Newsletter
Number 56, August 2023

INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Welcome from the Editor

Dear **IIOA** member,

I am very pleased to release the latest issue of the *International Input-Output Association Newsletter*. Many thanks, as always, to all of you that have contributed by sending your inputs.

This issue contains a message from the IIOA President Sanjiv Mahajan, the latest ESR articles, the last three issues of the ESR, some highlights in Journals and recent related books. You can also find some information about the IIOA archive, some job positions, the summary of a past event, an ongoing project and a couple of new databases. The Social Accounting Corner brings this time exciting conversations with Anne Owen and Jan Oosterhaven.

Any feedback, comments or suggestions are greatly appreciated. I also welcome contributions to future issues.

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Would you like to contribute to the IIOA newsletter?
Send us your news at newsletter@iioa.org

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A message from the IIOA President – Sanjiv Mahajan

Dear **IIOA** member,

Hope you all have had an opportunity to have a nice, relaxing holiday break.

For those of you who were able to attend **the 2023 IIOA Conference in Alghero, Italy**, hope you had an enjoyable conference, learned new things, caught up with old friends and made new friends. For those of you attending for the first time, hope we met your expectations and it is the first of many IIOA conferences you are able to attend. I was very happy to see so many new faces as well as previous Conference attendees.

The various traditional events forming the Conference from the keynotes through to the ISIOA were well received. In addition, the Special Leontief Nobel Prize Sessions celebrating the 50th year since Leontief received his Noble Prize were well attended and thanks to **Monica Serrano**, **Bart Los** and others for the organisation and the presenters too.

The classical music concert was very good and really well attended.

A BIG thank you to **Giorgio Garau** (LOC Chair), **Jose Rueda-Cantuche** (SPC Chair) and all the supporting cast that helped to achieve another successful IIOA Conference.

Albeit delayed, we will announce the location of next year's conference soon.

Congratulations to **Albert Steenge** and **Josef Richter** (and others involved) getting the pilot version of the I-O Historical Archive ready and open to IIOA Members through the IIOA Members Area. This is a significant milestone in retaining historical material for future research and interest for many.

The summer is always full of lots of enjoyable sporting and social events – lots of winners and losers, lots of happiness and sadness too. I would like to just say, Felicidades to Spain beating England to win the 2023 FIFA Women's World Cup. Women's football has progressed so much and Spain have raised the bar to a new level.

For me personally, with my younger brother (a Police Commander) passing away in tragic avoidable circumstances, July and August have been a really difficult time. I am now in catch up mode.

Life is short, enjoy today do not wait for tomorrow.

Take care, be safe and have lots of fun =8-)

Sanjiv

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IIOA Archive

We are pleased to announce that access to the pilot version of the IO (historical) Archive is now open to IIOA Members through the IIOA Members Area.

PILOT VERSION

The current version of the archive offers access to the contributions to the IO Conferences 1971, 1974, 1979, and 1986 previously unpublished in proceedings or in journals. At present the PDF versions of about 280 contributions are available and can be downloaded. More documents will be offered in the near future.

USER INFOS

To use the Archive, please log in to the IIOA Members Area. In the top section of the page you now find the link "IO-Archive". Once you click on this link, you get to a landing page that provides links to 1.) a Quick Guide for your article search, and 2.) the General Terms of Use of the IOA Archive.

WHAT's NEXT

The IO-Archive Project continues over the years to come, in order to make additional documents available. We hope to serve you with this initiative. User feedback is always welcome, please use the link "Feedback and Questions" we will place on the Article Search page.

With kind regards,

Your IIOA Archives Team

https://members.iioa.org/

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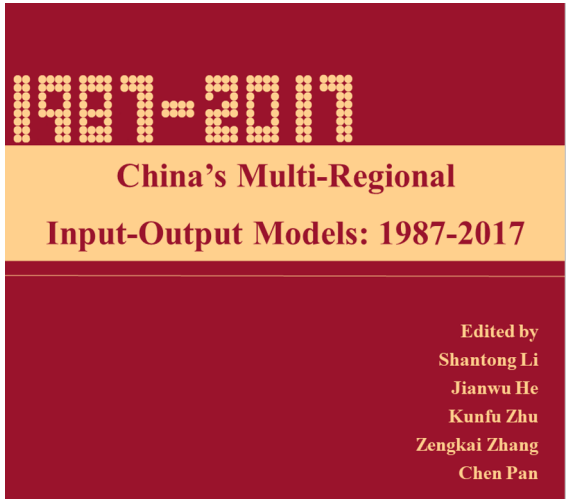
Databases

Download the *China's Provincial Multi-Regional Input-Output Tables in 1987-2017* and the *Global Multi-Regional Input-Output Table Embedded with China's Provinces in 2017* via:

https://easylink.cc/il9r5s

or send email to:

shantongdrc@163.com



When using this database, a reference should be made to the following publication:

In Chinese:

李善同，何建武，祝坤福，张增凯，潘晨等. 中国多区域投入产出模型：1987-2017年[M]. 北京：经济科学出版社, 2023.

In English:

Shantong Li, Jianwu He, Kunfu Zhu, Zengkai Zhang, Chen Pan, et al. China's Multi-Regional Input-Output Models: 1987-2017. Beijing: Economic Science Press, 2023.

GLORIA MRIO

A new release of the GLORIA global MRIO database is available from the *Industrial Ecology Virtual Laboratory* at https://ielab.info/resources/gloria/about, with data downloads at https://ielab.info/resources/gloria/supportingdocs.

The new release features:

- **Data update to 2021**, and **forecasts** of all tables starting 2022 until 2027, based on GDP projections by the International Monetary Fund and the World Bank, capturing developments caused by the Ukraine conflict;
- Benchmarking of GLORIA household expenditure on food items on **FAOSTAT Food Balances**, via detailed matching with primary data on per-capita dietary energy, protein, fat and carbohydrate intake, for all countries;
- Inclusion of GLORIA **commodity price estimates** for 1990-2019, based on UN Comtrade and FAOSTAT producer prices databases, and converted into GLORIA regional and sectoral classifications;
- Update of **greenhouse gas emissions and air pollution satellites** to adhere to the EDGAR 7.0 database for greenhouse gases and the EDGAR 6.1 database for air pollution; casting of emissions satellite in EDGAR categories;
- Improvement of **labour market data**; alignment of "Compensation of Employees" (wages and salaries) in the value-added block with the employment satellite, using data from the International Labour Organisation to produce estimates for per-worker wage, female labour participation and percentage of wages in value added over time.

For feedback or questions, please email Manfred Lenzen at the University of Sydney (manfred.lenzen@sydney.edu.au).

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Events

City-REDI event

On the 26th of April, City-REDI hosted a gathering for those interested in the development and application of regional input-output (IO) techniques in the UK.

It is an exciting time for an input-output scholar in the UK!

In recent years there has been a resurgent interest in trade, regional productivity and regional economies in the UK linked to issues of Brexit and the Levelling Up policy agenda. Alongside this, there appears to be increased interest in the ability of input-output to provide evidence for, and evaluation of, these issues. The growing interest is reflected both in data developments by the ONS and national governments.

In November 2022, the Northern Ireland Statistics and Research Agency (NISRA) published supply and use tables for Northern Ireland as part of its economic accounts project.

The presentations

The day saw six presentations on IO research from methodological developments, environmental applications and trade.

Jobs in Trade – The Who, What, and Where that Help Put the Why in Trade Policy.

James Black, *Fraser of Allander Institute*

The City within the Global: a methodological contribution to calculating urban emissions metrics.

Dr Kevin Connolly, *University of Strathclyde*

A multi-regional macroeconomic input-output model for the UK.

Professor Kurt Kratena, *CESAR*

The SEIM-UK household module.

Dr Huanjia Ma, *City-REDI*

From Regional IO to Regional Environmental Footprints.

Professor Calvin Jones, *Cardiff University*

Using crowdsourced data to estimate the carbon footprints of global cities.

Xinlu Sun, *UCL*

Matt Lyons, *Research Fellow, City-REDI / WMREDI*, University of Birmingham.

Link to the blog and contents

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Ongoing Research Projects

TWIN SEEDS. *Towards a World Integrated and Socio-economically Balanced European Economic Development Scenario*

Funded within the Horizon Europe program
(Grant agreement ID: 101056793)
(https://cordis.europa.eu/project/id/101056793)

Led by Politecnico di Milano (POLIMI) (Project coordinator: Roberta Capello). Team integrated by The Vienna Institute for International Economic Studies (wiiw), University of Groningen (UGR), Universidad de Castilla-La Mancha (UCLM), Università degli Studi di Milano Bicocca (UNIMIB), Copenhagen Business School (CBS), Austrian Institute of Technology (AIT), Erasmus University Rotterdam (EUR), Poznań University of Economics and Business (PUEB), Toulouse Business School (TBS) and Old-Continent.

Keywords: global value chains, geopolitical and policy shifts, relocalization, technological transformation, strategic sectors, MNEs

After a strong wave of global integration from the mid-1980s to the end of the first decade of the 21st century, several globalization forces eased. More recently, there is evidence that trends such as outsourcing and offshoring may even be reversing, leading to the back-shoring of some activities. The reasons behind this shift are multiple, linked to changes in geopolitics, rising concerns about globalization's impacts on inequality, environmental degradation and major challenges to the international fragmentation of production. These trends pose profound socio-economic challenges to business and government policy that remain incompletely understood.

Given this context, the TWIN SEEDS project studies the evolution of Global Value Chains (GVC) with the aim of understanding the role played by technological transformations and geopolitical and policy shifts (the "twin seeds") in shaping recent changes. More specifically, the objectives of the TWIN SEEDS project are four-fold:

- To explore the geographical reorganization of GVC under current transformative geopolitical, economic and technological conditions, paying particular attention to key players within GVC, especially MNEs and their production networks.

- To analyze how recent and emerging technological developments and GVC restructuring impact social inequalities through changing international production structures and shifting work organization, employment opportunities and job requirements. At the same time, we will explore how such changes interact with the major adjustments required to address the challenges of climate change and other environmental imperatives and draw out the implications for productivity dynamics, growth and employment at regional, national and supra-national levels.

- To highlight the effects of the challenges posed by the COVID-19 pandemic to trade relations and GVC in general and to international production in key strategic sectors such as health, in particular.

- To construct optimal, multifaceted scenarios for a spectrum of interrelated policies in the critical policy areas of trade and investment, competition and social policies. The scenarios developed will form the basis for suggested policy recommendations.

The project is developed through different methodologies and approaches to enrich the outcomes. In this framework, input-output analysis constitutes a core element to disentangle certain GVC aspects such as strategic dependencies, environmental impacts or employment and competitiveness effects. This part of the project is being implemented by several members of the IIOA from the University of Groningen -led by Bart Los- and from the University of Castilla-La Mancha -led by María Ángeles Cadarso.

Thanks to the joint effort of eleven universities and research institutions from eight EU countries, TWIN SEEDS is expected to enrich the European debates and public policies aiming at economic prosperity, social cohesion and environmental quality in the light of the still unknown effects of GVC reconfiguration.

Further information can be found at https://twinseeds.eu/

Funded by the European Union

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Published papers and books in Input-Output Analysis and related methods

Economic Systems Research
Journal of the IIOA
Volume 35, Issue 1, 2023

Paul de Boer, Jan van Daal & João F. D. Rodrigues

Consumer preferences in CGE models when data are scarce: comparing the linear expenditure and the indirect addilog systems

The linear expenditure system (LES) is a popular option for modeling consumer preferences in computable general equilibrium (CGE) models when data are scarce, since its underlying functional form is parsimonious in parameters. The goal of this paper is to compare the performance of LES against the indirect addilog system (IAS), a hardly known alternative, in terms of their theoretical properties and in a case study. Both systems are equally easy to implement and require the same information for parameter calibration. IAS, however, offers a richer description of consumer preferences. On the basis of an expenditure survey of Statistics Palestine in 1998, we find overwhelming statistical evidence that the IAS demand equations perform better than those of the LES. Simulations with a CGE model developed for disaster impact analysis applied to the intifada of the early 2000s show that the absolute value of the equivalent variation is larger for IAS than for LES.

Davit Stepanyan, Georg Zimmermann & Harald Grethe

Stochastic simulation with informed rotations of Gaussian quadratures

Given the fast growth of available computational capacities and the increasing complexity of simulation models addressing agro-environmental issues, uncertainty analysis using stochastic techniques has become a standard modeling practice. However, conventional uncertainty/sensitivity analysis methods are either computationally demanding (Monte Carlo-based methods) or produce results with varying quality (Gaussian quadratures). In this article, we present a computationally inexpensive and reliable uncertainty analysis method for simulation models called informed rotations of Gaussian quadratures (IRGQ). We also provide an R script that generates IRGQ points based on the required input data. The results demonstrate that this method is able to produce approximations that are close to the estimated benchmarks at low computational costs. The method is tested in three different simulation models using different input data in order to demonstrate the independence of the proposed method on specific model types and data structures. This is a methodological paper for practitioners rather than theorists.

Ryo Itoh & Kiyoshi Yonemoto

An interregional input–output analysis with the Eaton–Kortum model

This study proposes a multi-regional input–output (I–O) model obtained from comparative statics analysis and a linear approximation of Eaton and Kortum's (2002). [Technology, geography, and trade. Econometrica, 70(5), 1741–1779. https://doi.org/10.1111/ecta.2002.70.issue-5] general equilibrium trade model. The derived reduced form, which represents the effect of a final demand shock, is equivalent to the Leontief inverse, which means that our model is a straightforward extension of the conventional I–O framework. In addition, supply-side shocks, such as a decrease in transport costs, and the corresponding welfare gains are also calculated without setting any structural parameters. The linear reduced forms also enable us to decompose the welfare gains into various ripple channels, such as by sector, region, or the time that the gain arrives. A Japanese multi-regional I–O table is used as a numerical example to derive the effect of a reduction in transport costs (for the links around the northern region). The results indicate that more than half of the welfare gains in the southwest region are delivered through indirect channels, and their time to arrival is more than twice of that in the northern region, which is close to the shock.

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Muhammad Daaniyall Abd Rahman, Bart Los, Anne Owen & Manfred Lenzen

Multi-level comparisons of input–output tables using cross-entropy indicators

We introduce a cross-entropy (CE) indicator to quantify the extent to which two input–output tables or two tables with results based on input–output analysis differ from each other. Our work deploys a unique feature of the CE indicator: it can be decomposed, allowing for matrix comparisons at various levels within one coherent framework. To illustrate the power of this approach, we apply the technique to five multi-region input–output (MRIO) tables for 2011, derived from the Eora, EXIOBASE, GTAP, OECD and WIOD databases. We make pairwise comparisons between MRIOs and between global value chain (GVC) computations based on these MRIOs. We find that answers to questions related to broader aggregates are generally quite similar, but that answers to questions at the level of single industries can be rather different across MRIOs.

Vladimír Holý & Karel Šafr

Disaggregating input–output tables by the multidimensional RAS method: a case study of the Czech Republic

The RAS method is an iterative procedure that bi-proportionally scales an input–output table to be consistent with given row and column sums. It can be used to disaggregate an annual national table to more detailed tables, such as regional, quarterly, and domestic/imported tables. However, the regular two-dimensional RAS method does not ensure the consistency of the disaggregated tables with the original table. For this problem, we use the multidimensional RAS method, which besides input and output totals, also ensures regional, quarterly, and domestic/imported totals. Our analysis of Czech industries shows that the multidimensional RAS method increases the accuracy of table estimation as well as the accuracy of the Leontief inverse, the quarterly value added, and (to some degree) the regional Isard's model. We also rigorously demonstrate its relation to the cross-entropy model.

Anwar Shaikh, Luiza Nassif-Pires & José Alejandro Coronado

A new empirical contribution to an old theoretical puzzle: what input–output matrix properties tells us about equilibrium prices and quantities

Eigenvalues of input-output matrices have significant implications for the structures of equilibrium prices and quantities. According to the Bródy Conjecture (BC), all subdominant eigenvalues of matrix would approach zero as matrix size approached infinity. Thus, any given initial quantity or price vector would converge to the corresponding equilibrium one in a single step. This paper adds significant empirical evidence to this theoretical discussion. We create a database of 307 different sizes matrices ranging over 30 years. Contrary to BC, we find that: the coefficient of variation and the subdominant eigenvalue moduli rise with matrix size; there's a universal rank-size curve of eigenvalue moduli, but it is smooth and convex rather than L-shaped; the distribution of eigenvalue moduli is best fit by a Weibull probability distribution; the Weibull quantile function in turn yields a power law for eigenvalue moduli which is a better fit than a previously proposed exponential function.

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Markus Simbürger

Filter methods for MRIO tables: an evaluation

Researchers who deal with network analysis based on multi-regional input–output (MRIO) tables cannot avoid the intensively discussed issue of filtering, which means identification of the most important and significant trade connections. The question of what is an appropriate filter method remains. This paper expands the existing discussion and brings new insight based on the evaluation of existing filter methods for MRIO tables. Six filter methods from the prevailing literature are identified as relevant and tested on the published MRIO tables: EORA26 and EXIOBASE. The results are verified by a case study. The evaluation shows that the Tolerable Limit approach and filter based on the Weaver–Thomas Index are the most restrictive. The Leontief filter and the filter based on holistic accuracy can be partially recommended. The filter on absolute trade values and average transactions can be recommended as 'good' methods.

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Economic Systems Research
Journal of the IIOA
Volume 35, Issue 2, 2023

Maureen Lankhuizen, Dario Diodato, Anet Weterings, Olga Ivanova & Mark Thissen

Identifying labour market bottlenecks in the energy transition: a combined IO-matching analysis

This paper combines an input–output model and a novel regional labour market matching model in order to identify potential bottlenecks in regional labour markets resulting from shocks in demand caused by the energy transition. Identifying these bottlenecks provides relevant information for policymakers to determine in which regions and industries policy intervention in labour markets may be needed to ensure a smooth transformation. We analyse the effects of a shock that is illustrative for the energy transition in the Netherlands. Our results indicate that the aim of the Dutch government to substantially reduce greenhouse gas emissions may, at least in the short run, be hampered by bottlenecks in labour markets.

Daniel Herrero & Adrián Rial

Productive linkages in a segmented economy: the role of services in the export performance of German manufacturing

This article analyzes the causes that affect the export performance of the German manufacturing sector. By applying a subsystem approach to input–output analysis, we take into account the interlinkages between manufacturing and services. In particular, we consider two types of relationships that influence manufacturing competitiveness: the wage squeeze in services due to institutional factors and outsourcing; and the role played by knowledge-intensive business services (KIBS) as innovation drivers. Taking vertically integrated sectors as units of analysis, an export model is estimated. We find that labor costs play only a minor role for international competitiveness, while non-price factors are the main drivers of German exports. Therefore, although the wage squeeze in services is the centerpiece in the unit labor costs and export prices moderation, it is of minor importance for export growth. Conversely, the growing integration of KIBS provides a strong stimulus for non-price competitiveness and export growth.

Enrique Gilles, Javier Deaza & Alejandro Vivas

The role of imported intermediates in productivity change

We address the role of imported intermediates in productivity by applying a methodology that proposes an equivalence between input–output analysis and data envelopment analysis, and decomposes sectoral productivity gains into two factors: efficiency change and technical change. We illustrate this by using data for Spain in the 2008–2015 period with three levels of labor skills, capital, and twenty-eight industries, and compare the results of two different settings: one including only domestic intermediates and the other incorporating total (i.e. both domestic and imported) inputs. We find differential results regarding productivity, efficiency, and technical changes that are attributable to imported intermediates. We also find that the main drivers of productivity change are high-skilled labor and the manufacturing sector. Our results suggest the importance of both trade and educational policies that respectively foster international economic complementarities and promote higher qualification of labor.

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José L. Zofío, Julio González, Angel Prieto & Juan Vicente

Modelling the spatial and sectoral benefits of productivity enhancing innovations using a transport oriented multiregional IO framework: the 'megatruck' in Spain

We render operational the model outlined by Carter (1990) via the introduction of the research methods necessary for studying the spatial and sectoral (upstream and downstream) benefits of productivity-enhancing innovations within a real interregional input–output framework. As case study we examine the reduction in production costs derived from the adoption of longer and heavier vehicles in freight road transportation. We exploit a new Spanish regional table including a detailed disaggregation of the transportation sector. The productivity gains at the national level, resulting from a 30% reduction in transport costs, amount to 2.95% of the GVA at market prices. Results show that firms operating in this niche market appropriate most of the gross operation surplus (which increases by 10%), consistent with the existence of market power. The remaining transportation sectors see profits slightly worsened, suggesting limited substitution effects. A high regional heterogeneity exists because of the different input–output structures.

Aleksandra Kordalska & Magdalena Olczyk

Upgrading low value-added activities in global value chains: a functional specialisation approach

This paper aims to identify patterns of functional specialisation (FS) in global value chains (GVCs) and determinants of upgrading them for selected Central Eastern European (CEE) economies. By combing the World Input-Output Database with data on occupations, we reveal a new FS pattern among subgroups of CEEs. Poland and Slovakia have an unfavourable GVC position and specialise in low value-added fabrication function. In contrast, other CEEs have competitive advantages in high value-added tasks: the Baltic countries and Slovenia in management services, the Czech Republic and Slovenia in R&D. We identify upgrading factors for different types of FS in GVCs. The wages convergence of CEEs with developed economies, and strong GVC backward linkages support the path to higher value-added in almost all business functions. Higher GDP per capita and lower economic distance to Germany allow CEEs to escape from 'factory economies' status and also generate higher value-added in R&D activities.

Arianto A. Patunru & Prema-chandra Athukorala

Measuring trade in value added: how valid is the proportionality assumption?

For countries that have only aggregate ('competitive type') input–output (IO) tables, value added in exports is commonly estimated using the 'proportionality assumption' to separate imported-inputs from domestically procured inputs. We test the validity of this assumption using non-competitive type IO tables, which contain separately compiled domestic- and imported-input matrices, for Indonesia, Thailand, Malaysia, Taiwan, and Australia. The results show that the proportionality assumption leads to an overestimation of domestic value-added in exports, and that the magnitude of the bias becomes amplified when the export composition of a country shifts from primary products to manufactured goods through integration into global production networks.

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Rayan Wolf, Angelo C. Gurgel, Leonardo C. B. Cardoso, Ian M. Trotter, Marcos S. Nazareth & Erly C. Teixeira

Welfare impacts of a negative income tax on regions of Brazil

This paper aims to analyze the effects of a public policy based on negative income tax (NIT) ideals as an alternative to the current social programs of income transfer in Brazil. A multiregional applied computable general equilibrium model of Brazil's economy is used to analyze the impacts on households' welfare, split into 10 income classes, and 2 factors (capital and labor) for each of 5 major regions. By analyzing two scenarios for the proposed policy, we show that the NIT could be more effective than the current social programs as well as resulting in longer lasting outcomes.

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Economic Systems Research
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Lena Kilian, Anne Owen, Andy Newing & Diana Ivanova

Microdata selection for estimating household consumption-based emissions

To estimate household emissions from a consumption-perspective, national accounts are typically disaggregated to a sub-national level using household expenditure data. While limitations around using expenditure data are frequently discussed, differences in emission estimates generated from seemingly comparable expenditure microdata are not well-known. We compare UK neighbourhood greenhouse gas emission estimates derived from three such microdatasets: the Output Area Classification, the Living Costs and Food Survey, and a dataset produced by the credit reference agency TransUnion. Findings indicate moderate similarity between emission estimates from all datasets, even at detailed product and spatial levels; importantly, similarity increases for higher-emission products. Nevertheless, levels of similarity vary by products and geographies, highlighting the impact microdata selection can have on emission estimates. We focus our discussion on how uncertainty from microdata selection can be reduced in other UK and international contexts by selecting data based on the data generation process, the level of disaggregation needed, physical unit availability and research implications.

Ershad Ostadzadeh, Amin Elshorbagy, Marta Tuninetti, Francesco Laio & Ahmed Abdelkader

Who will dominate the global fossil fuel trade?

Fossil fuels are not distributed evenly throughout the world, and hence the countries rely heavily on international trade to secure energy supply. Characterization of the energy trade network is needed to conduct long-term assessments of energy security. This study proposes a modeling framework to assess the evolution of energy trade under current conditions as well as under future scenarios up to 2050. The total trade of each country is estimated with trade predictive models (TPMs) using key variables. Subsequently, a matrix-balancing method (RAS) is used to estimate the annual bilateral trades. The projected energy trade network in 2050 varies under each shared socioeconomic pathway (SSP) of the future, with annual fossil fuel global trades among countries ranging between 538 and 215 EJ. Canada, USA, Venezuela, and China are projected to dominate the global trade network, with Canada-USA remaining the most dominant fossil fuel trade link up to 2050.

Timothé Beaufils, Etienne Berthet, Hauke Ward & Leonie Wenz

Beyond production and consumption: using throughflows to untangle the virtual trade of externalities

Understanding how countries contribute to the generation of externalities globally is important for designing sustainable policies aimed at reducing negative externalities such as carbon emissions. Commonly used approaches focus on either producers or consumers, thereby neglecting the role of intermediates. We here introduce the concept of throughflow to comprehensively quantify upstream externalities generated by the supply chains originating from, passing through or ending in a given country. We define the Throughflow Based Accounting (TBA) framework as the decomposition of the throughflow into local, imported, exported and traversing externalities. We illustrate the strength of the TBA by identifying the CO2 emissions caused by supply chains involving the German economy. We show that Germany could use its position in global value chains to help reduce two times more CO2 emissions than measured with usual production- or consumption-based accounting frameworks.

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Huiwen Liu, Huibin Du, Zengkai Zhang, Huimin Wang, Kunfu Zhu, Yaling Lu & Xi Liu

Trade heterogeneity and virtual water exports of China

China is facing serious water scarcity, and the effects of international trade on its water resources have been widely examined. Processing exports account for nearly half of China's gross exports. Adopting China's multi-regional input–output table that captures processing exports, we enrich the literature on virtual water exports by accounting for trade heterogeneity. The results show that China's virtual water exports show a significant trade heterogeneity. Normal and processing exports are attributed to 86.7% and 13.3% of the Agriculture sector's water use induced by exports respectively. Conversely, normal and processing exports are attributed to 31.8% and 68.3% of the Communications Equipment, Computers sector's water use induced by exports respectively. In addition, a cross-regional compensation is needed to deal with the unequal regional distribution of water uses and economic benefits related to exports.

Ruoqi Li, Wenjun Wu, Wei Zhang, Yuanchun Zhou, Hongqiang Jiang, Yaling Lu, Cuiyang Feng, Jinnan Wang, Miaomiao Liu, Jun Bi, Yu Liu, Hongkuan Zang & Yuli Shan

Managing lead (Pb) emissions in China from the perspective of final demand

Lead (Pb) pollution is a serious environmental and health risk and remains a major challenge for China. This study analyzes China's atmospheric Pb emissions from the dual perspectives of production and final demand, by integrating localized emission factors and a Multi-Regional Input – Output model. Our results show that Shandong, Hebei, and Hubei directly contribute over 36% of the national emissions. However, from the final demand perspective, some developed provinces, such as Jiangsu, Guangdong, and Zhejiang, induce a considerable proportion (29%) of the national emissions by relocating emissions to other provinces through inter-provincial trade. Trade-embodied emissions typically flow from interior regions to more affluent coastal regions (e.g. Henan-Jiangsu, Anhui-Jiangsu, Hunan-Guangdong). Considering both production and final demand, we identify different roles for provinces in Pb emission management. Prosperous beneficiary provinces should take more responsibilities by transferring advanced technologies, especially those in industries such as coal dressing, to sacrificial provinces.

Joel Bruneau, Madanmohan Ghosh, Deming Luo & Yunfa Zhu

Income and investment, not energy policy, are driving GHG emission intensities

Global greenhouse gas (GHG) emissions continue to rise but, at the same time, emission intensities associated with domestic consumption and territorial production have declined albeit at vastly different rates across economies. To identify the socioeconomic factors that drive this cross-country variation, we combine input–output modelling with panel data analysis. Using the World Input–Output Database, we estimate GHG intensities separately for domestic consumption and for territorial production. For the regression analysis, we consider several socioeconomic factors that capture development features, exposure to international trade, as well as energy prices and GHG-relevant programmes. Our results show that development-type factors, such as per capita income, capital-labour ratios, and investments, are the primary drivers of cross-country differences. Energy prices and domestic GHG policies are not major drivers. We also find that reductions in intensities are primarily through changes in techniques rather than compositional changes in the structure of economies.

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Meihui Jiang, Cai Suo, Liangpeng Wu & Peter Berrill

Consumption structure optimization for reducing energy footprint

To investigate how to obtain the optimal balance between energy consumption and economic development, this paper proposes a multifactor optimization model (MFOM). Different from previous input–output optimization models, our proposed MFOM comprehensively considers the direct and indirect impacts of sectoral consumption activities on total energy consumption. The results show that MFOM achieves higher energy-saving goals by smaller adjustment to consumption activities than the previous input–output optimization models do. The results also show that the consumption of some products should be limited to achieve the energy-saving and economic growth goals, such as Non-ferrous Metal Ore Mining, Chemical Products and Ferrous Metal Ore Processing. Furthermore, the results indicate that the share of some sectors, especially high-level manufacturing sectors, significantly decreases in the consumption structure after optimization. To maintain the sustainable development of these sectors, the dependence of their production activities on energy-intensive products should be reduced.

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INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Latest ESR articles

Economic Systems Research
Journal of the IIOA
Latest articles (up to 13th of June)

Kurt Kratena

Effective demand, wages and prices, and the multiplier

The calculation of multipliers is the core of impact analysis with input–output (IO) models. Given this focus of IO modeling on the multiplier, it is remarkable that IO analysis has not contributed to the recent macroeconomic debate on fiscal multiplier heterogeneity. This heterogeneity stems from differences in consumption reactions to income shocks and from downward wage rigidity. Both features are absent in most IO models. In this paper, a macroeconomic IO model with a wage function is set up, where at high unemployment rates, downward wage rigidity allows for large real income and multiplier effects. At full employment, demand shocks mainly induce price adjustments. The model reveals GDP multiplier heterogeneity in line with the recent macroeconomic literature, ranging from 0.3 (boom) to 1.4 (recession). The GDP multiplier result of the standard type II model even outperforms the multiplier in the recession case and therefore is most probably biased.

Yiyi Ju, Nur Firdaus & Tao Cao

Industry's role in Japan's energy transition: soft-linking GCAM and National IO table with extended electricity supply sectors

Japan's energy transition towards carbon neutrality by 2050 will require a shift from fossil fuel energy on the energy supply side. The introduction of new power generation capacities and infrastructures will then lead to increasing demand for materials and industrial products. To capture such industrial energy service demand, we conducted a soft-linking between an integrated assessment model (GCAM) with an input–output framework (IONGES), considering both inter-model and inter-period iteration. The results show that: i) the industrial final energy under the carbon neutrality scenario would be 0.2-0.7EJ more after linking, which is almost the gap between the carbon neutrality and the reference scenario; ii) to achieve carbon neutrality by 2050, more power generation capacities would be introduced in the near-term periods (2020-2030), bringing additional growth afterward. Our soft-linking approach emphasized the role of industries in the energy transition and explored how industries can benefit from an increasingly low-carbon energy supply.

Ran Huang & Haixin Wang

Asymmetric tail risk contagion across China's automotive industrial chain: a study based on input–output network

The input-output network of an industrial chain provides a channel for risk transmission. Using Smooth-Transition Vector Autoregression model (STVAR) and Diebold-Yilmaz directional connectedness measures, we explore tail risk (extreme risk) contagion across China's automotive industrial chain. We find significant spillover effects that are asymmetric in different phases of China's business cycle, monetary cycle, and policy uncertainty. When China's economy is in a recession, under a monetary expansion, or at a high level of policy uncertainty, the total risk spillover across the chain is higher. We also find apparent risk spillover from the financial services industries to the automotive industrial chain as China's economy is in a recession or a monetary expansion period. Still, a reverse spillover is found as policy uncertainty is at a high level. Meanwhile, the direction of risk propagation across the automotive industrial chain may change with the transition in the economic state or policy uncertainty state.

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Ana-Isabel Guerra & Ferran Sancho

An extension of the hypothetical extraction method: endogenous consumption and the armington treatment of imports

The hypothetical extraction method (HEM) is the tool of choice for identifying underlying economic interdependencies. It provides critical information to policymakers regarding the strategic role of different sectors. However, the standard implementation of the HEM does not include the impact that falls on the price structure as a result of the substitution between domestic and imported products that takes place after the extraction of a sector or industry, in this case. We propose to overcome this limitation by extending the HEM using an Armington-Leontief model with endogenous consumption. Unlike the perfect substitution assumption typical of the standard HEM, the Armington assumption with endogenous consumption implies that the shift from domestic inputs to imports affects the cost functions. Therefore, both quantities and prices become endogenous in the 'post-extraction' equilibrium. We also argue that HEM indicators should be expanded beyond the typical output-related indicators, i.e. value-added, employment, or pollutant levels, so that summary indices of the type more commonly used in economics, such as welfare indicators, are used. We implement this novel approach using the latest input–output data for Spain in 2016.

Severin Reissl, Alessandro Caiani, Francesco Lamperti, Tommaso Ferraresi & Leonardo Ghezzi

A regional input-output model of the COVID-19 crisis in Italy: decomposing demand and supply factors

We propose an empirically estimated inter-regional input-output model of the Italian economy designed for COVID-19 impact assessment, intended as a tool for public authorities facing comparable adverse events and requiring timely estimates of sectoral and regional economic impacts. We evaluate the contributions of demand- and supply-side factors to output losses in Italy during the pandemic, providing insights on the suitability of demand- and supply-side policies. Supply-side shocks, as a consequence of mandated closures, are the primary driver of output losses only during the nationwide lockdown of spring 2020. During the following stages, changes in final demand due to income losses and changes in mobility play a pivotal role at the aggregate, regional, and sectoral levels. While this result supports demand-side policies, the efficacy of such policies may be hampered when final consumption demand is low chiefly due to reduced mobility rather than income losses.

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Highlights in journals

Fournier Gabela, J.G. & Freund, F.

Potential carbon leakage risk: a cross-sector cross-country assessment in the OECD area

Climatic Change

Achieving climate targets requires more stringent mitigation policies, including the participation of all economic sectors. However, in a fragmented global climate regime, unilateral mitigation policies affecting sectors' production costs increase carbon leakage risk. Carbon leakage implies reducing the competitiveness of domestic sectors without achieving the full mitigation objectives. Under such circumstances, generating information about sectors' vulnerability is essential to increase their acceptance of more stringent climate policies and design anti-leakage mechanisms. Our paper calculates and compares potential carbon leakage risk across sectors and OECD countries under varying climate policy scenarios covering GHG emissions along global supply chains. To measure this risk, we use the emission-intensity and trade-exposure metric and emission data including CO2 and non-CO2 gasses. Our results show that agri-food and transport sectors, usually lagging behind in countries' national climate mitigation policies, could have an even higher carbon leakage risk than energy-intensive industries. Furthermore, we find that this risk can be higher in many downstream sectors compared to directly regulated sectors and is highly heterogenous across OECD countries.

Kehan He, Zhifu Mi, Jin Zhang, Jinkai Li, & D'Maris Coffman

The Polarizing Trend of Regional CO2 Emissions in China and Its Implications

Environmental Science & Technology

CO2 emissions are unevenly distributed both globally and regionally within nation-states. Given China's entrance into the new stage of economic development, an updated study on the largest CO2 emitter's domestic emission distribution is needed for effective and coordinated global CO2 mitigation planning. We discovered that domestic CO2 emissions in China are increasingly polarized for the 2007–2017 period. Specifically, the domestically exported CO2 emissions from the less developed and more polluting northwest region to the rest of China has drastically increased from 165 Mt in 2007 to 230 Mt in 2017. We attribute the polarizing trend to the simultaneous industrial upgrading of all regions and the persistent disparity in the development and emission decoupling of China's regions. We also noted that CO2 emissions exported from China to the rest of the world has decreased by 41% from 2007 to 2017, with other developing countries filling up the vacancy. As this trend is set to intensify, we intend to send an alarm message to policy makers to devise and initiate actions and avoid the continuation of pollution migration.

Ya-Fang Sun, Shiwei Yu, Yue-Jun Zhang & Bin Su

How do imports change the energy consumption of China? An analysis of its role in intermediate inputs and final demands

Energy

The imports dependency of China sharply decreases from 27% to 14% during 2007–2020, but how it affects the energy consumption embodied in final demands is unresolved. With the 2007–2019 time-series input-output (I–O) datasets of China, this study employs environmentally extended I–O analysis and structural decomposition analysis to explore the impact of imports change issue. At national level, the input imports effect is responsible for around 15% of the embodied energy consumption growth over the research period, while no more than 5% of that is contributed by the demand imports effect. At sectoral level, the input imports effect happens chiefly via the metals sector from the supply side but mainly via the electrical and optical equipment sector from the demand side. It also puts forward the critical supply chains which can facilitate the input imports effect. Meanwhile, the demand imports effect occurs primarily via machinery, electrical and optical equipment, and transport equipment sectors. The similar analysis can be employed to other countries and indicators.

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Liming Chen, Yuanyuan Zhao, Rui Xie, Bin Su, Yue Liu & Xv Renfei

Embodied energy intensity of global high energy consumption industries: A case study of the construction industry

Energy

The construction industry plays a vital role in global economic development and is also an important industrial sector affecting global energy consumption. Energy conservation is an important guarantee for global sustainable development. Based on the perspective of embodied energy intensity of the global construction industry, this paper analyzes the reasons behind its high energy consumption. This paper uses a multi-regional structural path analysis model to explore the path of embodied energy intensity (EEI) in the global construction industry. The results show that the 2nd layer is the main path for the EEI in the global construction industry. In contrast, the higher layer plays an increasingly critical role in the EEI of the global construction industry. Its contribution increased by 49.27% during the study period. The construction material supply is the main source in the 2nd layer, and the coke and petroleum product manufacturing and power and gas supply are the main sources in the higher layer. Among the factors driving the inter-temporal change of EEI in the global construction industry, the sector energy intensity effect has a promoting effect on the decline of the EEI in all layers, while the final demand effect and input-output structure effect inhibit the EEI decline.

Kakali Mukhopadhyay, Vishnu S. Prabhu, Shraddha Shrivastava, Ananya Ajatasatru & Bernd Klauer

Measuring food-energy-water nexus footprint using a systematic input–output approach: A case study of Pune district

Natural Resources Forum

The advent of climate change with the recognition of interlinkages between Food-Energy-Water (FEW) resource security has brought forth a renewed emphasis on ascertaining the FEW footprints of varied policy interventions. The nexus approach through an IO framework explores the interplays and synergies between sectoral flows and their FEW footprints. India is currently undergoing great transformations under policy interventions on both the economic and environmental front. The country has been attracting investments to expand its manufacturing base, while also aiming to transition into a greener economy. The district of Pune has a balanced and diversified economic profile, spread across manufacturing, as well as knowledge-based tertiary sectors. However, rapid urbanization has put an undue burden on its FEW resources, challenging urban sustainability. Hence cohesive strategies are of priority to ensure sustainable and equitable development. Toward this end, the current study presents the first-ever district-level economy-wide FEW nexus study in India. Results indicate that the most resource-intensive sectors in Pune district include the food processing sector, motor vehicles, and electrical engineering and instruments. Based on this comprehensive footprint analysis, priority sectors are identified to pursue sector-wise efficiency analysis.

Vishnu S. Prabhu & Kakali Mukhopadhyay

Macro-economic impacts of renewable energy transition in India: An input-output LCA approach

Energy for Sustainable Development

India's higher emphasis on Renewable Energy adoption is aligned with the twin Sustainable Development Goals of tackling climate change (Goal 13) and ensuring sustainable, affordable, reliable energy for all (Goal 7). This study intends to evaluate the macroeconomic impact of India's ambitious 280 GW solar and 140 GW wind capacity expansion programme by 2030 using an Input-Output framework. The economic implications of solid waste generation and waste abatement in the End-of-life phase are evaluated. The solar and wind energy's economy-wide contribution is minimal; however, the solid waste generation is significant, ranging between 7.1–24 thousand tonnes of PV waste and 14.2–48.3 million tonnes of wind turbine waste in different solar and wind capacity mix. The solid waste abatement cost which constitutes the treatment of materials is aimed towards the attainment of the 3R strategy. The Green-GDP estimate by accounting for the net-environmental and health burden of solar and wind energy mix and the material waste generation witnesses 0.9 % to 1.52 % increase in net loss to GDP in different scenarios. The substantial emission savings of 11–23 % from the transition towards solar and wind energy can serve as a catalyst in helping India achieve its decarbonization targets.

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Surabhi Joshi & Kakali Mukhopadhyay

Cleaner the better: Macro-economic assessment of ambitious decarbonisation pathways across Indian states

Renewable and Sustainable Energy Transition

In first of its kind, this study evaluates socio -economic impacts of two ambitious decarbonisation pathways for India (i) aligned with India's Nationally Determined Commitments (NDC) negotiated through Paris agreement in 2015 and (ii) more ambitious NDC plus decarbonisation trajectory aligned with India's recent COP26 commitments at subnational level. The analysis uses a newly developed dynamic macro-econometric regional simulation model - E3-India to evaluate changes in key economic and emission parameter due to energy transition at both national and state level for India. Impacts on emission intensity of the economy, GDP, employment and income are assessed to highlight the larger macro-economic and regional distributive impacts of existing NDC targets for India . The results provide three key insights, (i) overall socio-economic impacts of committing to an ambitious decarbonisation trajectory primarily articulated through NDCs for India will be positive, but the transition trajectory will have unequal distributive impacts across states and sectors. (ii)The NDC trajectories will have an expansive impact on the harder to abate construction sector so along with decarbonisation of energy sector, steel and cement sector would also need focussed decarbonisation measures. (iii) In absence of policies promoting 'Just transitions' smaller coal bearing states will be worst off, stuck with expansion of only primary and extractive mining sectors while high renewable energy potential states will show expansion in technology focussed sectors and high skilled sectors.

Vishnu S Prabhu, Shraddha Shrivastava & Kakali Mukhopadhyay

Life Cycle Assessment of Solar Photovoltaic in India: A Circular Economy Approach

Circular Economy and Sustainability

This pioneering work employs the attributional and comparative life cycle assessment methodology to evaluate India's ambitious target of installing 100 GW of solar energy by 2022 and the FRELP method to study the circular economy prospects of the substantial PV waste it is expected to generate. Business as usual projections suggest that the intended target will be achieved no sooner than 2029. The lower lifetime of polycrystalline PV modules combined with their lower efficiency is found to severely downgrade their environmental performance vis-à-vis monocrystalline PV modules. The end-of-life treatment of the projected 6,576 tonnes of solar PV waste, expected to be accumulated between 2034-59, indicates a recovery rate of 90.7% entailing electricity consumption, GHG emissions, and monetary cost of 678.6 MWh, 648 tonnes of CO2 eq., and USD 11.8 billion, respectively. Simultaneously, the recovery of aluminum and glass alone leads to a direct saving of 70.3 GWh of energy by eliminating raw material extraction and processing. Further, the economic value of the recovered material at USD 11.74 billion is found to have the potential to generate additional solar capacity worth 19 GW. However, making the end-of-life treatment of PV waste financially feasible would require government subsidization. A minimum amount that would equate the costs to the benefits is USD 690/MW. The study, therefore, intends to inform potential stakeholders about the environmental burden as well as the economic potential of the impending PV waste and concludes with important policy prescriptions for enabling a sustainable energy transition through the circular economy approach.

Kajwan Rasul & Edgar G. Hertwich

Decomposition Analysis of the Carbon Footprint of Primary Metals

Environmental Science & Technology

This study investigates how different technological and socioeconomic drivers have impacted the carbon footprint of primary metals. It analyzes the historical evidence from 1995 to 2018 using new metal production, energy use, and greenhouse gas (GHG) emission extensions made for the multiregional input–output model EXIOBASE. A combination of established input–output methods (index decomposition analysis, hypothetical extraction method, and footprint analysis) is used to dissect the drivers of the change in the upstream emissions occurring due to the production of metals demanded by other (downstream) economic activities. On a global level, GHG emissions from metal production have increased at a similar pace as the GDP but have decreased in high-income countries in the most recent 6 year period studied. This absolute decoupling in industrialized countries is mainly driven by reduced metal consumption intensity and improved energy efficiency. However, in emerging economies increasing metal consumption intensity and affluency have driven up emissions, more than offsetting any reductions due to improved energy efficiency.

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Ranran Wang, Edgar G. Hertwich, Tomer Fishman & Julie B. Zimmerman

The legacy environmental footprints of manufactured capital

PNAS

The foundations of today's societies are provided by manufactured capital accumulation driven by investment decisions through time. Reconceiving how the manufactured assets are harnessed in the production–consumption system is at the heart of the paradigm shifts necessary for long-term sustainability. Our research integrates 50 years of economic and environmental data to provide the global legacy environmental footprint (LEF) and unveil the historical material extractions, greenhouse gas emissions, and health impacts accrued in today's manufactured capital. We show that between 1995 and 2019, global LEF growth outpaced GDP and population growth, and the current high level of national capital stocks has been heavily relying on global supply chains in metals. The LEF shows a larger or growing gap between developed economies (DEs) and less-developed economies (LDEs) while economic returns from global asset supply chains disproportionately flow to DEs, resulting in a double burden for LDEs. Our results show that ensuring best practice in asset production while prioritizing well-being outcomes is essential in addressing global inequalities and protecting the environment. Achieving this requires a paradigm shift in sustainability science and policy, as well as in green finance decision-making, to move beyond the focus on the resource use and emissions of daily operations of the assets and instead take into account the long-term environmental footprints of capital accumulation.

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Recent I-O Books and related

The Colombian Economy and Its Regional Structural Challenges

A Linkages Approach

Editors
Eduardo A. Haddad
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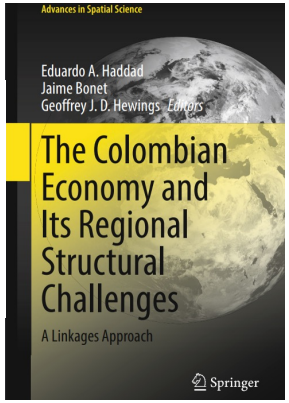
ISBN 978-3-031-22652-6 **Link**



This is the outcome of activities we built upon solid collaboration between the teams at the School of Economics, Business and Accounting at the University of São Paulo Regional and Urban Economics Lab (NEREUS) and at the Banco de la República - Colombia Centro de Estudios Económicos Regionales (CEER), involving altogether 24 scholars. Researchers from both institutions already had a long-standing record of continued collaboration initiated in 2003 under the guidance of Geoffrey Hewings from the University of Illinois Urbana-Champaign Regional Economics Applications Lab (REAL).

The book considers some of the regional structural challenges that need to be overcome if Colombia is to break free from the past and finally embark on a path of sustained social cohesion and regionally inclusive growth. The examined challenges broadly fall into three areas: (i) those centering on competitiveness and the supply side, (ii) those arising from critical business cycle demand side issues, and (iii) those connected with environmental sustainability, employment, and social inclusion. The volume examines each of these domains, approaching selected topics through quantitative simulations based on a unified general equilibrium framework.

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Recent I-O Books and related

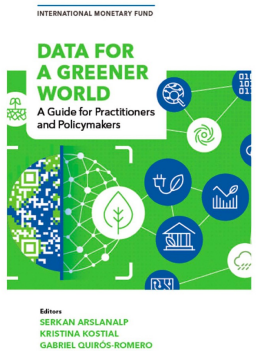
Data for a Greener World:
A Guide for Practitioners and Policymakers

Editors: Serkan Arslanalp, Kristina Kostial, and Gabriel Quirós-Romero,
Spring 2023, IMF.

Paperback ISBN 9798400217296
$31. English. 230pp.

DOI: 10.5089/9798400217296.071

The book is available for free download from the IMF eLibrary using the following DOI link:
https://doi.org/10.5089/9798400217296.071



Data for a Greener World, with input-output analysis in its core, presents a structured discussion on how to measure the economic and financial dimensions of climate change. It combines economic theory, and analysis with real world examples of how climate data can be constructed for different country settings, based on existing climate science and economic data. The book identifies important climate data gaps, as well as practical and innovative approaches to close many of these gaps.

Specifically, the book discusses how to track greenhouse gas emission by production and consumption (Chapters 1-2), which lead to physical risks (Chapters 3-4) and transition risks (Chapters 5-7) and concludes with cross-border implications of climate risks (Chapters 8-9).

The book showcases a collaboration of seven international organizations: European Central Bank, Eurostat, International Energy Agency, International Monetary Fund, Organisation for Economic Cooperation and Development, World Bank, and World Trade Organization. Chapter contributions come from leading practitioners and experts in the fields of energy and climate change issues, This volume also serves as a reference guide for the IMF's Climate Change Indicators Dashboard (CID) and future research in this area.

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Job Positions

NTNU
Norwegian University of Science and Technology

The Department of Energy and Process Engineering has a vacancy for a

PhD Candidate in Modelling Capital Dynamics for Resource Efficiency

Deadline	Employer	Municipality
17th August 2023	NTNU - Norwegian University of Science and Technology	Trondheim
Scope	**Duration**	**Place of service**
Fulltime	Temporary	Kolbjørn Hejesvei 1B, 7491 Trondheim

More info

European Commission

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The JRC is located in 5 Member States (Belgium, Germany, Italy, the Netherlands and Spain). Further information is available at: https://ec.europa.eu/jrc/

Auxiliary Contract Staff positions

Code: 2023-SVQ-B2-FGIV-023616 - SEVILLE

FGIV - Economic Analysts - General Equilibrium Modellers

Deadline: 31/08/2023 23:59 Brussels time

More info

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The Social Accounting Corner

Questions: 1) How did you learn about Input-Output for the first time? Can you remember your first thoughts? 2) Which was your first IIOA conference? Any memory that you want/can share? 3) Recommend the readers of the newsletter a paper that surprised or inspired you.

Anne Owen – EPSRC Research Fellow at University of Leeds (UK)

1) I first heard of IO when I was introduced to the idea of calculating a Carbon Footprint for the UK. I was working as a Geographic Information Systems analysist for the Stockholm Environment Institute at University of York, UK and was lucky enough to be there at the same time as Tommy Wiedmann, John Barrett and Jan Minx. I started working in their team and got hooked on the concept. I remember being delighted that the matrix algebra I had studied as an undergraduate had some real life use in Climate Science! I do wish I had had more of a grounding in Economics but it is interesting how many people who work with IO have come from wildly varying disciplines.

2) My first conference was the 20th IIOA in Bratislava in 2012. I had just been persuaded to start a PhD at University of Leeds and was at that stage where I wasn't really sure what I was doing. I'd also travelled to the conference via a backpacking trip in France and Switzerland and turned up with some very crumpled 'conference outfits', but as soon as I saw Manfred Lenzen in shorts and flip flops I realised I had found my people. I had arranged to meet with Tommy Wiedmann who was now working in Australia and he kindly introduced me to all the people whose papers I had been reading and I ended up arranging a research visit to Sydney to work with Manfred. In Bratislava I also started my great friendships with Kirsten Wiebe, Kjartan Steen Olsen and Christian Reynolds. Eleven years later we now swap stories about parenting.

3) I have to admit that I first read Dietzenbacher & Los (1998) Structural Decomposition Techniques: Sense and Sensitivity because I appreciated the pun in the title but it became the paper that sparked the key contribution I made in my PhD studies. I used their SDA method to compare the global MRIO databases that were released at the time of my studies to work out the drivers of differences in results. Then Weidmann et al (2011) Quo Vardis MRIO? basically provided me with my justification for research!

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Jan Oosterhaven – Professor Emeritus at University of Groningen (The Netherlands)

1) For my Master thesis, my supervisor suggested to specify a future output maximizing growth model using Mexican IO data he had acquired, in order to determine the sectoral composition of the Mexican turnpike growth path. I nicely programmed the forward looking dynamic IO model in FORTRAN, but frustratingly continued to get infinite solutions for future output, already in the second period of analysis. A column with negative numbers in the capital coefficient matrix appeared to be the cause. I was told that a negative result is also a result and completed my thesis with writing down all that.

2) The 7th in 1979 in Innsbruck was my first. My most vivid memory was the hippie style outfit with backpack of Karen Polenske at the one extreme and the dark, dull formal costumes of the few East-Europeans at the other extreme.

3) No doubt, it was the working paper of Ate Nieuwenhuis titled "Demand, Supply and IO Tables" (my translation), published by the Centraal Planbureau in the Hague. It helped me greatly to understand the lacking theoretical foundation of my 1977 ad hoc solution to modelling the forward economic inputs a big land reclamation plan in the northern Netherlands. Unfortunately for the readership of the Newsletter, both publications are written in Dutch. The best I can offer as an English language substitute for Nieuwenhuis´ working paper is my Southern Economic Journal article of 1996, with the Appendix of my most recent ESR article.