

Newsletter
Number 64, August 2026

INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Welcome from the Editor



Dear IIOA member,

I am delighted to release the latest issue of the *International Input-Output Association Newsletter*. My heartfelt thanks go to everyone who has contributed to this and previous editions.

In this issue, you will find updates on IO databases, the election of two new IIOA Fellows, the latest issue and articles from Economic Systems Research, and selected highlights from other journals.

I welcome your feedback, comments and suggestions, and encourage you to continue sharing your activities for inclusion in future issues. Thank you for your ongoing support and contributions.

Jing Meng

IIOA Newsletter Editor

University College London

Newsletter E-mail: newsletter@iioa.org

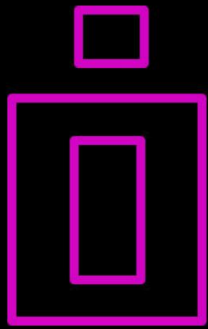
Personal E-mail: jing.j.meng@ucl.ac.uk

Would you like to contribute to the IIOA newsletter?

Send us your news at newsletter@iioa.org

In this issue

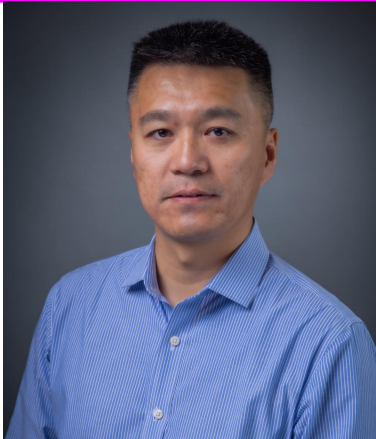
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INTERNATIONAL INPUT-OUTPUT ASSOCIATION

A message from IIOA President: Prof. Kuishuang Feng



Dear IIOA Members,

It was a pleasure to see so many of you in Seville this June. The 32nd International Input-Output Conference, held jointly with the 11th SHAO Conference from 22 to 26 June, was our first joint meeting with a regional input-output association, and it brought the regional and international IO communities together as we had hoped. The 14th International School of Input-Output Analysis and the 5th Spanish School of Input-Output Analysis (ESAIO) ran alongside it, giving our younger members a strong start in the field.

My sincere thanks go to Dr. María Teresa Álvarez Martínez, Chair of the Local Organizing Committee, to Dr. José Manuel Rueda Cantuche and Dr. Alfredo Mainar Causapé, Scientific Committee Co-Chairs, and to our host institutions in Seville for their dedication over many months.

I warmly congratulate Michael L. Lahr and Shantong Li on their election as Fellows of the IIOA. Both have shaped our field over decades: Michael through his work on subnational input-output modelling and long service to the Association, and Shantong through her foundational role in building input-output research in China.

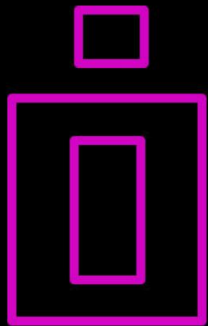
My congratulations also go to Jacobo Ferrer Hernández, winner of the 2026 Leontief Memorial Prize, whose work on distributionally extended input-output analysis is a reminder of the strength of the next generation of input-output researchers.

Looking ahead, the 33rd International Input-Output Conference and the 15th ISIOA will be held in Hong Kong from 4 to 9 July 2027, hosted by the University of Hong Kong. The call for papers and key dates will follow in due course, and I hope to see many of you there.

Best regards,

Kuishuang Feng

Professor, University of Hong Kong, Hong Kong
President of the International Input-Output
Association (2025 – 2027)
Council Member of the International Input-
Output Association (2021-2027)
Member of the International Input-Output
Association since 2007
Leontief Memorial Prize Winner (2013)
Editor-in-Chief, Sustainable Production and
Consumption
Editor, Ecological Economics
Highly Cited Researcher (top 1%) by Clarivate



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Databases

CEADs released the 2023 update of the EMERGING V2 global multi-regional input-output database

EMERGING, short for *Full-scale, Near Real-time Multi-regional Input-output Table for the Global Emerging Economies*, is a global multi-regional input-output (MRIO) database developed with a particular focus on emerging economies. By integrating multiple sources of statistical data, including energy balances, international trade statistics and national accounts, EMERGING provides a modular, scalable and time-consistent MRIO framework covering **245 economies and 133 sectors**.

Alongside the economic accounts, EMERGING V2 provides a sector-level CO₂ emissions inventory that is fully consistent with the MRIO structure. The inventory accounts for CO₂ emissions from fossil fuel combustion and energy use across economies and sectors. It is primarily based on IEA energy and emissions statistics, complemented, checked and harmonised with CEADs emissions data for emerging economies, with particular attention given to China and other major emerging economies.

EMERGING V2 currently provides MRIO tables and CO₂ emissions inventories for 2015–2023.

Compared with EMERGING 1.0, the new version improves the representation of intermediate input structures, import and export flows, and output estimates for electricity, transport and other energy-related sectors, particularly for small and medium-sized emerging economies. These updates improve the robustness of the model and its cross-country comparability.

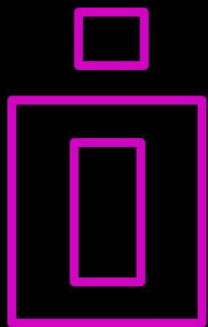
The EMERGING V2 MRIO database and associated CO₂ emissions inventories are freely available for academic research and policy analysis via the CEADs website.

Data available at:

<https://www.ceads.net/data/emerging-model/>



Carbon Emission Accounts and Datasets



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Databases

CEADs publicly released the EMERGING-E model

EMERGING-E is designed to better capture differences in electricity system structures in the context of the energy transition. Building on the EMERGING V2 framework, it disaggregates the originally aggregated electricity sector into **14 subsectors**, including one transmission sector, one distribution sector, and **12 electricity generation technologies**.

EMERGING-E covers **245 economies and 146 sectors**, providing higher-resolution data support for electricity transition assessment, carbon footprint analysis and policy evaluation. The **2018 EMERGING-E MRIO table** is now freely available on the CEADs website.

Data available at:

<https://www.ceads.net/data/emerging-model/>



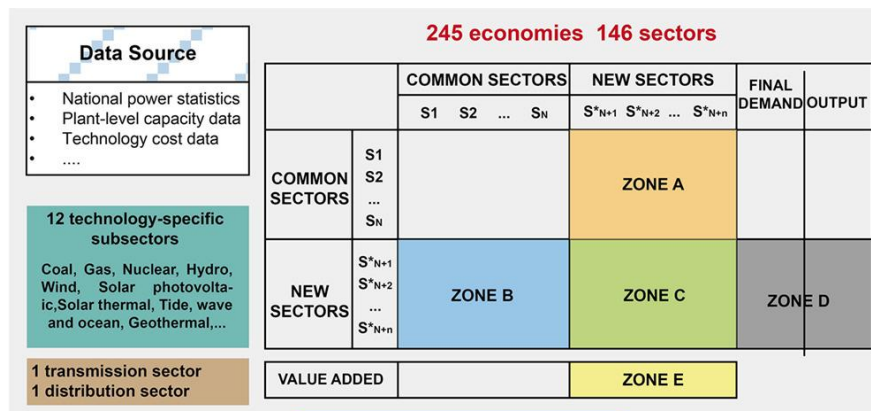
Carbon Emission Accounts and Datasets

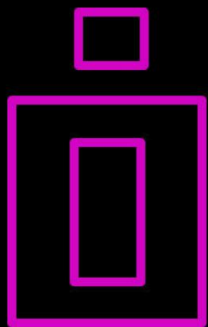
Methodology and validation

The methodology and validation of the dataset have been published in *One Earth*. Users are kindly asked to acknowledge the work of the data providers and cite the following paper when using the model or associated data:

Huo, J., Guo, R., Meng, J., Lindner, S., Li, J., He, Y., Wang, Z., & Guan, D. (2026). **EMERGING-E: A global multi-regional input-output model with renewable electricity disaggregation**. *One Earth*, 9(6), 101659.

<https://doi.org/10.1016/j.oneear.2026.101659>





INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Databases

CEADs released the Emerging Economies Consumption-Based CO₂ Footprint Report 2026

In 2025, CEADs published the first edition of the *Emerging Economies Consumption-Based CO₂ Footprint Report*, which systematically quantified sectoral consumption-based emissions and embodied carbon flows in trade for **30 emerging economies over the period 2015–2021**.

The report helped address a long-standing gap in the international statistical system regarding consumption-driven emissions in emerging economies and offered new insights into carbon responsibility transfers and mitigation opportunities in global supply chains.

Coverage expansion

2025 edition: 30 emerging economies, 2015–2021

2026 edition: 50 emerging economies, 2015–2023, with an expanded focus on African countries

The report provides updated and more comprehensive evidence on consumption-based emissions and trade-embodied carbon flows across emerging economies.

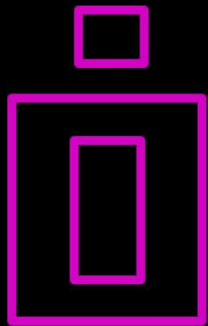
The 2025 and 2026 reports are freely available for download from the CEADs website.

Reports available at:

<https://www.ceads.net/data/emerging-model/>



Carbon Emission Accounts and Datasets



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INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Conferences

Special Session at the 50th International Conference on Regional Science

Barcelona, Spain | 21–23 October 2026

Venue: Universitat Oberta de Catalunya (UOC)

Special Session:

*Global Value Chains in Transition: Technologies for the
Decarbonization of Regions*

Organised within the PANTHEON Project

As part of the 50th International Conference on Regional Science, this special session will present the first advances of the PANTHEON project and examine how technological development and cleaner technologies can support deep decarbonization and shape economic, social and environmental outcomes.

Session Focus

The session brings together research on the socioeconomic and environmental implications of decarbonization efforts through the implementation of new technologies in the energy and industrial sectors.

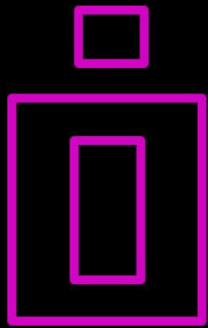
It will cover different modelling approaches, including multisectoral and multiregional input-output models, technological trajectories in integrated assessment models with system dynamics, and long-term analyses of technology convergence in carbon-intensive sectors.

PANTHEON Project

***Pathways to(wards) carbon neutrality for climate,
environment, health and socio-economic co-benefits***

More information:

<https://reunionesdeestudiosregionales.org/barcelona2026/en/sesiones-especiales/>



Newsletter
Number 64, August 2026

INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Awards, Promotions and Recognitions

Michael L. Lahr elected as a new Fellow of the IIOA



*Distinguished Research Professor (Emeritus), Rutgers
University*

PhD in Regional Science, University of Pennsylvania, 1992

*IIOA Council Member, 2001–2017; Vice President,
2013–2017*

Former Editor of Economic Systems Research

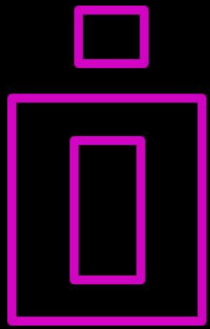
The nomination

Michael Lahr has recently been elected as a Fellow of the International Input-Output Association.

Professor Lahr has made longstanding contributions to input-output analysis, regional economics and economic impact modelling. As a regional IO modeller, his work has contributed to the development of best practices for producing input-output models at the subnational level. IO-based impact analysis has also benefited from his contributions to Hypothetical Extraction methods, Structural Decomposition Analysis and Shift-Share Analysis.

His academic work has advanced both methodological rigor and practical relevance, particularly in regional modelling, structural decomposition analysis, and the integration of input-output frameworks into policy evaluation and public decision-making.

His seminal editorial work, particularly the co-edited volume *Input-Output Analysis: Frontiers and Extensions* (Palgrave, 2001), remains an influential reference for scholars worldwide. Miller and Blair's definitive reference on input-output analysis includes more than three dozen references to his work.



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Awards, Promotions and Recognitions

Michael L. Lahr elected as a new Fellow of the IIOA

The nomination

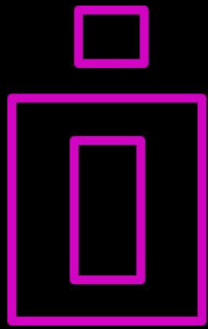
Professor Lahr's influence can be measured not only by citation counts but also by the incorporation of his ideas into the standard toolkit of input-output practitioners. What distinguishes Professor Lahr from many academic researchers is the seamless integration of theoretical rigor and practical application. He has built an impressive record of translating complex modelling frameworks into tools that inform real-world decision-making. His portfolio of more than 100 technical reports and policy analyses spans infrastructure investment, energy systems, disaster recovery and regional development strategy.

This applied work has not remained confined to academic circles. His analyses have reached broader public audiences through media coverage, bringing input-output perspectives to discussions of inflation dynamics, regional economic trends and even social phenomena such as tipping behavior.

Adding to his academic contributions, Michael Lahr's role in the IIOA cannot be overstated. He has devoted substantial time and effort to serving as a Council Member, Conference Organizer and Editor of the Association's flagship journal.

Equally important is his impact as a mentor. Professor Lahr has trained and inspired generations of young scholars from diverse countries and disciplinary backgrounds, including the USA, China, Spain, South Korea, Turkey and Iran. His mentorship extends well beyond formal supervision; he cultivates intellectual independence, encourages rigorous inquiry and fosters international academic exchange.

His insistence on conceptual clarity, empirical precision and policy relevance continues to shape the research and teaching of his former students. Many of them now hold academic and policy positions around the world, a testament to his lasting influence.



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Awards, Promotions and Recognitions

Michael L. Lahr elected as a new Fellow of the IIOA

Short bio

Michael Lahr is currently Distinguished Research Professor (Emeritus) at Rutgers Economic Advisory Service of the Edward J. Bloustein School of Planning and Public Policy at Rutgers University in New Brunswick, New Jersey.

Michael completed his BA/MA in Regional Science at the University of Pennsylvania in 1978. He received his PhD in Regional Science from the University of Pennsylvania in 1992, with a dissertation entitled “Methodology for Producing Hybrid Regional Input-Output Tables.”

From 1978 to 1983, he was Research Economist at Battelle Memorial Institute in Columbus, Ohio. Between 1983 and 1992, he held several contracts with the Regional Science Department at the University of Pennsylvania.

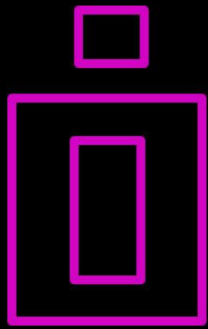
His other positions included Research Associate at the Regional Science Research Institute, Peace Dale, Rhode Island (1986–1987); Lecturer at the Economics Department and the Growth & Structure of Cities Program of Bryn Mawr College (1989–1991);

Regional Economist at the U.S. Department of Agriculture, Economic Research Service (1991–1993); and Senior Economist at Regional Financial Associates (1993–1994).

From 1994 onwards, Michael has been connected to the Edward J. Bloustein School of Planning and Public Policy at Rutgers University.

Michael served as a Council Member of the IIOA from 2001 to 2017 and as Vice President from 2013 to 2017. He also held several leadership positions in regional science communities, including Chair of the North American Regional Science Council, and Council Member (2007–2017) and President (2013–2014) of the Southern Regional Science Association.

Michael served as Editor of Economic Systems Research, Editor of Papers in Regional Science, Co-editor of Review of Regional Studies, and Assistant Editor of Journal of Regional Science.



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Awards, Promotions and Recognitions

Michael L. Lahr elected as a new Fellow of the IIOA

He chaired the Scientific Program Committee of the IIOA Conferences in Macerata (2000) and Mexico City (2015), the Local Organizing Committee of the IIOA Conferences in Alexandria, Virginia (2011) and Atlantic City, New Jersey (2017), and the Program Committee of the Annual North American Meetings of the Regional Science Association International in San Juan, Puerto Rico (2002) and Brooklyn, New York (2008).

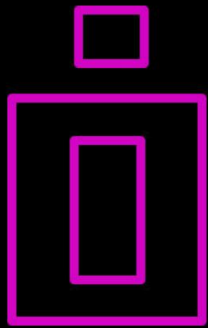
Personal note

Introducing Mike as a new Fellow is a bit special. Our relationship started in 1996, when Mike asked me to join him in editing a volume and organizing special sessions at a regional science conference in honor of Ron Miller. After many emails, we finally met for the first time at the conference in Buffalo, New York. The preface of the edited volume says about this occasion: "it certainly was not a disappointment although we both thought the other's picture on the web looked slightly better than the person himself."

Our co-editorship and later also co-authorship developed into a long friendship. I keep precious memories of our trips: meeting bears in Shenandoah Park, drinking beers in Macerata, and visiting Los Alamos with Ron Miller. Even Mike's never-ending monologues on his favorite Captain Beefheart album, Trout Mask Replica, are memorable.

Witnessing Mike's selfless devotion to the IIOA, I would like to thank Mike for being acting President in 2016/17, when I was recovering from a long stay in hospital. It is a great pleasure to welcome you as a Fellow.

***Kindly provided by Erik Dietzenbacher,
Chair of the Election Process***



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Awards, Promotions and Recognitions

Shantong Li elected as a new Fellow of the IIOA



*Senior Research Fellow, Development Research Center
of the State Council, PRC*

BA and MSc in Mathematics, Peking University

GTAP Research Fellow, 2016–2019

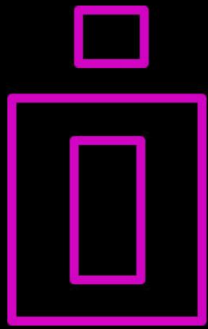
*Vice President, Chinese Input-Output Association,
2001–2016*

The nomination

Professor Li is widely recognized as one of the leading scholars in China in the field of input-output analysis. Her contributions have been foundational to the development and institutionalization of IO research in China. Her influence extends well beyond her own publications: she has helped shape the intellectual infrastructure, research community and generational continuity of IO scholarship in China.

Her leadership in compiling China's multi-regional input-output (MRIO) tables for benchmark years including 1987, 1992, 1997, 2002, 2007, 2012 and 2017 established an essential empirical foundation for regional and national CGE modelling in China. This sustained effort over three decades has had transformative influence, not only enabling rigorous policy analysis within China but also integrating China more fully into the global input-output research community.

The subsequent construction of Social Accounting Matrices and national CGE models under her leadership further demonstrates her ability to bridge statistical compilation and advanced economic modelling.



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Awards, Promotions and Recognitions

Shantong Li elected as a new Fellow of the IIOA

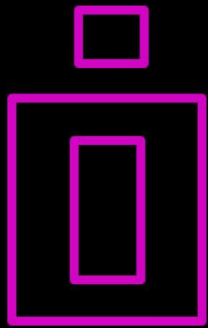
Beyond methodological and data infrastructure contributions, Professor Li has consistently applied input-output and CGE approaches to major policy questions. Her work assessing the economic impact of China's accession to the WTO, published with the World Bank, remains a landmark study connecting IO-based modelling with structural reform and poverty reduction.

She has authored or co-authored 33 books and 195 academic journal articles, with a focus on IO and CGE analysis. Her extensive publication record reflects both depth and breadth of scholarship and sustained intellectual leadership. Many of her studies have served as important references for national decision-making.

Equally important is Professor Li's longstanding commitment to the IIOA community. She served as an appointed member of the IIOA Council from 2000 to 2003 and played a pivotal role in bringing the 2005 IIOA Conference to Beijing, a milestone in expanding the Association's global reach.

Through her leadership roles in China and her active engagement with international research platforms such as GTAP and INFORUM, she has strengthened the institutional and intellectual ties between Chinese scholars and the global IO community. In recognition of her outstanding leadership and academic guidance in CGE-based research and policy analysis in China, she was named a GTAP Research Fellow for the term 2016–2019. She also served as Vice President of the Chinese Input-Output Association from 2001 to 2016.

Professor Shantong Li exemplifies the qualities that IIOA Fellowship is intended to recognize: sustained scholarly excellence, foundational contributions to the development of input-output analysis, and dedicated service to the international IO community.



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Awards, Promotions and Recognitions

Shantong Li elected as a new Fellow of the IIOA

Short bio

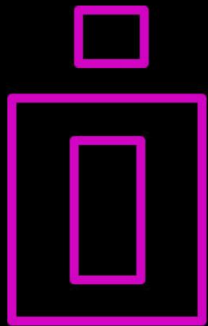
Shantong Li is currently Senior Research Fellow at the Department of Development Strategy and Regional Economy, Development Research Center of the State Council of the People's Republic of China.

She completed her BA in Mathematics at Peking University in 1968 and her MSc in Mathematics there in 1981. She has worked for the State Council since 1981, including as Research Fellow at the Techno-Economic Research Center (1981–1986); Division Chief (1986–1990), Vice Director (1990–1995) and Director General (1995–1998) at the Department of Development and Forecasting of the Development Research Center; and Director General at the Department of Development Strategy and Regional Economy from 1998 to 2004.

Since 2000, Shantong Li has been involved in more than 30 research projects, many of which were externally funded, including projects supported by the National Natural Science Foundation of China, the European Commission and the American Energy Foundation.

In 2014, Shantong Li won the Fudan Management Excellence Award. She has also received several awards for her projects, including the Second Prize of State Science and Technology (1996, 1999), the First Prize of China's Development (1997, 1999, 2001, 2009), the Special Prize of China's Development (2005), and the Business Development and Research Achievement First Prize (2010).

***Kindly provided by Erik Dietzenbacher,
Chair of the Election Process***



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Awards, Promotions and Recognitions

Election of the 2026 IIOA Fellows

Summary of the election process

The bylaws provide detailed information on the nomination and election of “Fellows of the IIOA”. The aim of electing Fellows of the IIOA is to honor appropriate members for their contributions to the field of input-output analysis. The contributions may be scientific or related to, for example, data acquisition inspired by applications in sub-national, national and multinational input-output studies.

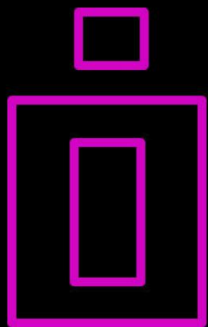
Once every calendar year, IIOA members who are not Fellows are invited by the Chair to nominate other members for election. Each nomination must be supported by at least two additional IIOA members.

All living Fellows are invited to vote on the election of the new Fellows, and at least 50% of them should participate to achieve a quorum. For each nominee, the Fellows are requested to vote “yes” or “no”. A nominee will be declared sufficiently supported if he or she receives at least 75% of the votes cast as “yes”.

Because the maximum number of new Fellows is two, a second round is required if more than two nominees receive sufficient support. This year, Michael Lahr and Shantong Li were the only nominees, implying that a second round was not necessary.

See the full list of IIOA Fellows:

https://www.iioa.org/who_we_are/fellows_and_prizes.html



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Awards, Promotions and Recognitions

Jacobo Ferrer Hernández receives the 2026 Leontief Memorial Prize

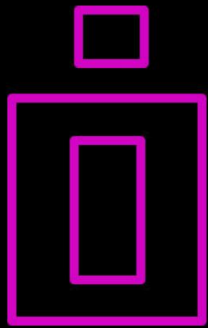


*Universidad Politécnica de Madrid
2026 Leontief Memorial Prize
32nd IIOA Conference, Seville
Best paper presented by authors under 40*

The 2026 Leontief Memorial Prize was awarded at the 32nd IIOA Conference in Seville to Jacobo Ferrer Hernández (Universidad Politécnica de Madrid) for his winning paper, “Distributionally extended input–output analysis (DE-IOA): A methodological guide to data compilation with an application to study industry shocks on living standards.”

The paper responds to the G20 Data Gaps Initiative call for integrated micro-macro distributional statistics. Building on the Miyazawa interrelational multiplier tradition, it develops distributionally extended input-output tables that integrate the income and expenditure sides of the household sector, combining Eurostat’s FIGARO symmetric input-output tables, the Survey on Income and Living Conditions, and the Household Budget Survey.

Applied to Spain over 2010–2023, the framework shows that price shocks in essential-goods industries are systematically regressive, with the burden concentrated on lower-income deciles while wage gains accrue mainly to middle-income groups. The complete Spanish DE-IO table series is released as supplementary material. The IIOA warmly congratulates Jacobo on this contribution to the field.



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INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Economic Systems Research

Journal of the IIOA

Volume 38, Issue 3, 2026



**Fernando de la Torre Cuevas, Michael L. Lahr, Ana
Lúcia Marto Sargento & João Pedro Ferreira**

**Subnational MRIO building: the added value of
household consumption and aggregate value-added
data**

Data scarcity makes subnational input-output accounts inaccurate. Builders of such accounts must resort to allocating output, value added, imports, and exports to regions using readily available industry-wise data, like shares of national jobs by industry. Meanwhile, population shares are typically used to allocate other final demand components. Lately, however, some statistical agencies have been releasing more subnational data. Surprisingly, builders of subnational input-output accounts do not appear to use them. This is probably due to uncertain trade-offs between the costs and benefits of deploying such data. We, therefore, explore the degree to which using some value-added and household consumption data can improve subnational multiregional input-output accounts. We find that integrating either household-consumption or some value-added data improves account accuracy little. Using both datasets in combination, however, does improve estimated accounts somewhat. Plus, together they portray rather accurate estimates of interregional income multipliers and consumption-based greenhouse gas emissions.

**Rizwan Fazal, Yifei Ma, Tim Baynes &
Manfred Lenzen**

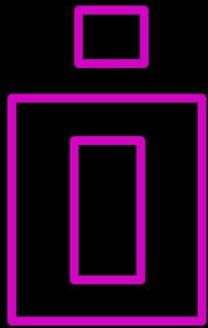
**Estimating concordance matrices using
Artificial Intelligence**

Concordance matrices play a crucial role in input-output analysis, for translating between databases expressed in different sector classifications, or translating many misaligned databases into a common format. These matrices are critical tools in enabling the utilisation of all possible primary data sources for compiling input-output tables, even if those data sources are completely misaligned. Until this date, concordance matrices are constructed manually by interpreting pairwise sector labels, resulting in an often labour-intensive process. In this work, we use artificial intelligence (AI) approaches for the first time to estimate concordance matrices for input-output analysis, offering to significantly reduce the time and labour involved in primary data processing. We show that, when applying deep learning techniques to textual sector labels, AI algorithms are able to grasp intricate linguistic relationships and capture semantic nuances, thus bridging the gap between human language and numerical binary relationships. We use a range of performance evaluation measures and demonstrate the ability to predict a wide range of concordance matrices with up to 85% accuracy.

Mohamed Badr & Konstantin Stadler

**Satellite account dependent sensitivity differences to
source data uncertainty in environmentally extended
multi-regional input-output footprint results**

Environmentally extended multi-regional input-output (EE-MRIO) models play a crucial role in sustainability analysis and policy making, yet the treatment of uncertainty in MRIO modelling remains under-explored. So far, uncertainty analysis has primarily been applied to carbon footprints and methods such as aggregation-based uncertainty analyses and Monte Carlo simulations have been used. In this work, we apply linear error propagation to trace uncertainty from environmental and social extensions to final footprint estimates, with validation through Monte Carlo simulations. We also conduct a sensitivity analysis to identify which footprints are more influenced by extension uncertainty. Our findings suggest that footprints linked to extensions evenly distributed across economic sectors (ex: GHG emissions, nitrogen, and employment) exhibit lower relative standard deviations compared to those tied to sector-specific extensions, such as land use, phosphorous, and water consumption. Sector-specific footprints, in general, demonstrate greater sensitivity to stressor uncertainty. The research further introduces an Outsource Coefficient, revealing that regions with higher outsourcing levels in their consumption-based accounts are less impacted by uncertainty in the underlying extension data. Finally, we provide uncertainty estimates for all EXIOBASE footprints using a 2019 product-by-product EXIOBASE 3 model and assume a uniform relative standard deviation of 0.1 across all extensions.



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Chen Xu, Max Munday & Calvin Jones

Can an information and communication technology (ICT) satellite account help us to understand digital sovereignty?

The concept of 'digital sovereignty,' relating to a nation or region's ability to assert control over its digital infrastructure, data, and capabilities, is increasingly embedded in strategic policy towards key parts of the information and communication technology (ICT) industry. However, there are few tools available that enable us to better understand the interconnections and interdependencies between supply and use of ICT products and services in an economy, as well as dependence on externally produced ICT goods and services. This paper investigates how an ICT satellite account can provide valuable insights across various industries and products. We employ satellite accounting methods to identify key elements of the significance of the ICT industry and show that such an accounting framework might inform debates over digital sovereignty.

Nadia Garbellini, Raffaele Giammetti & Ariel L. Wirkierman

Global labor requirements in the world economy: a GVC decomposition approach

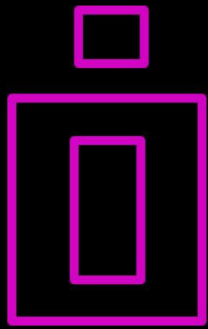
What have been the different channels that contributed to the dynamics of global labor productivity in the 'hyper-globalization' (1995–2009) and 'slowbalization' (2009–2018) periods? To answer this question, this paper identifies four channels contributing to global saving of labor requirements by means of an input-output-based decomposition: within each global value chain (GVC), we distinguish whether a reduction in labor requirements is due to (i) direct labor saving trends or (ii) a geographical/sectoral reorganization of the GVC; (iii) across countries within a global sector, we identify the contribution of changes in countries' final output market shares; and (iv) across global sectors, we identify the contribution of changes in the product composition of global final output. Our results suggest that technological change within GVCs was the main channel for global labor productivity growth, whereas the reallocation of final output between countries exerted a negative effect on productivity.

Yu-Wen Su, Ya-Syun Syu & Yu-Hsin Yao

Quantifying carbon reduction from dietary behavioral changes in Taiwan

Economic Systems Research, 38(3), 434–464

Achieving net-zero emissions requires not only technological transitions but also changes in everyday lifestyle choices. Although many governments promote green lifestyle behaviors, few studies quantify how much carbon reduction different behaviors can realistically achieve. This study develops the Green Lifestyle Economic Behavior (GLEB) Model, a consumption-based framework that uses Taiwan's data to estimate carbon emissions associated with dietary consumption. By decomposing emissions into two components – consumption quantity and carbon intensity – we evaluate multiple dietary behavioral scenarios. The results show that, when accounting for both per-capita carbon reduction and the likelihood of widespread adoption, eating locally and seasonally and choosing unprocessed foods offer the highest aggregate reduction potential. The GLEB Model provides a systematic method for governments to prioritize lifestyle-based mitigation policies and identify high-impact behavioral interventions. The findings demonstrate that individual actions matter; targeted behavioral changes can unlock meaningful carbon reductions with minimal disruption to daily life.



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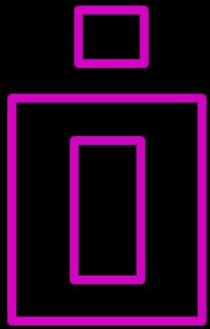
**Tryfonas Christou, Abián García-Rodríguez,
Nicholas Joseph Lazarou, Stylianos Sakkas &
Simone Salotti**

**A macroeconomic analysis of the impact of
productivity-enhancing European Social Fund
interventions on regional educational mismatch**

We use a spatial dynamic computable general equilibrium model incorporating a macroeconomic measure of educational mismatch and endogenous labour participation for three different educational groups. Our objective is to assess the impact of the European Social Fund's investments in labour productivity on both regional macroeconomic educational mismatch and employment. The analysed labour market interventions generate positive long-run effects on GDP and employment in all regions, with interesting implications for educational mismatch. Raising the productivity of the low educated workers reduces mismatch, while targeting the medium educated leads to relatively smaller reductions. Interventions targeting the highly educated result in an increase in mismatch, although they generate larger increases in GDP, implying the existence of a trade-off. Its intensity depends on the initial regional economic conditions as well as on the size of the policy interventions.

Tijs W. Alleman, Koen Schoors & Jan M. Baetens
**A dynamic disequilibrium input-output model of
the Belgian COVID-19 pandemic**

We adapt the dynamic disequilibrium input-output model of Pichler et al. (2022). [Journal of Economic Dynamics and Control, 144, 104527.] to the Belgian economy and conduct a cross-context validation of the COVID-19 pandemic. Labor supply and export demand shocks are refined using business surveys and observed trade flows, while household demand shocks are calibrated to 115 time series on GDP, revenue, employment, and interindustry transactions. The refined shocks improve the model's ability to reproduce the observed evolution of GDP, revenue, and employment. However, the model systematically underestimates the persistence of interindustry trade, suggesting structural limitations in its ability to represent firms' incentives to sustain trade. Relaxing the Leontief production function based on input criticality improves the model's accuracy, consistent with the original model, though differentiation across degrees of relaxation proved unidentifiable despite a larger dataset. Overall, our results confirm the original model's validity for assessing epidemic-driven economic impacts, thereby strengthening its credibility as a policy tool.



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Jacobo Ferrer & Sergio Alvarez

Local drivers and global suppliers of GHG emissions from the city of Madrid, 2010–2023

Despite its relevance for global mitigation, quantifying scope-3 emissions at the city level remains challenging. This study presents a consumption-based carbon footprint of Madrid over 2010–2023, integrating municipal data, regional supply and use tables, the FIGARO multiregional input-output database, and the first air emissions account for the city. The household CF fell from 31,135 ktCO_{2e} in 2010 to 21,308 ktCO_{2e} in 2023, with per capita emissions at 6113 kgCO_{2e} and over 55% of emissions coming from international supply chains. Distributional analysis reveals pronounced carbon inequality: high-expenditure households emitted 5.2 times more than the lowest-expenditure quintile. Simulations suggest that reshaping expenditure patterns among top-spending households and fostering limited carbon-neutral transport adoption could jointly reduce the household CF by 29.6%. These findings underscore the need for consumption-focused mitigation strategies to complement Madrid's Roadmap toward Climate Neutrality.

Esteban Fernandez-Vazquez

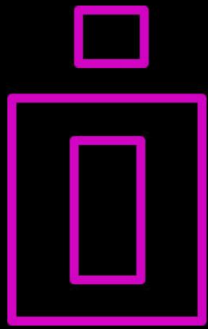
Balancing matrices with both positive and negative entries: a generalized cross-entropy solution

This paper presents a matrix balancing technique based on Generalized Cross-Entropy (GCE) that can be suitable for matrices containing both positive and negative entries. One comparative advantage of the technique presented here is that it allows for the incorporation of inference into the estimates. An additional advantage is that this technique makes possible sign flips in the cells of the initial and the estimated matrices, which can be something desirable in situations where assuming sign-preservation for all the entries of the matrix could be too restrictive. A simple illustrative example shows how GCE works when adjusting a matrix characterized by having positive and negative entries within a Supply and Use Tables (SUT) framework, producing comparatively better indicators of error than other adjusting techniques.

Kurt Kratena

The socioeconomic impacts of energy transition: a macroeconomic energy-input-output model

This paper presents important model features for covering the socioeconomic impacts and the energy system dynamics of energy transition. For that, the standard IO model is extended to an energy system-IO model by linking to partial bottom-up energy models. The treatment of energy demand deviates from standard energy/environment CGE models by including energy (E) as a capital-stock specific demand. The IO core of the model identifies energy and non-energy industry linkages. Investments can shift the output shares across different energy-related technologies (e.g. from blast-furnace to electric-arc steel). This mechanism is consistently linked to the IO structure by applying a two-layered framework, i.e. energy flows are measured in both monetary and physical units. The impacts of energy transition on income distribution across households can be modelled by introducing ten different household/labour types.



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Umed Temursho & Matthias Weitzel
[Input-output micro-macro twins](#)

This paper contributes to the literature on demand estimation from survey data and the integration of consumer demand with macro-models. We estimate and analyze EU-wide and country-specific results of (modified) Taylor's [The Internal Structure of U.S. Consumption Expenditures. Springer.] intra-budget regressions, providing insights into the internal structure and interdependencies of European households' consumption expenditures. We propose a modified Taylor consumer demand system by properly incorporating the household budget constraint into the Taylor micro-model and derive closed-form expressions for price and income elasticities. We then integrate the modified Taylor micro-model with an open input-output (IO) quantity setting, analyzing both the non-linear and linearized IO micro-macro systems. The linearized framework enables the integration of any demand system into an IO model, supporting the analysis of consumer price impacts. Finally, we introduce and empirically examine novel multiplier matrices that capture the impacts of price changes on consumption, income, and production, and analyze the effects of consumer price increases in the EU.

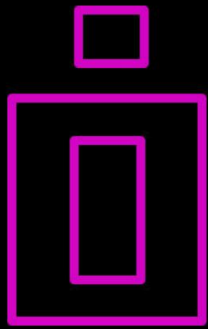
Thiago Cavalcante Simonato, Edson Paulo Domingues, Aline Souza Magalhães & Geoffrey J.D. Hewings

[Inequality in Brazil seen through consumption behavior: toward better economic modeling with utility function estimation](#)

Household consumption accounts for approximately 60 percent of Brazil's GDP. Accurate representation of this component in applied economic models requires accounting for household preferences to capture spending heterogeneity across income groups. This paper is the first to estimate parameters of a Stone-Geary utility function for Brazil, covering 31 productive sectors and ten household income deciles. Results reveal a negative relationship between income and subsistence spending share in total expenditure, especially for food and housing. Higher-income households allocate a greater proportion of their income to services, such as private education, healthcare, tourism, culture, and recreation. The estimated parameters are applied in Computable General Equilibrium (CGE) simulations to evaluate their importance. Compared to a non-parameterized scenario, the estimated model yields 30% smaller GDP impacts, 40% smaller sectoral output effects, and heterogeneous shifts in consumption patterns, including 15 times higher impacts on imports and 6 times greater impacts on insurance by top-income households.

Cherrylyn P. Labayo & Philip Arnold P. Tuaño
[Informality and production linkages in the Philippines: evidence from an input-output analysis](#)

Informal economic activities account for a large share of employment in the Philippines, yet their contribution to the production system is not fully captured in standard economic measures. This study uses an economy-wide input-output model, disaggregated into formal and informal activities. It estimates how changes in demand affect total output, household income, and production linkages across formal and informal activities. Results show that informality is concentrated in agriculture and key service sectors, while industry sector remains predominantly formal. Despite smaller transaction volumes, informal activities are more strongly connected to domestic supply chains than their formal counterparts, both upstream as input buyers and downstream as suppliers. Informal activities also generate larger household income gains when local demand expands. These findings suggest that policies addressing informality should promote improvements in productivity and fairer market integration of informal producers into domestic production networks, as regulatory constraints may dampen multipliers and income gains.



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Ana-Isabel Guerra & Ferran Sancho
[Are tariffs an economic trump?](#)

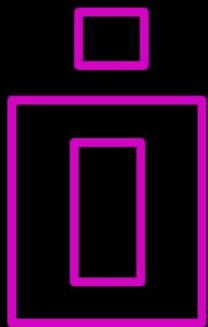
Barriers to free trade slow economic growth and reduce the efficient use of resources. Although economic theory shows that trade benefits countries overall, some people mistakenly see it as a zero-sum game in which one country's gain is another's loss. Tariffs are a key obstacle because they raise the price of imported goods to protect domestic industries. This paper uses recent OECD data to examine how higher tariffs affect the entire U.S. economy, both with and without retaliation from trading partners. The analysis uses a nonlinear input-output model to capture how consumers and firms substitute between domestic and imported goods when prices change. It considers both intermediate goods used in production and final goods consumed by households. The model allows for vertical and horizontal substitution across product varieties and distinguishes five trading partners, each supplying different varieties and facing different tariff rates.

Rubén Martínez-Alpañez, José Daniel Buendía-Azorín & María del Mar Sánchez-de-la-Vega
[Improving the estimation of regional input-output tables using non-survey methods](#)

Input-output tables provide a useful tool for analyzing economic and environmental impacts. The main purpose of this paper is to evaluate the accuracy of different regionalization methods in estimating input-output tables based on location quotients. Specifically, the paper aims to identify the most accurate methods and to propose a practical procedure to improve their estimation. In doing so, this study compares the accuracy of various methods, using the 2015 Korean multi-regional input-output table as a benchmark. In the analyzed location quotient methods, smoothing adjustments to the estimated quotients depend on the choice of smoothing parameter values. An additional contribution of this study is the proposal of a simple and efficient procedure for estimating these parameters based on commonly available information on road freight transport and goods imports from the rest of the world. The results show that this procedure improves the accuracy of these estimation methods.

Vicente Ferreira, João Pedro Ferreira, Dario Guarascio & Francesco Zezza
[Inflation in the EU: how sectoral price shocks ripple domestically and across borders in core and periphery countries](#)

The return of inflation in Western economies has reignited the debate over its causes, bringing sector-specific shocks and supply chain bottlenecks to the forefront. Building on inflation studies using the Leontief price model, we develop a method to measure EU member states' vulnerability to sectoral price shocks. Using international input-output data, we identify which sectors have the greatest impact on overall inflation and analyze how price shocks spread across borders. Our findings reveal two critical asymmetries. First, peripheral countries are more exposed to shocks originating in the EU core than vice versa. Second, all EU member states are considerably exposed to price shocks originating from non-EU countries, namely Russia and China. These strategic dependencies pose challenges for price stability and require targeted industrial policy interventions going beyond conventional monetary policy.



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Mahmoud Arbouch & Eduardo Amaral Haddad
[Disentangling regional economic and environmental impacts of transportation costs in Morocco: an inter-province CGE approach](#)

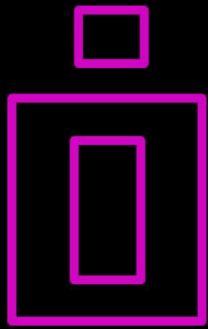
This paper examines how reductions in transportation costs reshape regional economic and environmental outcomes in Morocco. We simulate a reduction in delivered (purchasers') costs via a transport-margin efficiency improvement – implemented as a margin-saving technical change in the transport sector – within a province-level Spatial Computable General Equilibrium (SCGE) framework. Simulating a 1% decline in transport costs, we assess the marginal impacts across regions. Results reveal uneven gains: coastal areas along the Casablanca-Tangier axis and emerging hubs like Béni Mellal-Khénifra and Dakhla-Oued Ed Dahab benefit from growth and lower emissions, while traditional centers such as Fès-Meknès and Marrakech-Safi experience stagnation and rising carbon intensity. The findings highlight a partial decoupling of economic and environmental convergence, driven by both production structure and scale effects. Our analysis stresses the importance of territorially differentiated infrastructure policies that balance spatial equity with sustainability, offering insights for place-based development and green transformation strategies.

Junbo Wang, Zhenyu Ma & Xiayang Fan
[We are all in the same boat: the welfare and carbon abatement effects of the EU carbon border adjustment mechanism](#)

Amid the intensifying global climate crisis, the European Union (EU) has introduced the Carbon Border Adjustment Mechanism (CBAM) to strengthen climate action and mitigate carbon leakage. This paper quantitatively evaluates the welfare and carbon abatement effects of CBAM using a multi-country, multi-sector general equilibrium model that integrates global production networks and carbon emissions. Employing a structural approach with ventilation coefficients as instrumental variables, we address endogeneity in pollution elasticities. Our findings indicate that CBAM improves the welfare of the EU and several developed economies such as Japan and the USA through terms-of-trade improvements. Conversely, most other economies suffer significant welfare losses. While CBAM effectively reduces global emissions, its contribution to the EU's domestic reduction is limited due to internal scale effects. Counterfactual analyses further indicate that a globally harmonized carbon pricing scheme achieves larger emission reductions with lower aggregate welfare costs, highlighting the importance of international policy coordination.

Xiang Yao
[Average propagation length analysis for carbon emission waves and pathways in China's electricity and heat sector](#)

This study employs the Average Propagation Length (APL) model to examine carbon emission propagation in China's electricity and heat sector, using a detailed 2020 input-output dataset. By integrating input-output analysis and carbon accounting methods, the research identifies critical emission pathways and quantifies the direct and indirect emissions triggered by final demand shocks. Results highlight structural imbalances, with carbon-intensive upstream sectors significantly influencing downstream emissions through extensive production chains. Notably, the electricity and heat production subsector contributes disproportionately to total industrial emissions, necessitating differentiated carbon mitigation strategies. This research recommends centralized regulation for emission-intensive industries and decentralized, market-driven mechanisms for sectors with dispersed emissions. The findings offer crucial insights into refining carbon trading policies and optimizing industrial energy efficiency, directly supporting China's dual-carbon objectives and providing a robust methodological foundation for future environmental-economic studies.



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Min Zhang, Bin Li, Zhenguo Wang, Li Jiang & Xiang Gao

How do robots affect the domestic service value-added ratio of Chinese firms?

The widespread adoption of robots has transformed firm production and introduced new challenges for domestic service inputs. We measure the domestic service value-added ratio as the share of value added in firms' exports generated by domestic service activities and examine how robots affect this ratio, thereby assessing how technological advancements influence Chinese firms' use of domestic service inputs. The findings indicate that robots significantly reduce the value-added ratio in domestic services, thereby diminishing firms' use of domestic service inputs. Robustness and endogeneity tests confirm that the finding still holds. The negative effect of robots on the domestic service value-added ratio primarily stems from employment substitution, capital dependence, and a squeeze on the production chain. Furthermore, the diffusion effect of industry differs significantly between ordinary and processing trade firms. It broadens the understanding of the relationship between robots and the growth of domestic service sectors, providing guidance for business managers.

Lianlian Wei & Chae-Deug Yi

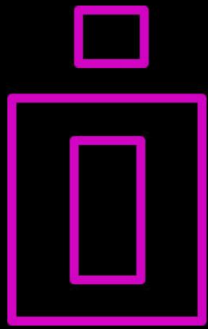
The economic turbulence examination of Japan's nuclear wastewater discharge with SARIMA and mixed Input-Output model

This study assesses the short-term impacts of nuclear wastewater discharge on Japan's fishing and fishery product exports and on output changes across countries and sectors using a Seasonal Autoregressive Integrated Moving Average (SARIMA) model and a Mixed Input-Output (IO) model. A SARIMA model is used to predict export values for Japan's fishing and fishery products without discharge, and the predictions are compared with the observed total export value to derive export changes. These changes are used to analyze shifts in output and final demand within Japan and other countries through a Mixed IO model. The results indicate that nuclear wastewater discharge decreases Japan's fishing and fishery product exports, reducing the output and final demand of Japan's fishing and aquaculture industry. Furthermore, it negatively affects industrial output in all 75 countries (and the Rest of the World). These findings provide essential insights for policy responses to environmental shocks and for sustainable development.

Doudou Qu, Jinsheng Zhu & Zhenguo Wang

How does dual circulation drive employment in China? A novel input-output analysis distinguishing firm ownership

This paper examines how China's dual circulation strategy affects employment, accounting for heterogeneity in firm ownership. We first use a value-added decomposition framework to quantify the evolution of dual circulation and its associated employment outcomes at the aggregate, industry, and ownership levels. We then employ structural decomposition analysis (SDA) to identify the key drivers of changes in employment. We find that both domestic and complex external circulations – particularly the former – have jointly supported employment growth at multiple levels. Notably, high-tech manufacturing has emerged as a new engine of job creation. Circulation among domestic-owned firms contributes the most to employment, whereas circulation between domestic-owned and foreign-owned firms contributes the least, although it has been rising. SDA results further indicate that the positive effects of intermediate supply and final demand outweigh the negative effects of labor productivity and the value-added rate, yielding a net positive employment effect for dual circulation.



INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Lena Kilian, Anne Owen & Rutger Hoekstra

Quantifying the impacts of multi-regional input-output data on emissions from imports

Recent years have seen an increased interest in consumption-based emissions. To calculate these, global multi-regional input-output (MRIO) data with environmental extensions are needed. However, various MRIO databases exist, each with unique strengths and limitations. This research investigates differences in emission estimates from global MRIO databases: EXIOBASE, FIGARO, GLORIA, and ICIO. We ask how the imported component of a country's environmental footprint differs between these databases, to understand the implications of choosing one of these datasets over another. We find high levels of similarity across the databases for most countries, including for the 10 largest economies. However, differences are stronger for some countries with higher proportions of imported emissions. Here, choice of MRIO data can have a significant impact on policy decisions. Finally, industry-level analyses indicate that priority industries for climate policy are consistent across the datasets, even where absolute emission estimates may differ.

Grant J. Allan & Gioele Figus

Resilience by design: how modelling choices shaped tourism's COVID-19 impact analyses

Multisectoral economic modelling provided insights to policymakers during the COVID-19 pandemic, including the economy-wide impacts of changes in tourism and the design of policy responses. These models embed assumptions about how firms and households respond to adverse shocks, which are linked to the level of economic resilience they exhibit. This paper illustrates how Input-Output and Computable General Equilibrium models, incorporating different behavioural assumptions, can yield different estimates of static resilience, the economy's ability to maintain function when shocked. Using the example of Scotland in 2020 and simulating an Accommodation demand shock, we show that model specification can rule out responses that directly influence the degree of estimated resilience in an economy. By comparing simulation results with observed changes in value added of the Accommodation sector, we demonstrate that appropriately accounting for resilience mechanisms helps close the gap between simulated and observed data.

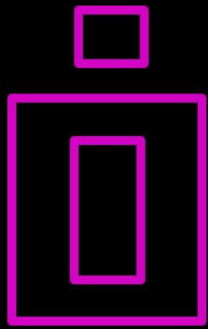
Haiyan Zhang, Yixin Cao & Beibei Liu

China's household carbon footprints: structural drivers and provincial disparities (2002–2022)

This study tracks the transformation of China's household carbon footprints from 2002 to 2022, examining urban-rural disparities and regional heterogeneity. Integrating multiregional input-output modeling and structural decomposition analysis, we quantify direct and indirect household emissions and disentangle the roles of fuel switching, energy efficiency, consumption growth, production structure, and interprovincial trade. Results reveal divergent decarbonization trajectories: while aggregate household emissions plateaued after 2017, urban emissions peaked and declined whereas rural emissions continued rising, driven by ongoing energy transitions and lifestyle changes. Residential and transportation sectors have overtaken food as dominant emission sources, signaling fundamental lifestyle shifts. Meanwhile, growing spatial decoupling between consumption and production highlights intensifying interprovincial emission transfers, with affluent regions increasingly outsourcing carbon footprints to industrial provinces. These findings call for differentiated strategies: accelerating rural electrification, strengthening urban demand-side management, and establishing mechanisms to balance production – consumption responsibilities – all essential for China's dual carbon goals.

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Highlights in journals

López-Morales, C., & Boyer, M.

On the social implications of technological processes: Towards hybrid social life cycle analysis (H-SLCA)

Journal of Cleaner Production, 547, 147806

Recent approaches to hybrid life-cycle analysis (H-LCA) and social life-cycle analysis (SLCA) converge in common aims to develop methods for assessing the social dimensions of technological processes, with particular attention to the conditions affecting the provision and reproduction of labor. In this paper, we explore 'hybrid social life-cycle analysis' (H-SLCA), an integrated approach combining process-based SLCA with economy-wide social accounting to assess environmental and social impacts of particular technological processes in their interactions with the wider economy. To do so, we modify the numerical example with which Suh (2004) introduced the input-output based H-LCA to build a proof of concept for H-SLCA. The resulting model exploits the compatibilities in the computational structures of process-based LCA, the input-output model and social accounting matrices to include labor provision, income generation, and household consumption in the characterization of both the foreground system and the background economy. Thus defined, hybrid-SLCA computes impacts in those social variables while also producing estimates for environmental impacts higher than those obtained with H-LCA. This is because the social accounting matrix is more comprehensive than the input-output table. The model for H-SLCA is sufficiently flexible to potentially include additional social dimensions relevant to SLCA (human rights, safety, gender, etc.) when represented quantitatively. Finally, we suggest that this richer representation of production technologies is compatible with understandings of technology in the wider social sciences. As such, H-SLCA can be a basis for multidisciplinary collaboration between researchers interested in technological processes from either quantitative or qualitative orientations.

Boyer, M., López-Morales, C., & Favre, M.

Technology as the material 'how' of socio-ecological (re)production: Reflections on Wassily Leontief's 'technological structure of the economy'

Ecological Economics, 250, 109175

Wassily Leontief is widely known for his development of an applied approach in economics known as input-output (IO). In this paper, we turn to Leontief's analysis to reconstruct a concept of technology based on his work. The concept rests upon an analysis of Leontief's epistemological-methodological assumptions and the premises of his input-output model regarding interdependence. We argue that Leontief's concept of technology highlights the physical process of technology in two senses: As concrete flows of material stuff used in economic production in the sense of a particular 'recipe'; but also as emergent systemic effects of that particular 'recipe' throughout an economy, or indeed throughout a socio-ecological system. This contrasts with other approaches in the social sciences that understand the materiality of technology largely in terms of objects, artifacts, and infrastructure. We argue that future research could benefit from incorporating Leontief's approach with work elsewhere in the social sciences. On the one hand, IO depictions of quantitative and systemic effects could be complemented by aspects that are not explicit in Leontief's framework, including specific social relations such as power, and the role of certain actors or conflicts. On the other, Leontief's emphasis on physical material aspects and their systemic effects can also link nicely with ecological research, even beyond the now common environmental extensions of the IO model. We argue that such work could yield interesting synergies in the future, not least in the field of ecological economics.