■ REVIEWS

Book Review of *Techniques for Evaluating the Differences in Multiregional Input-Output Databases: A Comparative Evaluation of CO$_2$ Consumption-Based Accounts Calculated Using Eora, GTAP and WIOD*, by Anne Owen

As indicated in this special issue, consumption-based accounting with the use of global multiregional input-output tables (GMRIO) became an important toolbox in the input-output and industrial ecology communities in the last 5 to 10 years. Various GMRIOs with environmental extensions were developed, including GTAP (www.gtap.org), WIOD (www.wiod.org), EORA (www.worldmrio.com), and EXIOBASE (www.exiobase.eu). Most of these databases were published for the first time around 2012.

The community of practitioners using these databases obviously wondered if there would be differences between environmental footprints calculated with such databases. Of course, such differences were observed. A next question is, What elements in the GMRIOs would create such differences in outcomes?

Anne Owen deserves the honor to be one of the, and probably the first, authors who analyzed the differences between GMRIOs in a structured way. Starting her Ph.D. thesis work around 2011, she realized such comparisons between GMRIOs would be the next big question once the GMRIOs had been developed. She wrote a very complete and comprehensive thesis on the matter, that now has been published in a slightly revised form as a book (Owen 2017) with Springer International Publishing,[1] in a series on "Developments in Input Output Analysis" edited by two well-known scholars in this field, Tommy Wiedmann and Erik Dietzenbacher.

The core of the work by Owen is a pair-wise comparison of footprint results calculated with WIOD, EORA, and GTAP (EXIOBASE not yet being available when she started her work). She focuses in her work particularly on carbon footprints. She uses a number of methodologies to compare the results, such as structural decomposition analysis, matrix difference statistics, and structural path decomposition analysis. The structure of her approach is outlined in chapter 2 of the book, and the methods are elaborated in more detail in chapter 3. GTAP, EORA, and WIOD have quite different classifications, and in order to do a proper comparison, she had to have these databases in a similar country and product/sector classification (the so-called common classification). This "common denominator" classification is obviously more aggregated than the original GMRIOs were. Hence, in chapter 4, Owen

rightly starts with an analysis of to what extent aggregating the original databases to the common classification may change the calculated country footprints. In her case, when focusing on the carbon footprint, she found that the aggregation she used did not matter too much.

Then, in chapter 5, she does the comparison in earnest. She first applies structural decomposition analysis, structural path decomposition analysis, and matrix difference statistics to see which factors contribute most to the differences in carbon footprints of nations calculated with different GMRIOs. Owen's assessment is very comprehensive. As we also show in this special issue (Tukker et al. 2018, an analysis partly based on Owen's work), such analyses give very good guidance to MRIO builders in areas of priority for reduction of uncertainty. Owen's most striking finding is that territorial carbon dioxide (CO$_2$) emission data are still one of the most important reasons for differences in calculated consumption-based accounts. It is also illuminating to see that, for most countries, differences in import values do not matter that much (imports being relatively minor compared to gross domestic product [GDP]), despite the fact that the relative difference in import values by country between databases may be significant. The book ends with a chapter discussing such matters and conclusions. Various chapters of Owen's work are based on work published in the peer-reviewed literature, and while Owen obviously pulled her whole story together, it is nice to see the credits she gives for the contributions of other groups with whom she collaborated during her Ph.D. journey, most notably the Industrial Ecology group at NTNU in Trondheim, Norway.

Overall, this book is a pioneering step in comparative assessments between GMRIOs and a must read for any input-output practitioner who wants to understand uncertainty in footprint calculations.

Note

1. *Techniques for Evaluating the Differences in Multiregional Input-Output Databases: A Comparative Evaluation of CO$_2$ Consumption-Based Accounts Calculated Using Eora, GTAP and WIOD*, by Anne Owen. Cham, Switzerland: Springer International Publishing AG, 2017, ISBN 978-3-319-51555-7, 217 pp., hardcover: US$129.00, eBook: US$99.00.

References

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Tukker, A., A. de Koning, A. Owen, S. Lutter, M. Bruckner, S. Giljum, K. Stadler and R. Wood. 2018. Towards robust, authoritative assessments of environmental impacts embodied in trade: Current state and recommendations. *Journal of Industrial Ecology* 22(3): 585–598.

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