



Editorial

Global Biodiversity, Production Chains and Input-Output Analysis



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Dear IIOA member,

The challenge posed by the expanding globalised economy to the earth's complement of living things, its biodiversity, was highlighted in a *Nature* Letter published on June 6th 2012 (*Nature* 486, 109–112 2012). It revealed that 30% of the world's threatened and endangered animal species were impacted by trade in commodities, most of it to affluent consumers in developed countries such as the USA, Japan and the EU. Most of the threatening activities took place in tropical, biodiversity-rich, developing countries. Countries such as Papua New Guinea, Madagascar and Honduras had levels of biodiversity threatened by trade on the order of 50-60%. This highlights how poverty, inequality and weak institutional frameworks allow global companies to bypass rules and regulations. A counter argument is it is due to their lack of industrialization that developing countries remain rich in biodiversity: thus in pursuing their development goals they must sacrifice some degree of biodiversity. By extension, this argument paints a bleak picture for the natural world. Since it suggests that to avoid financial collapse, global trade must expand somewhat free and unfettered. One positive note is that Article XX in the World Trade Organisation's (WTO's) General Agreement on Tariffs and Trade (GATT) permits a legal block to trade in "environment threatening" activities, so institutions are not powerless. Still, they may remain thoughtfully myopic. Each country's place in this global picture is depicted in a production (threats suffered) or consumption (threats driven) perspective on a trade-flows website (<http://globalcarbonfootprint.com/biodivmap/>).

The analysis was based on the University of Sydney's Eora database (The *Eora* MRIO Database: <http://globalcarbonfootprint.com/>) constructed by a team led by Professor Manfred Lenzen. This is a new series of environmentally extended multiregional input-output (MRIO) tables with applications in carbon, water, and ecological footprinting, and Life-Cycle Assessment, as well as trend and key driver analyses (<http://www.iucnredlist.org/>). It distinguishes 187 individual countries comprising more than 10,000 industry sectors, and hence offers high detail and provides information delayed just 2-3 years, significantly improving timeliness. Additionally it presents MRIO elements that allow users to understand the reliability of data.

The global biodiversity analysis required that each country's record of threatened and endangered animal species in the IUCN Red List be integrated with the *Eora* MRIO framework. A series of inclusion and exclusion rules filtered the IUCN data so that only species impacted by economic activity



were included. Only the 'vulnerable, endangered and critically endangered' categories of species status were used, while the 'drivers of threat' categories excluded natural events such as earthquakes and diffuse pressures such as 'invasive species'. The specific approach used to integrate the MRIO database with the IUCN's Red List is available in the supplementary material provided online with the *Nature* Letter. Simply put, if the 'Black and White Bird' was endangered through the clearing of land in Australia for the purpose of growing wheat for both domestic use (50%) and export to Japan (20%), Singapore (10%) and China (20%), then this ONE species' threat is allocated 0.5 to Australia, 0.2 to Japan, 0.1 to Singapore and so on. Thus from either a production or consumption perspective, each country had a balance sheet of 'species threats' allocated to it. The peer review process leading to the eventual publication was deep and exacting, leaving the authors with a grudging admiration for the journal and its reviewers, inspite of the global press's delight when there is an occasional mishap in IPCC reporting or 'climategate' exposés. The review process lead to an ever-expanding methodology section published online, as reviewers

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Newsletter

International Input-Output Association (IIOA)

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Three issues of many might interest the Input-Output community. The biggest was the 'scientific proof' for the Eora MRIO model. Given the challenges inherent in global MRIO construction, our initial response had three levels. First, the underlying data stem from national and international public records, with each country conforming to international standards. The second was parts of the methodology had been published in peer reviewed journals before. At that stage the Eora model was not peer-reviewed published (now rectified, see Environmental Science and Technology reference below). The third was partly



rhetorical by saying that "similar modelling approaches are commonplace in international emissions accounting, and Eora gives much the same results". The next reviewing hurdle was the mapping of IUCN species and threat causes to economic sectors. This required detailed presentation of concordance matrices in the supplementary material. Other reviewing hurdles that were not always easy to answer diligently, were ones related to biological and ecological issues. Some of these included the influence of subsistence agriculture (not counted in the SNA) and what to do about migratory species (especially birds) where many countries can impact on yearly life cycles. One particularly difficult issue was the challenge of naïveté, that the authors had the temerity to suggest that the global order need changing.

Analysis and subsequent publication is one thing, policy influence is another. Currently we have not found the time and the effort to take this further, either in six to ten underpinning publications that lie hidden in the MRIO calculus, or in disseminating the results to the WTO, IUCN, CITES and many global institutions that oversee the accelerated mining of the globe's biodiversity. Perhaps in 2013!

Tales from the IO world

Input-output European stories: a new collection can start.

Dear readers,

Eurostat, the statistical authority of the European Union, has released in October 2012 European supply-use and input-output tables for the reference year 2008. This publication has been the third release of such data since May 2011: European supply, use and input-output tables are now available from 2000 to 2008. Eurostat disseminates results for the European Union (27 Member States) and for the Euro Area (17 Member States forming the euro monetary union).

The new consolidated European Supply, Use and Input-Output Tables serve the general interest of the European community. Several stories can be told using the new set of European Supply, Use and Input-Output Tables. One starts as follows:

"Between 2000 and 2007 more than two thirds of the embodied employment in European exports was due to manufactured products, while financial and real estate services showed the largest embodied labour income per person employed in exports activities, both in the European Union (EU-27) and in the euro area..."

The story continues on Eurostat website. Such analyses require data and techniques made available to statisticians, economists, and researchers. As a standard input-output technique, the European input-output tables have been used to apply the Leontief quantity model to employment and labour income in this example.

Another story related to international trade and employment has singled out for the very first time the number of jobs created due to spill over and feedback effects associated to the Single Market and originated by the European exports.

"(...) Despite the reduction in the labour intensity of the European exports, the associated employment grew from 22 to 25 million jobs (2000-2007), out of which 9 million jobs were created due to spill over and feedback effects associated to the Single Market".

A third story was published by the Environmental Accounts Unit of Eurostat, which made an assessment of the environmental impacts of final consumption using the environmental extended input-output tables. And so on and so forth...

From a methodological view, the European supply-use and input-output tables (European Union and euro area) are built up from 27 national supply and use tables at basic prices (or 17 in the case of the euro area tables). This project has started in 2008 in association with the European Commission's Joint Research Centre-Institute for Prospective and Technological Studies (JRC-IPTS) at Seville with the first results published in May 2011 for the years 2000 to 2006. The data is based on the Nace rev. 1.1 classifications of activities and products for the years 2000 to 2007. But referring to year 2008, the National Accounts data have moved to a new classification NACE rev. 2 in line with the ISIC rev. 4. So did the supply, use and input-output tables as well.

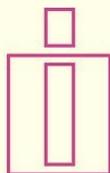
The national input data is based on the European System of National and Regional Accounts (ESA95) transmission program. Under this regulation, EU Member States transmit to Eurostat Supply and Use Tables (SUT, annually) and Input-Output Tables (IOT, 5 yearly) up to 36 months after the end of the reference period. Unfortunately, the currently available data using the more detailed activities (especially in the services area) and products classification NACE rev. 2 are not available for years prior to 2008. Subsequently, the classification scheme industry by commodity in 2008 (NACE Rev.2) is currently different from that of 2007 (NACE Rev.1.1). Eurostat, in collaboration with the JRC-IPTS, is working on a backcasting a time series back to 2000 using the classification NACE rev. 2 (ISIC rev. 4) that will be published in autumn 2013 with detail to 65 activities and 65 products. For more information on the European supply, use and input-output tables, you can have a look at our dedicated section on Eurostat website here: <http://epp.eurostat.ec.europa.eu>



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International School of Input-Output Analysis. Kitakyushu (Japan)

7/8 July 2013

Sunday, July 7, 2013

Opening and welcoming to the School

Monday, July 8, 2013

a) Learning to use REAL I-O for regional and global analyses

Lecturers: Norihiko Yamano and Geoffrey J. D. Hewings
OECD (France) and University of Illinois (US)

b) Updating Supply, Use and Input-Output Tables

Lecturer: Jörg Beutel, Konstanz University of Applied Sciences (Germany)

c) The GTAP Data Base and Contributing I-O Tables to the GTAP Data Base

Lecturer: Ángel Aguiar, Purdue University (United States)

d) Material Flow Analysis and Input-Output Analysis

Lecturers: Stephan Lutter, SERI (Austria)

e) Applied CGE modelling

Lecturer: Eduardo Haddad, University of Sao Paulo (Brazil)

f) Environmental Input-Output Analysis

Lecturer: Tommy Wiedmann, University of New South Wales (Australia)

Further details: at:

http://www.iioa.org/Conference/21st/school_of_io.html

News about the 2013 International Input-Output Conference

The 21st International Input-Output Conference will be held in Kitakyushu (Japan), from July 9 till July 12. Like in the past few years, it will be preceded by sessions organized within the framework of the International School of Input-Output Analysis, on July 7 and 8. The Call for Papers has been out for some time already, see http://www.iioa.org/Conference/21st/paper_submission.html. Please

note that abstracts for papers should be submitted through <http://copass.iioa.org> by December 31, 2012. Colleagues are also encouraged to submit proposals for organized sessions before that date, by means of an e-mail message to Bart Los (b.los@rug.nl).

The local organizers (Shigemi Kagawa and Yasuhide Okuyama) and the chairman of the programme committee (Bart Los) are happy to announce the names of the first two keynote speakers at the conference: Glen Peters and Richard Baldwin.



Glen Peters

Peters is Senior Research Fellow at CICERO in Oslo (Norway) and has a vast publication record in environmental applications of input-output analysis, often linking trade statistics and input-output data to indicators of environmental repercussions of production activities. His publications include articles in the Proceedings of the National Academy of Sciences (PNAS), Science and Global Environmental Change.

Richard Baldwin is Professor of International Economics at the Graduate Institute of International and Development Studies in Geneva, Switzerland. Much of his recent empirical work focuses on the causes and consequences of the emergence of "global value chains", which has led to a renewed interest in roles of intermediate inputs in the global production system. Baldwin's publications include the well-known textbook *The Economics of European Integration* (with Charles Wyplosz) and articles in the *Journal of Political Economy*, *American Economic Review*, and the *Quarterly Journal of Economics*. Baldwin is also founding editor of *VoxEU*, a highly popular website about economic



Prof. Richard Baldwin

policy. This site is maintained by the Centre of Economic Policy Research CEPR, at which Baldwin is Policy Director.

Bart Los
University of Groningen



Sustainable Production and Consumption Unit

The Sustainable Production and Consumption Unit has a vacancy for a post-doctoral researcher to work in environmental economics. The successful candidate's main tasks will consist in the development and use of environmental economic models and in conducting, formulating and coordinating techno-economic studies, the management and monitoring of research tasks, analysis and summary of results and preparation of reports for policy makers. Candidates must hold a doctoral degree or having fulfilled all the obligations to obtain a PhD (certified by the university) or having a minimum of 5 years research experience after the first university degree.

Deadline 10/12/2012.

Further info:

<http://recruitment.jrc.ec.europa.eu/?inst=3582>



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Published papers in Input-Output Analysis and related methods.

In the next ESR issue

Economic Systems Research –

Journal of the IIOA

Volume 24, Issue 4, 2012

<http://www.tandf.co.uk/journals/titles/09535314.asp>



DISAGGREGATING INPUT-OUTPUT MODELS WITH INCOMPLETE INFORMATION. LINDNER S., LEGAULT J. and GUAN D.

Disaggregating a sector within the Leontief input-output (IO) framework is not a straightforward task since there is more than one possibility for the unknown technical coefficients of the disaggregated IO table, and more information than what is embodied in the aggregated IO table is thus required. This paper presents a methodology for disaggregating sectors into an arbitrary number of new sectors when the only available information about the newly formed sectors is their output weights. A random walk algorithm is used to explore the polytope containing the admissible combinations for the unknown technical coefficients of the disaggregated IO table. These combinations are then used to construct the probability distribution of the coefficients of the inverse Leontief matrix. The methodology is illustrated by disaggregating the electricity production sector of China's 2007 IO table and by looking at the probability distribution of the CO₂ emission intensity factors of the sectors of the economy.

USING A CGE MODEL TO IDENTIFY THE POLICY TRADE-OFF BETWEEN UNEMPLOYMENT AND INFLATION. THE EFFICIENT PHILLIPS CURVE. ANDRÉ F.J., CARDENETE M.A. and LIMA M.C.

This paper provides a new reading of a classical economic relation: the short-run Phillips curve. Our point is that, when dealing with inflation and unemployment, policy-making can be understood as a multicriteria decisionmaking problem. Hence, we use so-called multiobjective programming in connection with a computable general equilibrium (CGE) model to determine the combinations of policy instruments that provide efficient combinations of inflation and unemployment. This approach results in an alternative version of the Phillips curve labelled as efficient Phillips curve. Our aim is to present an application of CGE models to a new area of research that can be especially useful when addressing policy exercises with real data. We apply our methodological proposal within a particular regional economy, Andalusia, in the south of Spain. This tool can give some keys for policy advice and policy implementation in the fight against unemployment and inflation.

DOWATER-RICH REGIONS HAVE A COMPARATIVE ADVANTAGE IN FOOD PRODUCTION? IMPROVING THE REPRESENTATION OF WATER FOR AGRICULTURE IN ECONOMIC MODELS. DUCHIN F. and LÓPEZ-MORALES C.

With growing demand for fresh water and uncertain supplies, there is an increasing concern about future water scarcity. Since most freshwater withdrawals are for agriculture, reliance on water embodied in imported food (trade in 'virtual water') is a possible strategy to provide food to water-stressed regions while conserving their scarce supply for other purposes. To evaluate this proposition, we extend a model of interregional trade by (1) defining endowments of water that cannot be exceeded, (2) allowing simultaneous operation of rainfed and irrigated agriculture, and (3) distinguishing sub-regional endowments within a larger economic region. An application to the Mexican economy compares region-specific water abundance with economic comparative advantage under alternative scenarios. We conclude that the water-rich regions of Mexico are relatively high-

cost producers of food and that they do not pick up the slack even when the lowest-cost Mexican regions are constrained by binding water constraints.

INCOME DISTRIBUTIONS IN INPUT-OUTPUT MODELS. STEENGE A.E. and SERRANO M.

The analysis of income distribution (ID) has traditionally been of prime importance for economists and policymakers. However, the standard input-output (I-O) model is not particularly well equipped for studying current issues such as the consequences of decreasing access to primary inputs or the effects of specific redistributive policies. This paper addresses this gap in the existing literature. We propose that IDs can excellently be studied by restructuring the I-O relations. A new coefficients matrix is defined, the so-called augmented input coefficients matrix. This matrix is the sum of the intermediate input coefficients matrix and newly constructed matrices of sector-specific input coefficients that represent the existing distribution of income. We show that shifts in the distribution can be modelled by attributing weights to these matrices and vary these according to system-specific rules. Numerical illustrations based on the existing literature are given throughout the paper.

A CYCLING METHOD FOR CONSTRUCTING INPUT-OUTPUT TABLE TIME SERIES FROM INCOMPLETE DATA. LENZEN M., PINTO DE MOURA M.C., GESCHKE A., KANEMOTO K. and MORAN D.D.

There are a number of approaches for constructing time series of input-output tables. Some authors generate an initial estimate for a base year, and then serially estimate tables for subsequent years using the balanced prior-year table as an initial estimate. Others first generate a series of initial estimates for the entire period, and then balance tables in parallel. Current serial methods are affected by sudden leaps in the magnitude of table elements, which occur straight after a period of data unavailability. Current parallel methods require two complete tables for base and final years in the same classification, and therefore do not work under misaligned or incomplete data. We present a new method for constructing input-output table time series that overcomes these problems by averaging over alternate forward



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and backward sweeps across the time series period. We also solve the problem of hysteresis causing forecast and backcast table estimates to differ.

BOOK REVIEW

Applied General Equilibrium: An Introduction. Cardenete M.A., Guerra A.I. and Sancho F.

Highlights in journals

FUA F., LIUA H., POLENSKE K. R., ZHENG LI (2013). MEASURING THE ENERGY CONSUMPTION OF CHINA'S DOMESTIC INVESTMENT FROM 1992 TO 2007. *APPLIED ENERGY* 102, PP. 1267–1274.

In this study, we first define the energy consumption of domestic investment as the investment-driven energy consumption (IDEC). Then, we build an energy input–output model to identify quantitatively the amounts of China's IDEC from 1992 to 2007. We also use the model to analyze the sector distributions of the IDEC for the same time period. The key findings derived from this study improve the understanding of the effects of China's domestic investment on its energy consumption expansion and reflect the fact that China's rapid urbanization and industrialization processes are among the main reasons for the large amount of energy consumption in China. We provide some quantitative information for further determining the energy-saving potentials of China's economy during these processes.

LLOP M. (2013). WATER REALLOCATION IN THE INPUT-OUTPUT MODEL. *ECOLOGICAL ECONOMICS* (86), PP. 21–27.

Water reallocation between economic agents has been and continues to be the subject of a considerable amount of research. This paper proposes a method for evaluating how water is reallocated within the economy in response to changes in final demand and changes in the technical water needs of activities and consumers. The empirical application, which is for the Catalan economy, shows important asymmetries in the effects that exogenous inflows and changes in water technical requirements have on water reallocation. In the process of water distribution, exogenous inflows mostly benefit

agriculture and damage private consumers. On the other hand, increases in technical water requirements have negative effects on agriculture and positive effects on the other production activities and consumers. The results of the study suggest that agriculture is an important activity not only in terms of water distribution but also in terms of water reallocation due to changes in final demand and technical water needs.

BEKHET H.A. (2013). ASSESSING STRUCTURAL CHANGES IN THE MALAYSIAN ECONOMY: I-O APPROACH. *ECONOMIC MODELLING* (30), PP. 126–135

This study attempts to re-investigate the production structure change for the Malaysian economy through changes in the A and $(I - A) - 1$ matrices over the period 1980–2005, when the planners formulated and implemented nine plans so far. Five input–output tables were published by the Department of Statistics in Malaysia for the period under study. A structural change method was carried out to analyze and assess the changes in economic efficiency. This comparative study focuses on changes in the economic structure with different levels of development over time (1980–2005). The change in the economic structure is decomposed into two initial components (technology and total output). In accordance with the results, there appear to be similarities over time in the national structure of production patterns of intermediate use of commodities. Also, the results clearly indicate a rather remarkable degree of commonality in the patterns of growth processes, with more significant differences among sectors than between tables. However, the changes within sectors, and the Malaysian table as a whole, seem to result from changes in the level of the efficiency. Technical relationship seems to have remained relatively unchanged. It is clear that the economy has not moved fast enough forward, and does not seem to be geared by, the type of exports that may sustain a dynamic industrial development, based on external markets. New evidence is revealed in this study: the efficiency degree between demand and supply side for the Malaysian economy still remain weak and changeable over the period of study.

Upcoming conferences



BAHÇEŞEHİR
UNIVERSITY



ICOA 2013

*Istanbul, Turkey
27-29 June, 2013*

The aim of the conference is to bring together economists from different fields of Applied Economic Research in order to share methods and ideas. All papers, accepted after peer review, will be published on line by Elsevier and indexed in Scopus.

Important dates:

1st April, 2013 Full paper submission

24th April, 2013 Notification of successful authors

30th April, 2013 Submission of a PDF scanned copy of the copyright transfer form

24th April, 2013 Proposals for sessions and minisymposia

Further info at: http://kastoria.teikoz.gr/icoae/?page_id=26

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