
This is an electronic reprint of the original article.
This reprint may differ from the original in pagination and typographic detail.

Lof, Matthijs; Mekasha, Tseday Jemaneh; Tarp, Finn
Rejoinder to Herzer, Nowak-Lehmann, Dreher, Klasen, and Martinez-Zarzoso (2014)

Published in:
WORLD DEVELOPMENT

DOI:
[10.1016/j.worlddev.2014.08.008](https://doi.org/10.1016/j.worlddev.2014.08.008)

Published: 01/01/2015

Document Version
Publisher's PDF, also known as Version of record

Please cite the original version:
Lof, M., Mekasha, T. J., & Tarp, F. (2015). Rejoinder to Herzer, Nowak-Lehmann, Dreher, Klasen, and Martinez-Zarzoso (2014). WORLD DEVELOPMENT, 70, 397-399. <https://doi.org/10.1016/j.worlddev.2014.08.008>

This material is protected by copyright and other intellectual property rights, and duplication or sale of all or part of any of the repository collections is not permitted, except that material may be duplicated by you for your research use or educational purposes in electronic or print form. You must obtain permission for any other use. Electronic or print copies may not be offered, whether for sale or otherwise to anyone who is not an authorised user.



Rejoinder to Herzer, Nowak-Lehmann, Dreher, Klasen, and Martínez-Zarzoso (2014)

MATTHIJS LOF^a, TSEDAY JEMANEH MEKASHA^b and FINN TARP^{b,c,*}

^a *Aalto University, Finland*

^b *University of Copenhagen, Denmark*

^c *UNU-WIDER, Helsinki, Finland*

Summary. — The Herzer et al. (2014) comment on our article (Lof et al., 2014) addresses two issues. First, they propose various ways to circumvent our concerns regarding data handling in a paper by Nowak-Lehmann et al. (2012). We point out that under these new approaches the link between the empirical model and theoretical specification no longer holds. Moreover, the issue of reverse causality is not tackled by Herzer et al. (2014). Second, Herzer et al. (2014) criticize our empirical strategy and Panel VAR results. We show their remarks are based on misunderstandings and were, for the most part, already addressed in Lof et al. (2014).
 © 2014 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/3.0/>).

Key words — foreign aid, growth, time-series, VAR models

In our recent article (Lof, Mekasha, & Tarp, 2014), we replicate the results of Nowak-Lehmann, Dreher, Herzer, Klasen, and Martínez-Zarzoso (2012) and provide two fundamental critical remarks regarding their methodology. First, we revealed that their model is presented in logs, which is not possible as not all variables are strictly positive. This has led to the exclusion of a large fraction of the available observations resulting in a highly unbalanced panel. Second, we argued that the single equation regression model by Nowak-Lehmann et al. (2012) measures correlations between income, aid, and other variables, but is not informative about the existence and size of possible causal effects of aid on GDP and/or vice versa. Instead, we provided empirical results based on another methodology, namely Panel Vector Autoregressions (PVAR). These PVAR results suggested, unlike the results by Nowak-Lehmann et al. (2012), a positive and significant impact of aid on income.

Herzer, Nowak-Lehmann, Dreher, Klasen, and Martínez-Zarzoso (2014) have now commented on our paper. Regarding the first point (missing observations due to a logarithmic transformation), Herzer et al. (2014) acknowledge the mistake but argue that this mistake did not distort the results as the results are qualitatively similar when no logs are taken or the missing observations are controlled for in another way. This is indeed true, but Herzer et al. (2014) leave out some fundamental points. Nowak-Lehmann et al. (2012) arrived at the log-linear specification by considering a Solow-type framework with a Cobb-Douglas production function. This multiplicative framework requires all inputs to be strictly positive, and requires log-linearization to result in a linear regression model. Controlling for negative values by supplementing the model with dummies, adding a positive number to the negative values, or abstaining from taking logs provides an empirical fix, but breaks the links between the empirical specification and the theoretical model. Also the cointegration tests presented in Nowak-Lehmann et al. (2012) are no longer valid in these new setups. More importantly, abstaining from taking logs does not help in any way to solve the other issue, namely that the reported regression coefficients should not be interpreted as causal effects. As we mentioned in our article, although the DGLS estimator may estimate a cointegrating

vector consistently even in the case of endogenous regressors, it is a serious misunderstanding to think that the parameters of this cointegrating vector could be interpreted as causal effects. In Lof et al. (2014), we referred to the textbook by Stock and Watson (2011, p. 697), who warn explicitly against such a causal interpretation.

Unfortunately, Herzer et al. (2014) do not tackle the causality issue at all while this was one of the two main points in our article Lof et al. (2014). Instead, they raise a number of concerns regarding our PVAR analysis. Most of these concerns, however, seem to be based on misunderstandings. First, Herzer et al. (2014) claim repeatedly (first time in footnote 8) that our panel is unbalanced, because we only include observations for which full time-series are available. This is incorrect. We started off with the full sample of 131 countries by Nowak-Lehmann et al. (2012), and eliminated all countries for which there are missing or negative observations on aid or income over the period 1970–2006. This resulted in 59 countries, for which full (strictly positive) time-series are available. Hence, this is a balanced panel (a panel is balanced when for each cross-sectional unit an equal amount of time-series observation is available).

Second, Herzer et al. (2014) list three of our modeling choices, and claim that these choices are driving our results. These choices are (i) ignoring the first ten years of data by starting the analysis from 1970 instead of 1960; (ii) considering aid and income in per capita terms; and (iii) excluding external and domestic savings from the model, focusing instead on a bivariate model of aid and income alone. It is true that we make these choices for our benchmark model. In our article Lof et al. (2014), we justify all three of them. It is however not true that these choices are driving our results and we demonstrated this in Figure 5, where we considered the PVAR under alternative modeling choices, including varying the starting date to 1960 and 1980 (Figure 5a and b), considering aid and/or GDP in aggregate rather than per capita terms,¹ (Figure 5c and d), and supplementing the model with domestic and external savings (Figure 5g and h). Our main result, a

* Final revision accepted: August 9, 2014.

positive effect of aid on GDP, holds under all these alternative robustness checks. Claiming that these choices are instrumental for our results is simply incorrect.

For completeness, Figure 5 contains two more robustness checks, namely the reversal of the recursive order (Figure 5e), and the PVAR in differences rather than levels (Figure 5f and i). The last check shows that aid has an estimated positive effect also in the framework of a stationary (differenced) PVAR rather than the PVAR in levels in vector-error correction (VECM) notation. This implies that our result would hold even if we were wrong about the existence of a cointegrating relationship. This brings us to the replication exercise. Herzer et al. (2014) present cointegration tests, Granger causality tests, and impulse responses from an estimated PVAR that contrast with our results. They find no evidence for cointegration, and no evidence that aid Granger causes income. The impulse responses show a negative effect of aid on GDP, although confidence bounds are missing. We cannot say much about these results, as we have not been able to replicate them. After reading Herzer et al. (2014), we have executed the Kao (1999) and Pedroni (1999) cointegration tests with our data and find completely different results.² Unlike Herzer et al. (2014), we are able to reject the null hypothesis of no cointegration at the 1 per cent level. This result is consistent with Juselius, Framroze-Møller, and Tarp (2014) who also report evidence of a cointegrating relationship between aid and GDP in many countries.

We are also not able to replicate the impulse-response functions by Herzer et al. (2014, Figure 1). It seems that they use the exact same data and model (Eqn. (3) in Lof et al., 2014 is identical to Eqn. (2) in Herzer et al., 2014), so it is unclear why the results are so different. Replication is complicated by the fact that Herzer et al. (2014) do not provide many details about the estimation of the VAR and the computation of the impulse responses. For example, it is not clear from the text how the PVAR is estimated, how the shocks were identified (we used a recursive identification scheme using a Choleski decomposition), and whether the VECM was transformed to a PVAR in levels before computing the impulse-response

functions (i.e., does Figure 1 show the responses in differences or levels?).³ The reported negative effect of aid on GDP is in contrast not only with our benchmark model and the various robustness checks, it is also in stark contrast with other recent studies applying vector autoregressive models to assess the aid-growth relationship, including Gillanders (2011) and Juselius et al. (2014).

Herzer et al. (2014) present the results of Granger causality tests, and make causal interpretations on the results. Granger causality has however very little to do with causality in an economic sense. Granger causality is about predictability. A common joke among econometricians is that the number of people carrying an umbrella Granger causes the probability that it will rain. Of course, carrying an umbrella does not cause rain. Instead, people carry an umbrella in anticipation of rain, just like donor countries may increase aid in anticipation of harsh economic conditions in recipient countries. No statements about the economic effects of aid can be based on these observations.

Finally, our paper contributed to a broader literature on aid and growth, which we do not believe we presented selectively as claimed by Herzer et al. (2014); see for example Ravallion (2014). The main purpose of this rejoinder is, however, to respond to the concerns expressed by Herzer et al. (2014) about our empirical strategy, rather than provide another survey on the aid-growth literature. Herzer et al. (2014) correctly demonstrate that their results hold qualitatively when they control for the missing observations. The theoretical foundation and cointegration tests laid out in Nowak-Lehmann et al. (2012), however, are no longer valid in this framework. Most importantly, it does not address the fact that the reported coefficients measure correlation and not causation. The critical statements regarding our empirical strategy are either false (we do have a balanced panel) or were already tackled by our extensive set of robustness checks (Figure 5: Lof et al., 2014). Moreover, we are not able to replicate the new results. Despite using the same data and model, the Herzer et al. (2014) results are in contrast with our results and other recent VAR-based studies.

NOTES

1. As we explained in Lof et al. (2014), we do not measure aid as a percentage of GDP, because this makes impulse-response analysis impossible: It would be by construction inconsistent to consider a shock to GDP which does not have an immediate impact on the aid-to-GDP ratio.

2. Our codes, data, and full results are available upon request.

3. Since we provided on request all our Lof et al. (2014) codes to the authors of the comment (Herzer et al., 2014) on 1 April 2014, they should, as we see it, at a minimum have identified the exact reason for the differences between the reported impulse responses.

REFERENCES

- Gillanders, R. (2011). *The effects of Foreign aid in sub-Saharan Africa*. School of economics, University College Dublin Working Papers.
- Herzer, D., Nowak-Lehmann, F., Dreher, A., Klasen, S., & Martínez-Zarzoso, I. (2014). Comment on Lof, Mekasha, and Tarp (2014), World Development, <http://www.sciencedirect.com/science/article/pii/S0305750X14001715>.
- Juselius, K., Framroze-Møller, N., & Tarp, F. (2014). The long-run impact of foreign aid in 36 African countries: Insights from multivariate time series analysis. *Oxford Bulletin of Economics and Statistics*, 76(2), 153–184.
- Kao, C. (1999). Spurious regression and residual-based test for cointegration in panel data. *Journal of Econometrics*, 90(1), 1–44.
- Lof, M., Mekasha, T. J., & Tarp, F. (2014). Aid and income, another time-series perspective. *World Development*, <http://www.sciencedirect.com/science/article/pii/S0305750X13002994>.
- Nowak-Lehmann, F., Dreher, A., Herzer, D., Klasen, S., & Martínez-Zarzoso, I. (2012). Does foreign aid really raise per capita income? A time series perspective. *Canadian Journal of Economics*, 45(1), 288–313.

Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics*, 61, 653–670.

Ravallion, M. (2014). On the role of aid in The Great Escape. *Review of Income and Wealth*, <http://dx.doi.org/10.1111/roiw.12136>.

Stock, J. H., & Watson, M. (2011). *Introduction to Economics*. (Addison-Wesley series in economics). Pearson Education.

Available online at www.sciencedirect.com

ScienceDirect