[3] Column 1 reproduces our DFGLS regressions dropping zero and negative values for any of the included variables, as in Nowak-Lehmann *et al.* (2012). In column 2, we exclude external savings from the model, substantially increasing the number of observations. Column 3 adds a positive constant to the negative values before taking logs (which is common in the literature),[4] while column 4 replaces missing values after taking logs with zeroes and adds a binary indicator variable that is one in this case (and zero otherwise). This way, we can use all observations and the binary indicator controls for the fact that there were missing observations for some covariates. Finally, column 5 includes the covariates in levels and thus estimates an additive model.[5]

As can be seen from Table 1, these different specifications all lead to the same conclusion, which is a negative coefficient of the aid variable that is either significant or marginally insignificant. We conclude that our approach to drop these observations does not affect the results of no significant positive effect of aid.[6]

3. LMT – AN ALTERNATIVE TIME-SERIES APPROACH?

Rather than testing for the robustness of the results in Nowak-Lehmann *et al.* (2012), LMT rely on a different time-series approach to show that aid increases income. They relate their analysis to ours by pointing to their use of the same data. However, they choose to omit the earlier years (1960–69) of our data from their sample in their main regressions in order to increase the number of countries in their panel.[7] Surprisingly, LMT's analysis also relies on an approach they criticize us for, namely an unbalanced rather than balanced sample. This does not become immediately obvious, in particular due to LMT's claim of the contrary. It is true, however, that despite limiting the time range of their sample, LMT's panel does remain unbalanced.[8] What is more, LMT omit our control variables from most of their regressions, so that their analysis is hardly comparable to ours in any dimension, other than relying on the same data source for GDP per capita and aid. Specifically, LMT estimate a panel vector autoregression (VAR)/vector error-correction (VEC) model. As we did, they aim to examine the causal effect of aid on GDP per capita. Instead of using aid as a share of GDP, as we do, they prefer to use aid per capita of the recipient population. Relying on impulse–response analysis, they conclude that aid

Table 1. *Do different ways to address negative covariates affect the results?*

	Dependent variable: Per-capita income				
	Full model (1)	No external savings (2)	Transformation of net external savings (3)	Controlling for missing values of net external savings (4)	Model with unlogged variables (5)
Population growth	−0.003	0.10	0.13	−0.01	−1532.77
	(−0.02)	(1.25)	(1.62)	(−0.20)	(−0.95)
Domestic savings	0.07***	0.08***	0.09***	0.06***	1170.52***
	(5.56)	(7.27)	(8.17)	(6.02)	(3.60)
Net external savings	0.05***	–	0.09***	0.03***	1534.95***
	(4.79)		(5.57)	(4.14)	(2.94)
Net aid transfer (aid-to-GDP)	−0.01	−0.01*	−0.02***	−0.01	−547.85**
	(−1.47)	(−1.89)	(−2.85)	(−1.61)	(−2.14)
External savings missing	–	–	–	−0.01***	
				(−2.63)	
Fixed effects	Yes	Yes	Yes	Yes	Yes
2 leads and 2 lags	Yes	Yes	Yes	Yes	Yes
Cross sections	50	56	56	58	57
Periods	41	41	41	42	41
Observations	755	1642	1543	2389	2014
R-squared adj.	0.99	0.99	0.99	0.99	0.99
Durbin–Watson stat.	2.02	1.72	1.80	1.83	1.61

Notes: Estimation is with DFGLS; *t*-values are in parentheses. *** (**, *): significant at the one (five, ten) percent level. All variables in the first four columns are in natural logs, while the dependent and independent variables are in levels in the fifth column.