Newsletter
Number 49, August 2021

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 to all of you that have contributed sending your inputs.

This issue contains a presidential message regarding the virtual IIOA campaign, the latest ESR articles, highlights in Journals and recent I-O books, but also a report of the Sir Richard Stone Prize (2019-20) with a message from the awardees and a call for papers for the Leontief Memorial Prize 2021! You can also find a call for a Special Issue, job positions and other news from the I-O world. The Social Accounting Corner brings this time conversations with Esteban Fernandez-Vazquez and Clio Ciaschini. It is an issue full of interesting news that I hope you will enjoy!

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

Andre Carrascal Incera
IIOA Newsletter Editor
University of Oviedo, Spain
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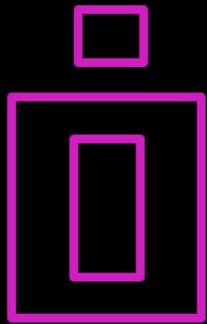
Would you like to contribute to the IIOA newsletter?
Send us your news at newsletter@iioa.org

In this issue

Presidential Message – A Report on the Virtual IIOA Campaign

Dear valued IIOA members,

The Tokyo Olympic Games over. In Japan, there have been (and still are) conflicting views on whether we really should have held the event during the pandemic. I personally do not have a clear answer to this question only time will tell.

Yet still, I would like to express my deep respects for all athletes who had come through this difficult time and brought themselves to presenting their best at the grand arena.

Now, the Tokyo Paralympic Games have started. I am sure it will give us equally memorable moments.

The IIOA continues to move forward. Since the last issue of the IIOA Newsletter, we have had several important events of the Virtual IIOA Campaign.

The Development Programme Online was held on 6th and 7th July 2021, the days on which we would have had the International Input-Output Conference. The Development Programme is designed to offer young researchers an opportunity to develop their work-in-progress papers through an interactive session with a discussant and the audience. It started from the previous IIOA Conference in Glasgow in 2019, and since then there has been a huge demand for making it a regular program. Due to various restrictions, we had to downscale the event this time but many motivated young researchers participated in the sessions, either as a presenter or a part of the audience, to engage in lively discussions and exchanges on the various topics of interest.

Another IIOA webinar was successfully delivered on 3rd June 2021, by Mr. Thomas Howells from the U.S. Bureau of Economic Analysis (BEA). In this webinar Mr. Howells provided an overview of BEA's structure, the role of the supply and use tables framework as the foundation for many of BEA's products, and on-going research building on BEA's SUTs/IOTs. The recorded webinar can be watched from the top page of the IIOA website.

The International School of Input-Output Analysis (ISIOA) continues to proceed online. The second module of the current edition was presented from 10th to 31st May 2021 by Dr. Norihiko Yamano and Dr. Joaquim. M. Guilhoto, both from the Organisation for Economic Co-operation and Development (OECD), titled "Understanding and Using Multiregional Input-Output at the World Level". The OECD will soon be launching the new version of their inter-country input-output database and its derivative the Trade in Value Added (TiVA) indicators, so the timing of the module delivered to interested researchers was impeccable. This module had 32 participants, mostly coming from China, Spain and Sweden with 40% female attendees, coming mostly from China. It is also really encouraging that nine participants showed interest to carry out an assignment to get the School Certification, of which 6 were Ph.D. students. Moreover, 21 became IIOA Members in order to attend the training module, mostly coming from China and India. You can view the recordings of the four lectures through the ISIOA section in our website (members only).

After the summer break, a series of new events will be forthcoming …. Also, there will be an International Input-Output Conference (either in a physical or virtual form) in 2022. Please remain attentive to our announcement!!

Best wishes,

Satoshi INOMATA (The President of the IIOA) 2
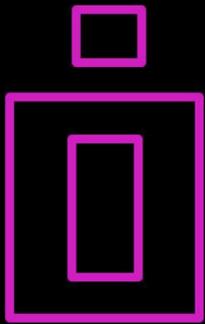
INTERNATIONAL
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Sir Richard Stone Prize for the ESR publications in 2019 and 2020

Sir Richard Stone Prize is awarded every other year for **the best paper(s)** that was submitted and accepted for publication in IIOA's journal **Economic Systems Research** in the two consecutive volumes.

Faye Duchin (Chair)

The prize is donated by Taylor & Francis, the Publisher of the journal. (See https://www.iioa.org/who_we_are/fellows_and_prizes.html for the list of past awardees.)

Jury member of Sir Richard Stone Prize, 2019-20
Faye Duchin (Chair)
Maria Alvarez
Xikang Chen
Xuemei Jiang
Yafei Wang

Selection procedure:

Out of all papers published in ESR during 2019 and 2020, we narrowed a list of more than a dozen initial jury nominations down to a short list of five articles.

These were then reduced to two preferred articles based on the tally of all jury members' top two choices.

The final vote was between choosing just one of the two or sharing the Prize between them. The latter prevailed by strong consensus.

The jury has selected the following **two papers** as the best of the papers published in ESR in 2019 and 2020 to share the Richard Stone Prize. Congratulations!!

Sir Richard Stone Prize for the ESR publications in 2019 and 2020

Schumacher, Dieter (2019). "The integration of international financial markets: an attempt to quantify contagion in an input–output-type analysis," ESR, 31:3: 345-360.

https://www.tandfonline.com/doi/full/10.1080/09535314.2018.1517084

Review summaries

This paper is a winner of the Richard Stone Prize for 2019-2020 for two reasons, its importance and its originality. The paper addresses a strategic challenge, identifying the indirect as well as the direct exposures of creditors in specific countries to credit defaults in specific receiving countries. The author constructs an inter-country input-output matrix of money flows, where a column of coefficients for a country represents the portion of its total inflow from each other country. The impressive credibility of the empirical results will hopefully encourage follow-up research that takes next steps to use the input-output conceptual framework to integrate global money flows, as pioneered in this study, with input-output studies of the global "real economy" to shed light on sources for funding investment, and prospects for defaults, in the 21st century.

Södersten, Carl-Johan H. & Manfred Lenzen (2020). "A supply-use approach to capital endogenization in input–output analysis," ESR, 32:4: 451-475.

https://www.tandfonline.com/doi/full/10.1080/09535314.2020.1784852

Review summaries

This paper is a winner of the Richard Stone Prize for 2019-2020 for two reasons: it identifies a shortcoming of an input-output methodology that is very widely used and highly valued, and it offers a solution that is clearly an improvement that further enhances the contribution of that methodology. The application is the footprint for environmental assessments using environmentally extended, multi-regional input-output databases. The shortcoming is that the footprint as currently calculated does not take the environmental impact of built capital into account. The reason is that investment is represented as a single, exogenous vector in the static input-output model rather than being part of an inter-industry matrix. The authors' solution is to distribute investment purchases among the sectors in the inter-industry matrix, which will capture their impacts on the footprint. This approach will no doubt be widely utilized.
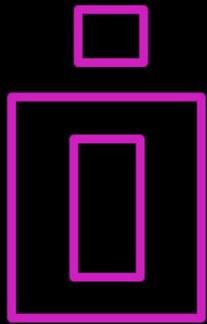
Sir Richard Stone Prize for the ESR publications in 2019 and 2020

Messages from awardees

Dieter Schumacher
Honorary Fellow of DIW Berlin - German Institute for Economic Research
Honorary Professor, Europe University Viadrina, Frankfurt (Oder)

It is a great pleasure for me and an honour to receive the Sir Richard Stone Prize. The awarded paper is an attempt to quantify contagion of financial crises by taking international capital linkages into account. In an input-output-type analysis, the effects of a credit default in a country are traced back to those countries from which the saving funds originated.

The first reference in the paper is to Richard Stone who in 1966 outlined a comprehensive system of social accounts integrating input-output and a matrix of financial liabilities and assets broken down by sectors in a closed economy. The paper heavily draws on the knowledge accumulated in DIW Berlin in input-output analysis in terms of methodology as well as data collection and data processing. My special thanks are due to Dietmar Edler, Mechthild Schrooten, Marius Clemens and Hella Steinke as well as, for helpful comments and suggestions, to Jürgen Blazejczak, Axel Jochem, Reiner Stäglin, and last but not least, to an anonymous referee of this Journal and the editors. The prize is an encouragement to continue research as outlined in the paper.
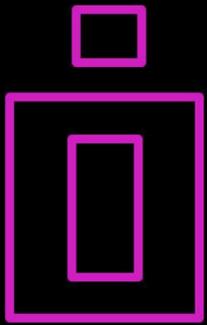
Carl Södersten
PhD
SINTEF, Norway

We are honoured to receive the Sir Richard Stone award. This paper addresses an important and often overlooked issue in input-output analysis, namely the treatment of capital goods. Here, we provide a novel approach to the endogenization of capital into the IO system using a supply-use framework. Writing this paper was quite a journey, both academically and geographically.

The conceptual idea emerged during fruitful brainstorming sessions on the rooftop terrace of the School of Physics in sunny Sydney at the end of 2017. The mathematical derivations were performed during a lengthier layover in Bangkok and subsequently tested numerically a stone's throw away from the arctic circle in Norway. The results were presented at the 2018 IIOA conference in Brazil and the paper was formally submitted in September 2018. Getting it accepted nearly two years later was hence a great satisfaction, and receiving this award further vindicates the efforts that were put into its development. We would like to thank Prof. Michael Lahr as well as several anonymous reviewers for helpful feedback during the long but enlightening reviewing process. I also wish to thank my co-author Manfred Lenzen for his help and perseverance in bringing this paper to completion.

Leontief Memorial Prize 2021: Call for Papers

We are delighted to announce that the **Call for Papers for the 2021 Leontief Memorial Prize** is now open!

The Leontief Memorial Prize is an award for **the best paper presented at an International Input-Output Conference** by author(s) all **under 40 years of age**. The Prize was first awarded in the year 2000 and the most recent winner was Matteo Vincenzo Rocco at the 2019 conference in Glasgow, UK. There will be a 2021 competition despite this being a year with no International Input-Output Conference.

Please submit a completed manuscript on a topic in the field of Input-Output Analysis **before November 12th 2021**.

Manuscripts should follow this **structure**: title, abstract, keywords, introduction, materials and methods, results, discussion, acknowledgments, references, appendices (as appropriate) and be a Word, rich text format (RTF), open document format or PDF file.

Papers must be submitted via the online submission system COPASS.

All (co-)authors of the paper submitted for the competition must have been **under 40 years old on 1st January 2021**.

The Prize winner will be determined by a **jury** consisting of:
- the Chair of the Jury
- the President of the International Input-Output Association
- the Vice-Presidents of the International Input-Output Association
- one of the Editors of Economics Systems Research - the Journal of the Association

The winner of the Prize will be awarded a certificate and prize money of **US$1,000**.

The winning paper will be automatically considered for publication in *Economics Systems Research*.

For the 2021 prize, the winning paper will be presented in an IIOA webinar in early 2022.

The winning paper will be announced on **December 17th 2021.**

Dr Anne Owen

Chair of Jury for the 2021 Leontief Memorial Prize
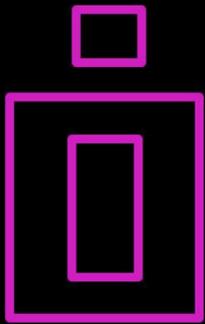
Events

SHAIO events

Sociedad Hispanoamericana de Análisis
Input-Output

SHAIO

Dear IIOA community,

Thank you for the great acceptance of the webinars held to date. Throughout 2021 we will continue to develop this series of webinars on a wide diversity of topics.

The 2021 Webinar's Series will come back by October 28 with Pablo Ruiz Nápoles, from UNAM, Mexico. With the November and December presentations, we will close this year's Webinar Series. The names will be announced as soon as we have the confirmations.

• **October 28** (5:00 pm, CET): **Pablo Ruiz Nápoles**, UNAM, Mexico (language: Spanish, materials in English).

The entire input-output community is invited to join our webinars. If you are not a SHAIO member, you only need to fill in a registration form that will appear about two weeks before each webinar on our web pages and social networks.

Don't forget to subscribe to our social networks **Facebook** and **Twitter** to be updated with our events, and we remind you that you can enjoy the previous meetings and download the materials presented from our **Youtube channel** and our **web page**.

From SHAIO, we wish you and your families all the best.

Stay healthy!   **The SHAIO Council.**

(I-O)^W

May 27 (5:00 pm, CET): Luis Pedauga, University of León, Spain
June 24 (5:00 pm, CET): Julia Steinberger, University of Lausanne, Switzerland. Organized by SHAIO and RedMentes
October 28 (5:00 pm, CET): Pablo Ruiz Nápoles, UNAM, Mexico
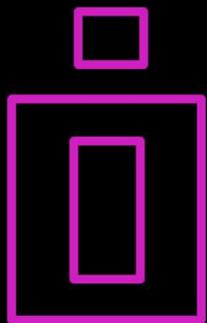
Events

SHAIO events

Dear colleagues,

The Faculty of Economics and Business of the University of León and the Department of Economics and Statistics are pleased to invite you to participate in the 8th permanent Workshop of the Hispanic-American Input-Output Society (SHAIO), which will be held in September of 2021 in León (Spain).

The health crisis caused by COVID-19 requires adopting preventive measures and following strict health protocols to prevent infection. For this reason, the organization committee of the 8th permanent Workshop of SHAIO has decided to adopt a double modality workshop (online and on-site).

Given the current protocol of measures Covid-19, the capacity in the spaces of the CRAI-TIC (place of the event) has been limited by the norms of the university to a total of twenty on-site participants.
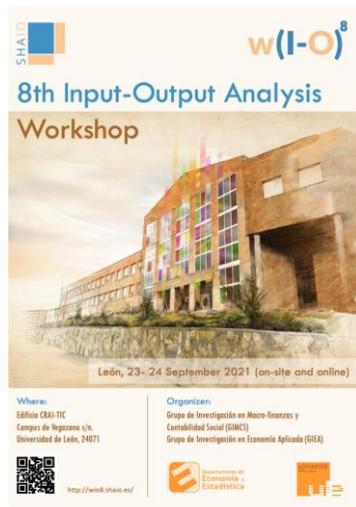
These participants will be chosen from those who select to be indifferent between online and on-site presentation when they send the abstract. As far as sanitary conditions allow it. Of course, the online presentation will be available for those who show their preference for the online presentation.

We are sure of the hospitality that characterizes this millenary city will offer in the next meeting the most favorable conditions to share and discuss our latest works. This 8th meeting is another example of the consolidation of a constant and uninterrupted meeting in addressing all these issues of relevance in the economic analysis.

The keynote speaker confirmed is Óscar Dejuán (University of Castilla-La Mancha, Spain).

Key Dates:

- **Abstract submission**→ June 15, 2021
- **Notification of acceptance** → June 30, 2021
- **Full paper submission** → July 13, 2021
- **Registration** → August 15, 2021
- **Workshop** → September 23-24, 2021

More information at: http://wio8.shaio.es/en/

We are looking forward to seeing you in León!
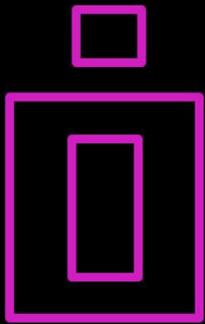
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Awards and promotions by the IIOA members

Miernyk Medal for Research Excellence to Dr. Joao-Pedro Ferreira

This award is sponsored by the Regional Research Institute at West Virginia University and is awarded annually to an eligible author of the **best paper presented at the Meeting of the Southern Regional Science Association**.

His paper is titled:

"2018 Red Tide and peer-to-peer accommodations: Assessing the economic impacts using a multi-regional input-output model".

See a blog about this from the University of Florida (link) and more information about the Miernyk Medal award (link).

Many congratulations Joao-Pedro!!

Other IIOA News

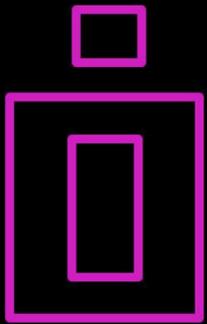### Nowcasting SUTS and Tourism Satellite Accounts to 2020 for the UK, Scotland and Northern Ireland

Supply and Use Tables, SUTS, are now established as integral to the UN System of National Accounts and the ESA 2010. Although most national statistical institutes have reduced the time it takes to produce them, it is still in most countries around two years or more between the end of the year to which they relate and first publication. This is the case for all three officially published UK SUTS, and is particularly frustrating when all economies are being disrupted by the pandemic, the policies it has required, and the changes it is wreaking. Some of these will probably be structural and long lasting, including but extending beyond the people-facing industries which are the subject of commentary.

Tourism and travel are at the core of the pandemic, having been instrumental in its spread and central to control efforts. Best practice for measuring tourism's economic role is via Tourism Satellite Accounts, a UNWTO/ OECD/ EU standard. TSAs combine production data and visitor surveys in a presentation that is in effect a SUT with a very detailed focus on supply from tourism-related industries and use by people who are outside their normal environment (tourists).

SAFER (Social Accounting Frameworks for Epidemics and Revival) has developed and applied methodologies for nowcasting SUTS based on modelling and on short term indicators. Annual tables bridging gaps between the latest official publication and 2020 can be downloaded from www.safer2020.com **from early September**.

(UK 2019,2020; Scotland 2018-2020; NI 2017-2020).

Methodology in a nutshell:

1) Extend SUTS classifications to itemise key covid-affected industries and to conflate the three different classifications in the official published tables. Disaggregate official SUTS tables to the resulting 176 industries, using public-domain data only.

2) Domestic Supply: time series models for each industry's production based on Annual Business Survey up to 2019, up-to-date Monthly Business Survey and Price Indices. and Energy and Construction Statistics. Official estimates of public services. Estimate 'make' matrix and apply to yield product outputs. Estimate trade margins from sector indicators.

3) Use: intermediate demand with input vectors for each industry based on a KLEMS factor demand model, input output coefficients and Energy Statistics. GVA and primary incomes are part of the output.

4) Use: household consumption based on incomes through an Almost Ideal Demand System, with adjustments for regulatory and other impacts on retailing and face-to-face services

5) Use: capital formation and inventories based on stock adjustment models

6) Trade: Import supply and export demand for the UK based on HMRC trade statistics; Scotland and Northern Ireland on DREAM®trade, an established interregional trade model of the UK and Republic of Ireland at the NUTS3 territorial level.
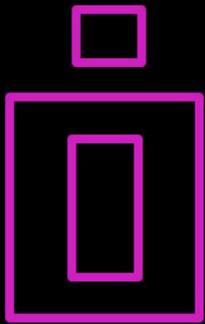
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Methodology in a nutshell:

7) Review employment, secondary distribution of income, and consistency of tax, finance and flow of funds. Rebalance as necessary with RAS.

8) Generate Tourism Satellite Accounts with SUTS and tourism/ transport indicators, with adjustments for regulation.

If applied in future years we would expect to be able to produce a provisional SUTS and TSA within six months of the end of the year to which they relate.

We gratefully acknowledge financial and other support from the Scottish Government and Northern Ireland Department of the Economy, and very helpful cooperation from many teams in the Office for National Statistics, the Northern Ireland Statistics and Research Agency, and the tourist boards for Britain, Scotland and Northern Ireland.

After consultation with the funders we plan to write up the work for ESR immediately after publication.

By Professor Hervey Gibson, University of Glasgow

Upcoming OECD Handbook on Extended Supply and Use Tables and Applications

The availability of new analyses covering **trade in value-added (TiVA)** have transformed our ability to understand the scale, complexity and the impact of global value chains (GVCs). The TiVA indicators are typically only available at industry-level, whereas attention should also be given to the type of firms involved, e.g., SMEs, multinationals or exporters. Even within narrowly defined industries, firms exhibit distinctive characteristics in terms of their size, productivity, skilled-labour intensity and trade patterns as well as different input structures. Therefore, they are integrated in GVCs in different manners and magnitudes. Conventional Supply and Use Tables (SUTs) and Input-Output Tables (IOTs) cannot be used to quantify firms' roles and interdependencies in GVCs. The SUTs and IOTs also do not yield insights on the relation between trade and investment in the same way that can viewed through the TiVA datasets. Additional methodology and data are required to obtain more relevant statistics to better inform policymakers relating to the cross-border flows of such activities.

This can be achieved by splitting industries in the SUTs and the IOTs. For example, separating the metal industry into SMEs and large enterprises accounting for their heterogeneous production functions and trade patterns. Such tables are called Extended SUTs or Extended IOTs. The integration of the data of a country at a more detailed level than in conventional SUTs has the additional advantage that it also helps to improve the quality of these tables.
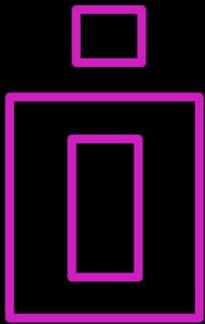
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Other IIOA News

Furthermore, due to the additional granularity, quality of the **TiVA indicators** will improve as well. Like SUTs and IOTs, the extended tables can also be linked across countries.

Researchers at the OECD, universities, National Statistical Offices already carried out several studies **combining firm-level data with national SUTs or IOTs** to derive new insights. Here are some examples:

• Fortanier et al. (2020) use assumptions and aggregated business data (such as TEC and AMNE) in combination with IOTs to derive information about the role of multinationals in GVCs.

• Chong et al. (2019) use micro-data to compile extended SUTs by SMEs and large enterprises and subsequently derive the corresponding extended IOTs.

• Michel et al. (2021) also leverage on existing micro-data to compile extended SUTs and extended IOTs focusing on exporters and export-sustained employment.

Tremendous progress has been made in the past few years developing such tables and analyses but only a few countries produce these extended tables. Therefore, the OECD Expert Group on Extended Supply and Use Tables (EGESUTs) was created to promote best practices and to encourage more countries to produce these tables. This Expert Group with the input of various people aims to **deliver a handbook on compiling Extended SUTs by the end of 2023.**

This will describe best practices (and alternatives) and proposes guidance to help better inform international standards. Furthermore, it will draft a report with the results of discussion of **Beyond Value Added** topics, including jobs, skills and compensation, income distribution, CO2 and other emissions. Currently, researchers from 14 countries are already contributing to this initiative. A version for public review is expected by the end of 2022.

The website of the Expert Group provides more information. Amongst the information, the latest version of the table of contents of the proposed handbook is also shown.

Example of possible output:

Channels for Dutch services SMEs to reach domestic and foreign markets, 2016
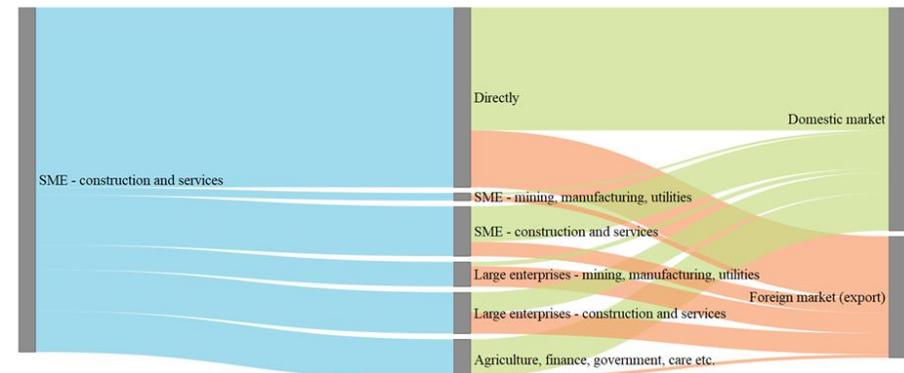
Based on Onat et al. (2018)

Other IIOA News

If you are interested in helping with this initiative or would like more information, please contact any of the people listed below:
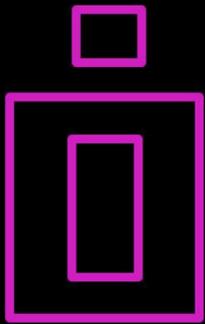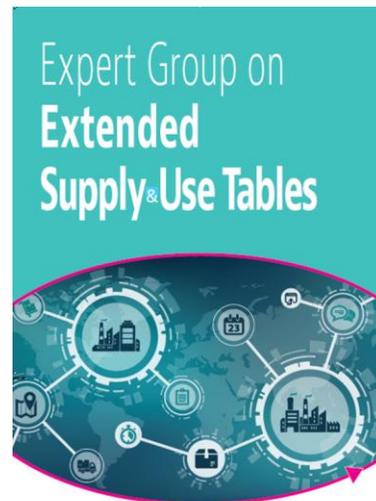
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Expert Group on
Extended
Supply & Use Tables

Using granular data to improve the quality of Supply & Use Tables

OECD
BETTER POLICIES FOR BETTER LIVES

Oscar Lemmers (Statistics Netherlands), José M. Rueda-Cantuche (European Commission) and Guannan Miao (OECD)

Databases

iel industrial ecology virtual laboratory

Two new MRIO databases have been made available on the Industrial Ecology Virtual Laboratory Hub website (https://ielab.info):

Australian State & Territory MRIO Table Timeseries

This resource contains Australian subnational multi-regional input-output tables (MRIOs) for Australia, built using the IELab infrastructure. The model resolution is 8 sub-regions (Australian states and territories) at 25 sectors. The tables cover the timeseries 2009-2018. For each year, the model contains table for each margin layer: Basic prices, Trade margin, Transport margin, Taxes margin, Subsidies. Use of this model is governed by a creative commons attribution non-commercial license (https://creativecommons.org/licenses/by-nc/3.0/au).

The Australian MRIO dataset can be found here for downloading and citation: https://ielab.info/resources/117

Global MRIO Table Timeseries

This resource contains global multi-regional input-output tables (MRIOs), built using the IELab infrastructure. The MRIO covers the timeseries 2009-2015. For each year, the model contains table for each margin layer: Basic prices, Trade margin, Transport margin, Taxes margin, Subsidies. The model resolution is 164 world regions at 97 sectors. Detailed region and industry labels are packaged with the model. This model is made available under a creative commons attribution non-commercial license (https://creativecommons.org/licenses/by-nc/3.0/au).

The Global MRIO dataset can be found here for downloading and citation: https://ielab.info/resources/135
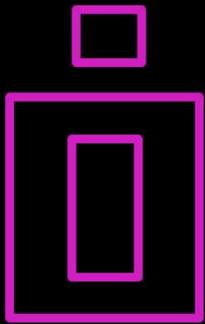
In memoriam

Pedro Miguel Girão Nogueira Ramos (1957-2021)

Our fellow Pedro Ramos died on July 6th, 2021.

Pedro Miguel Girão Nogueira Ramos was born in Figueira da Foz, in 1957. He was full Professor at the Faculty of Economics of University of Coimbra and founding member of CeBER (Center for Business and Economics Research).

A well-known Portuguese economist, he studied a wide range of research areas, with emphasis on macroeconomics, regional economics, input-output analysis, and value chains. He was one of the important precursors of input-output analysis in Portugal, and influenced many young researchers to pursue this line of research, including many of our Portuguese "EU-REAL mafia".

Besides research, Pedro Ramos was a devoted teacher. He reflected about the curriculum and the synergies between research and teaching in a particularly solid way and always with a critical sense. He truly shaped the teaching of Economics in his institution by implementing new courses and linking economics to geography and regional studies. Pedro Ramos influenced successive generations of thousands of undergraduate students and hundreds of graduate students. He had an integrated view of the economy, linked to social problems and development goals.

Due to his academic recognition, Pedro Ramos had a distinctive role in Portuguese and European institutions. He worked for the Portuguese National Statistics Institute for over a decade, and for many years was the Director of National Accounts. He also served as Eurostat consultant for Regional Accounts and help to design common rules for all European countries. For many years, he was the director of the Revista Portuguesa de Estudos Regionais – RPER (the Portuguese Review of Regional Studies). He has published dozens of articles, reports and chapters in national and international books and journals.

EU-REAL members join all remaining friends, colleagues, students and former students in our most heartfelt tribute and address respectful condolences to his family. Of his intelligence and intellectual vivacity, we will keep a very affectionate and always grateful memory.

Ana Sargento, Polytechnic Institute of Leiria, Portugal
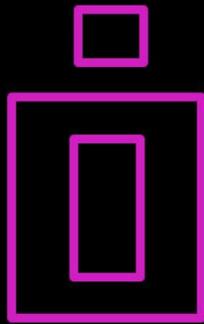
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Published papers and books in Input–Output Analysis and related methods

Latest ESR articles

Economic Systems Research

Journal of the IIOA

Volume 33, Issue 2, 2021

José Francisco Cubells & Maria C. Latorre
Brexit deal done! A detailed micro- and macroeconomic analysis of its fallout.

We offer a rich set of macroeconomic and sectoral effects of Brexit in France, together with macroeconomic ones for the UK, the rest of the EU and the rest of the world. We explain the intuition for the impact on production and trade across the 21 sectors that underlie our macroeconomic estimations (national imports and exports, output, GDP, welfare, wages and rental rate of capital). Our comprehensive technique captures the direct and indirect effects of Brexit on trade. Four types of withdrawal are analysed, including the finally agreed between the EU and the UK on December 2020. This will avoid tariffs, but other medium size (non-tariff) barriers will emerge. The UK, France and the rest of the EU will be harmed by Brexit, although asymmetrically. While Brexit will substantially harm the UK economy, the negative impact on France and the rest of the EU will be limited and similar.

Wei-Hong Hong, Hui-Chih Chai, Y.-H. Henry Chen, John M. Reilly & Sergey Paltsev
Will using newer input–output data for general equilibrium modeling provide a better estimate for the CO2 mitigation cost?.

We provide a critical evaluation about how updating the input–output data of a computable generation equilibrium model can affect policy results, an assessment that is rarely done in existing literature. Specifically, we explore how datasets with different fossil energy cost shares alter results of policy simulations that aim at reducing CO2 emissions. We prove analytically that a sudden fossil fuel price surge, which provides little time for adjustment through input substitution, can lead to a higher CO2 mitigation cost. The finding is demonstrated empirically in a full-scale economy-wide model for a base year with lower fossil fuel prices, contrasted with results from a base year when fossil fuel prices spiked. We then propose an adjustment to resolve the issues of using input–output data that embed abrupt fossil fuel price hikes.

Mainar-Causapé, A. J., Philippidis, G. and Sanjuán-López, A. I.
Constructing an open access economy-wide database for bioeconomy impact assessment in the European Union member states.

The bioeconomy encompasses the extraction, processing and transformation of renewable biological resources and waste streams, connected to activities as diverse as food, feed, energy and manufacturing. Under the auspices of the European Union's 'Green Deal' strategy, this broad collective of sectors is promoted as a cornerstone for achieving sustainable growth. Progress in developing ex-ante tools of economy-wide modelling analysis to assess its performance is, however, hindered by a paucity of consistent and comprehensive data. To overcome this shortcoming, the construction steps for a new set of open access social accounting matrices (dubbed 'BioSAMs') is described for a detailed and comprehensive selection of traditional and contemporary bio-based accounts for each of the EU member states. To illustrate its potential, a structural analysis based on three different and complementary methods (Rasmussen-Jones, hypothetical extraction method and eigenvector) is performed to classify bio-based sector wealth generating properties and to identify high performance ('key') sectors.
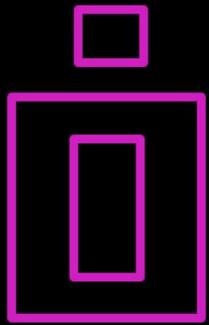
Carvalho, T. S., Santiago, F. S. and Perobelli, F. S.
Demographic change in Brazil and its impacts on CO2 emissions.

In recent years, the debate about demographic changes and its impacts on the economy has increased. The growth in the relative share of elderly people in the age pyramid may occur in the coming decades in many parts of the world, and their effects on the composition of consumption, notably on energy demand and emissions, are not yet known. This article estimates the changes in the pattern of consumption in Brazil due to the changes projected in the age pyramid in 2050 and the consequences of these changes on CO2 emissions. For this, projections will be made using an input–output model for the Brazilian economy for the year 2010 considering 67 productive sectors and six age groups. The results suggest that emissions grow less than proportionally to population growth and that the participation of sectors such as fuels and transport shows a small decrease in the consumption vector for 2050.

Umed Temursho
On the Euro method.

This paper critically examines the Euro method usage for the purposes of updating supply and use tables (SUTs) and/or input–output tables. Its known restricted applicability to only unnecessarily aggregated and symmetric SUTs (and not their underlying rectangular versions) is already an issue of concern.

However, by studying analytically the nature of Euro's adjustments of the SUT elements and empirically assessing some of its underlying assumptions, including newly revealed ones, it is concluded that the Euro method is a largely ad hoc updating procedure. Its recently claimed superiority over the generalized RAS approach (GRAS, or SUT-RAS) in the absence of industry output is challenged. It is shown that applying the standard GRAS with exogenously given estimates of industry outputs under such restricted data-availability environment still outperforms the Euro method.

Juan Manuel Valderas-Jaramillo, José Manuel Rueda-Cantuche & Joerg Beutel
The Euro and SUT-RAS methods: some further considerations.

The main objective of this paper is to revisit the Euro method in a critical and constructive way. We have analysed some arguments against the Euro method published recently in the literature as well as some other relevant aspects of the SUT-Euro and SUT-RAS methods not covered before. Although not being the Euro method perfect, we believe that there is still space for the use of the Euro method in updating/regionalizing Supply and Use tables.

Ciaschini, C. and Chelli, F. M.
Evaluating the impact of Violence Against Women in the macroeconomic Input–Output framework.

Violence against women and girls (VAW&G) has progressively become an emergency issue in many European countries and a relevant topic of public discussion. In this paper, we attempt to insert this theme within a model for macroeconomic policy design and evaluation. Special attention is devoted to the assessment of distortions in the allocation of public expenditure generated by VAW&G, in terms of gains and losses in aggregate total output. We adopt a macroeconomic input–output approach by adding to the framework an industry that produces care services to victims of VAW&G. The resulting model is integrated with the public expenditure reallocations that emerge as a result of the progressive elimination of violence. It is, thus, a simulation tool for determining total output gains or losses that emerge from the reallocation of public expenditures as VAW&G fades.
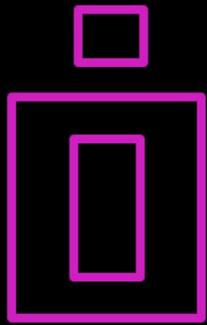
Economic Systems Research

Journal of the IIOA

Volume 33, Issue 3, 2021

Łukasz Lach
On the plausibility of using linear programming to trace important input–output coefficients in the framework of tolerable limits.

Recent input–output (IO) literature offers original proposals on using linear programming (LP) to make 'tolerable limits' approach suitable for measuring the importance of IO coefficients to an economy. In this paper, I focus on one of such influential proposals presented in Tarancón et al. [(2008). A revision of the tolerable limits approach: searching for the important coefficients. Economic Systems Research, 20, 75–95]. In the theoretical part of this paper, I provide exact analytical solutions to the LP problems formulated in Tarancón et al. The main result proves that the classification of IO coefficients with respect to their importance in the sense of the LP-based indicators of Tarancón et al. does not depend on the benchmark welfare measure of interest. This fact, in turn, severely reduces practical applicability of the discussed LP-based approach to tracing important IO coefficients.

**Carlos Llano, Julián Pérez, Fatima El Khatabi & Federico Steinberg**
Weaponized trade policy: the impact of US tariffs on the European automobile sector.

With trade tensions running high, the Trump Administration is considering new tariffs on imported automobiles, and the main target would be the European Union, traditionally America's closest ally. In this paper we combine disaggregated models to estimate the impact of these tariffs worldwide, and especially on Spain. First, a trade-policy simulation model computes the potential effects worldwide. Then we plug these into the World Input–Output Database, obtaining the inter-sectoral effects of the tariffs on Europe and the rest of the world. Finally, we insert these results into the Spanish inter-regional Input–Output Tables, obtaining final effects for Spanish regions via their inter-sectoral relations with the European Union and the rest of the world. By our calculation, the new US auto tariffs could end up destroying 10,400 jobs in Spain alone and 567,000 jobs worldwide. Moreover, they might have unexpected consequences, affecting, Spanish regions and sectors that just indirectly depend on the automobile industry.

Tsujimura, M. and Tsujimura, K.
Flow-of-funds structure of the U.S. economy 2001–2018.

Great inventions and substantial productivity growth of the Roaring Twenties brought unprecedented prosperity to the United States. After Black Thursday in the fall of 1929 however, the U.S. economic landscape changed dramatically. To ensure that the bitter experience of the Great Depression does not recur, Wesley Mitchell and Morris Copeland, the architects of flow-of-funds analysis, urged a better understanding of the circulation of funds, the means of payment. The new century has so far brought us many technological innovations and new ways of doing business. The objective of the paper is to find out if and how well the funds have been flowing in the U.S. economy over the past two decades, using the flow-of-funds matrix (payer-payee matrix) proposed by Tsujimura and Tsujimura (2018). A flow of funds analysis of the U.S. quantitative easing. The industrial revolution of the new century does not seem to have enough momentum circulating funds, the lifeblood of the economy.
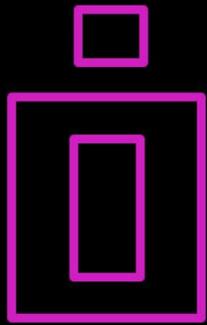
Parys, W.
David Hawkins and the making of the Hawkins-Simon conditions.

The Hawkins-Simon conditions, which are necessary and sufficient for the viability of input–output systems, are described in many encyclopedias, textbooks and papers, but always without historical details about the philosopher David Hawkins. The rich literature on the history of input–output economics has neglected Hawkins, probably because he spent only a few years among the economists. My paper fills this gap. By using the relevant archival material on Hawkins, Simon, and Leontief, I correct and expand some scarce remarks on Hawkins by Simon and Samuelson. I discuss Hawkins's three remarkable contributions to economics. First, Hawkins's dynamic input–output model in *Econometrica* in 1948 scooped Leontief. Second, I show how the correspondence between Hawkins and Simon created their famous joint note in *Econometrica* in 1949. Third, an overlooked chapter in Hawkins's 1964 book *The Language of Nature* discussed the commodity values of commodities, generalizing Marx's labour values and the Technocrats's energy values.

**Juan F. Fung, Jennifer F. Helgeson, David H. Webb, Cheyney M. O'Fallon & Harvey Cutler**
Does resilience yield dividends? Co-benefits of investing in increased resilience in Cedar Rapids.

Cedar Rapids, IA, offers a unique case study in planning for increased resilience. In 2008, Cedar Rapids experienced severe flooding. Rather than simply rebuilding, the city of Cedar Rapids began to invest in a resilient flood control system and in the revitalization of its Downtown neighborhood. This paper develops a Computable General Equilibrium (CGE) model for the regional economy of Cedar Rapids to quantify 'resilience dividends': net co-benefits of investing in increased resilience. A resilience dividend includes benefits to the community even if another disaster does not occur. We build a CGE model of Cedar Rapids at two different time periods: one in 2007, before the flooding, and one in 2015, after the flooding and initial investment in resilience. We show that a positive economic shock to the economy results in larger co-benefits for key economic indicators in 2015 than in 2007. Our approach illustrates how co-benefits are distributed throughout the economy.

Wang, Z., Zhang, Y., Niu, M. and Fan, Z.
How important is domestic and foreign demand for China's income growth by business function?.

This paper explores the contribution of domestic and foreign demand to China's income growth by business function. To this end, we extend a single country input–output approach to a global multi-country setting, and further redefine the measure via forward linkages. We also propose chaining structural decomposition analysis to identify the role of domestic and foreign demand in functional income changes over 1999–2011. Using the World Input–Output Database combined with Labor Occupations Database, we distinguish functional activities in production, management, marketing and R&D. This enables us to find that domestic and foreign final demands, especially the former, jointly lead to China's income growth by business function. Dynamically, the generally upward trends in China's income hold in the aggregate as well as by industry and business function. We also find that China's income growth is quite heterogeneous across industries and business functions.
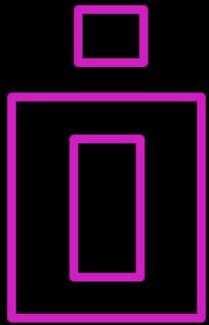
Economic Systems Research
Journal of the IIOA
Latest articles (up to 23rd of Aug)

Maria Llop
Defining prices in an inter-regional SAM system.
Economic Systems Research.

The literature of inter-regional social accounting matrices (SAM) focuses on quantity-oriented models that determine the transmission of income impacts. This paper develops a price version to identify the channels of price transmission at the inter-regional (or inter-country) level. The method proposed divides the total multiplier effects into intra-regional price multipliers (i.e. the cost impacts within a region), open loop inter-regional price multipliers (i.e. the cost impacts from one region on another by quantifying all the within-region impacts), and closed loop inter-regional price multipliers (i.e. the circular cost impacts transiting through the accounts in the other region and returning to the starting region). In addition, the intra-regional multipliers are divided into the intra-account, the inter-account and the cross-account (circular) effects. The empirical application, which uses a bi-regional SAM that distinguishes the United States (USA) and China (CHN), highlights the importance of the within-region interdependences for explaining price impacts.

Jorge A. Garcia-Hernandez & Roy Brouwer
A multiregional input–output optimization model to assess impacts of water supply disruptions under climate change on the Great Lakes economy.
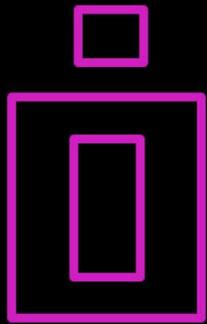*Economic Systems Research.*

This paper presents a water-restricted multi-regional input–output model to evaluate the economic impacts of water supply reductions in the Canadian Great Lakes Basin (GLB), one of the largest freshwater reservoirs in the world. The proposed model, first of its kind applied to the GLB, aims to minimize the impact of water supply disruptions on the GLB-economy, measured by the loss of GDP. A new flexible economic optimization procedure is introduced, capable of imposing resource constraints and ensuring minimal supply levels for intermediate and final consumption at the same time. The model accounts for inter-regional trade between different lake regions. The impacts of two climate change scenarios on water security and the economy are investigated, with and without additional food and energy security restrictions. The proposed economic optimization model holds promise as a new tool for resource-restricted Input–Output analyses.

José Firmino de Sousa Filho, Gervásio Ferreira dos Santos & Luiz Carlos de Santana Ribeiro
Structural changes in the Brazilian economy 1990–2015.
Economic Systems Research.

This paper analyses the structural changes in the Brazilian economy from 1990 to 2015 by applying structural decomposition analysis (SDA). The production structure of emerging economies is an important field of research because it enables the assessment of sectoral policies and technological progress to support sustained economic growth in the long-term. The investigation described here was conducted using input–output matrices for a short and long-term analysis which enabled us to verify the importance of twelve aggregate sectors regarding changes in production, final demand and technological coefficients. This topic could be used for such analyses in any other country. The results indicate that the production structure of Brazilian economy remains fragile and dependent on demand shocks for its growth. Furthermore, manufacturing industry remains the major sector capable of promoting structural changes in production.

Ángela García-Alaminos, Mateo Ortiz, Guadalupe Arce & Jorge Zafrilla

Reassembling social defragmented responsibilities: the indecent labour footprint of US multinationals overseas.
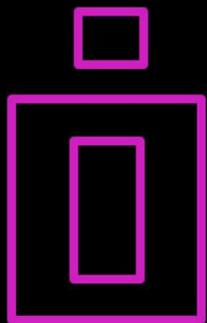*Economic Systems Research.*

Multinational corporations (MNEs) have been at the forefront of the geographical disintegration of production chains in search of lower salaries, among other reasons, which led to a global race to the bottom in labour standards. Therefore, significant amounts of indecent work are currently embodied in MNEs' global value chains, compromising not only the brands' corporative image but also the achievement of the Sustainable Development Goals. In this work, we shed light on this matter by estimating the indecent-work-conditions related impacts linked to the foreign activities of MNEs from the United States. Using a socially extended MRIO model that integrates three social indicators (forced labour, fatal and nonfatal occupational injuries), we found that these activities show increasing trends between 2009 and 2013 on indecent labour, contributing with 1.1%–1.3% of the global cases. United States affiliates located in India, China and Brazil, show the highest ratios per unit of value-added.

Tobias Emonts-Holley, Andrew Ross & Kim Swales

Estimating induced effects in IO impact analysis: variation in the methods for calculating the Type II Leontief multipliers.
Economic Systems Research.

Type II input–output (IO) multipliers are frequently used for impact analysis. Unfortunately, there is no standard way to calculate these. The fundamental issue is that these multiplier methods endogenise household consumption but all have drawbacks because the IO accounts are missing key information required to consistently link household income and consumption to domestic economic activity. Using compatible regional and national data sets, we evaluate the values for various IO Type II multipliers to a benchmark value calculated with the aid of social accounting matrix data. The results suggest that the variation in Type II IO multiplier values generated by these alternative methods is an empirically non-trivial issue.

Bartlomiej Rokicki, Oliver Fritz, Jonathan M. Horridge & Geoffrey J. D. Hewings

Survey-based versus algorithm-based multi-regional input–output tables within the CGE framework – the case of Austria.
Economic Systems Research.

Spatial CGE models rely on detailed multiregional input–output (MRIO) tables. This paper compares two different approaches to compiling MRIO tables for Austria – an algorithm-based approach that regionalizes national input–output tables (IOT) and generates trade estimates using a predefined set of regional variables (i.e. Horridge's algorithm), and a hybrid approach that uses as much regional and interregional data as possible. We investigate whether we observe differences in CGE simulation results that use them. Results from an aggregate simulation are surprisingly similar. So the algorithmic approach is, in fact, effective in making an MRIO from a national IOT. But noticeable differences appear at the sectoral level. They seem mainly due to differences in calibration rather than in regionalization.

Óscar Dejuán, Ferran Portella-Carbó & Mateo Ortiz
Economic and environmental impacts of decarbonisation through a hybrid MRIO multiplier-accelerator model.
Economic Systems Research.

This paper analyses the impacts of decarbonisation in three energy-intensive sectors/institutions (electricity generation, road transport, and household consumption) on four economic and environmental variables (value added, employment, energy consumption, and emissions). In our basic scenario, the EU is supposed to complete the decarbonisation of the selected sectors in 30 years, whereas in the rest of the world these sectors will be 30% decarbonised. We hypothesise that emissions and employment will fall once renewable sources of energy replace fossil fuels. Yet, in the meanwhile, massive investments are needed to build the required infrastructure. To compute the full impact, we apply a multiplier-accelerator model to a global multiregional hybrid input–output table derived from EXIOBASE3. In the EU, such a decarbonisation reduces yearly energy consumption, CO_2 emissions, and employment by 22%, 19%, and 4%, respectively. Thus, additional measures are necessary to avoid global warming and absorb unemployment.

Shohei Tokito, Shigemi Kagawa & Tesshu Hanaka
Hypothetical extraction, betweenness centrality, and supply chain complexity.
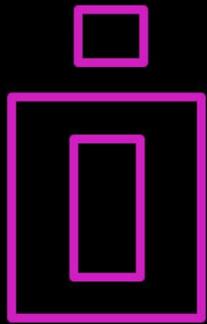*Economic Systems Research.*

Two frameworks, hypothetical extraction and betweenness centrality analysis, can be used to identify environmentally important sectors in complex supply chains. This study derives an analytic expression for the relationship between hypothetical extraction and betweenness centrality analysis. Second, using the Eora and WIOD, this study analyzes the degree of difference in 'important' sectors identified by hypothetical extraction and betweenness centrality analysis. While the results obtained by rank correlation yield similarities, both methods have advantages. This study demonstrates that estimating betweenness centrality is meaningful and less computationally expensive, and can help us to understand the structural positions in the global supply chain network. The hypothetical extraction indicators can be easily computed using the betweenness centrality indicators' mathematical relationship. We conclude that the implementation of effective CO_2-reduction polices through greener global supply chain engagement center around two key sectors, chemical and metal products from China, and their higher betweenness centrality should be strengthened.

Ana-Isabel Guerra, Laura Varela-Candamio & Jesús López-Rodríguez
Tax reforms in Spain: efficiency levels and distributional patterns.
Economic Systems Research.

This paper approximates the efficiency levels of the most relevant tax categories and their distributional patterns for a European country considering Spain as an illustrative example. This is done computing the 'marginal' excess burden of these taxes, taking into account the structure of the Spanish tax system before and after the major tax reforms undertaken since 2010. In doing so we use a static applied general equilibrium model, which features heterogeneous households classified according to their taxable income. In addition, and in identical terms, another alternative tax reform is evaluated: a flat value-added tax system and a reduction in employers' social security contributions. Our results indicate that the alternative tax reform would have slightly improved the degree of efficiency of these taxes while implying a lower negative impact on aggregate income. Regarding distributive effects, we do not find significant differences between the actual and the alternative tax policies.

Radomír Mach, Milan Ščasný & Jan Weinzettel
The role of allocation of retail trade margins across household segments on their carbon footprint calculation.
Economic Systems Research.

The homogeneity assumption, inherent to input–output (IO) analysis, implies that every euro spent within one product group is assigned the same environmental burden. We address this assumption applied to price conversion of household expenditures from purchasers' to basic prices when the carbon footprint of consumption is calculated for specific household segments by linking the IO table and micro-level household consumption data. We perform a sensitivity analysis of the different allocations of the retail trade margin of two consumption groups (Food and Goods) across household expenditure deciles. While a differently allocated retail trade margin influences the carbon footprint of household segments, it does not challenge the general finding that households with higher expenditures are responsible for higher footprints. This finding holds also for different emission intensities of retail trade margins.

Ignacio Cazcarro, Antonio F. Amores, Inaki Arto & Kurt Kratena
Linking multisectoral economic models and consumption surveys for the European Union.
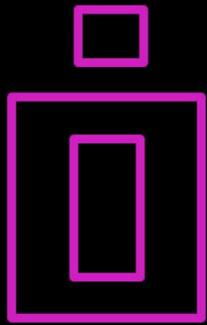*Economic Systems Research.*

Multisectoral models usually have a single representative household. However, more diversity of household types is needed to analyse the effects of multiple phenomena (i.e. ageing, gender inequality, distributional income impact, etc.). Household consumption surveys' microdata is a rich data source for these types of analysis. However, feeding multisectoral models with this type of information is not simple and recent studies show how even slightly inaccurate procedures might result in significantly biased results. This paper presents the full procedure for feeding household consumption microdata into macroeconomic models and for the first time provides in a systematic way an estimation of the bridge matrices needed to link European Union Household Budget Surveys' microdata with the most popular multi-regional input–output frameworks (e.g. Eurostat, WIOD, EORA, OECD).

Hong-Dian Jiang, Mei-Mei Xue, Kang-Yin Dong & Qiao-Mei Liang
How will natural gas market reforms affect carbon marginal abatement costs? Evidence from China.
Economic Systems Research.

Having recognised the significant role of natural gas in reducing carbon abatement costs, China is rapidly promoting its growth. However, obvious distortions exist in China's natural gas market, and it is unclear how these may affect abatement policies going forward. Therefore, to assess the effects of energy market distortions on the carbon marginal abatement costs (MACs) in China, this study proposes a computable general equilibrium model for China's natural gas sector, which considers the monopoly market structure, price regulation, and import restrictions. Results show that deregulation of gas prices will lead to an effective decrease in China's MACs. China's MACs are insensitive to liberalisation of the market monopoly or gas import restrictions. When all three distortions are fully deregulated, China's MACs show an obvious upward trend. Finally, this study uses China's carbon trading policies as an example to propose policy implications under different scenarios of natural gas market reform.

Claudia V. Montanía & Sandy Dall'erba
Multi-dynamic interregional input-output shift-share: model, theory and application.
Economic Systems Research.

Shift-share decomposition has been extensively used to identify the key drivers of sectoral and regional economic growth. Traditionally, shift-share does not pay attention to any form of interregional externalities and the rare exceptions define them based on geographical proximity only. However, given the increasing role of global value chains in economic growth, this paper introduces the Multi-dynamic interregional input-output shift-share decomposition in order to capture the dynamic intersectoral relationships between a spatial unit and any other unit it trades with. The methodology is illustrated on 35 productive sectors of 15 European Union countries over 1995–2006. The results show that the most important driver of output growth in these countries are their sectoral linkages with other European countries, followed by the domestic sectoral linkages.

Bernhard Michel & Caroline Hambÿe
Export-sustained employment: accounting for exporter-heterogeneity in input–output tables.
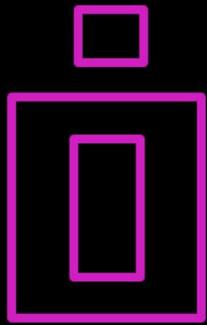*Economic Systems Research.*

Exports matter for domestic employment in both export-producing firms and upstream suppliers. Their total effect can be captured through an input–output-based indicator of export-sustained employment. However, as industry classifications used in regular input–output tables are based on product similarity, they fail to account for within-industry technological heterogeneity between exporters and other firms, which may lead to a bias in results for export-sustained employment. In this paper, we describe the breakdown of manufacturing industries into export-oriented and domestic-oriented firms in Belgian input–output tables and employment data based on detailed firm-level data for industry totals and input–output structures. Based on the resulting export-heterogeneous tables, we find that 585,000 jobs or 13% of economy-wide employment in Belgium is sustained by manufacturing exports. This is overestimated by 4% with regular tables. Moreover, we identify who contributes to and who gains from exports for groups of firms rather than aggregated industries.

María T. Álvarez-Martínez, Salvador Barrios, Diego d'Andria, Maria Gesualdo, Gaetan Nicodeme & Jonathan Pycroft
How large is the corporate tax base erosion and profit shifting? A general equilibrium approach.
Economic Systems Research.

The paper uses the computable general equilibrium model CORTAX to analyse the extent of base erosion and profit shifting (BEPS) in the EU, Japan and the US. Our approach estimates the direct fiscal losses of BEPS and accounts for the second round effects, in particular on the cost of capital and corporate investment. Our central estimates show that the net corporate tax revenue losses in the EU are €36.0 billion per year (7.7% of CIT revenues), €24.0 billion in Japan and €100.8 billion in the US (in both cases representing 10.7% of corporate tax revenues). Our estimates are comparable in size to the global tax revenue losses found using newly reported statistics on foreign affiliates. Our macroeconomic results suggest that eliminating profit shifting would slightly reduce investment and GDP and rise corporate tax revenues, which would positively affect welfare.

Andrea Bonfiglio, Silvia Coderoni, Roberto Esposti & Edoardo Baldoni
The role of rurality in determining the economy-wide impacts of a natural disaster.
Economic Systems Research.

Rural areas may be highly vulnerable to natural disasters because of their lower economic diversification and a higher incidence of sectors that may suffer from a larger impact produced by these adverse events. In addition, because of their trade dependence, local effects can be transmitted to neighbouring regions more diffusely so amplifying total impacts. This paper aims to quantify the economy-wide impacts generated by the earthquake sequence that mostly hit a markedly rural area of Central Italy in 2016–2017. To this purpose, a non-linear programming model based on a multi-regional IO table with a mixed territorial scale is adopted. Results indicate that some negative effects are transmitted outside the seismic area and a few positive effects are also produced. Moreover, they confirm that rural areas are more vulnerable to disasters and that the effects of disasters in these areas are more likely to be transmitted to the neighbouring space.

Tesshu Hanaka, Keiichiro Kanemoto & Shigemi Kagawa
Multi-perspective structural analysis of supply chain networks.
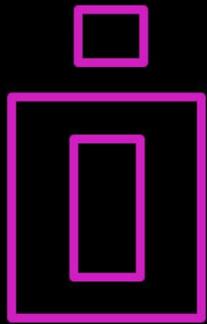*Economic Systems Research.*

Determining the structural positions and characteristics of multi-role sectors is critical for understanding supply chain networks. Thus, in this study, we developed an attribution analysis framework to assess the structure of sectors with multiple roles in a supply chain. Subsequently, we applied the framework in a case study, where the top-ranking Japanese sectors were identified for production-oriented, betweenness-oriented, and consumption-oriented carbon dioxide emission scores. Additionally, these attribution indicators were utilized to identify/visualize the structural positions of sectors. Using company-level data, we also evaluated the structural positions of Japanese companies in relation to their carbon disclosure project (CDP) reporting practices. The results demonstrate that a company's role in the supply chain is unlikely to be related to CDP reporting.

Timon Bohn, Steven Brakman & Erik Dietzenbacher
Who's afraid of Virginia Wu? US employment footprints and self-sufficiency.
Economic Systems Research.

Globalization has brought about concerns of domestic job losses due to outsourcing to countries like China. The 'employment footprint' concept provides new insights into the implications of trade for employment. Using this approach for the period of 1995–2008, we analyze the relation of US jobs with international trade, particularly with China. Furthermore, we compare the US employment footprint with its labor endowment to assess if the country could be self-sufficient in terms of labor. We find that the US's consumption increasingly depends on foreign workers. The country 'consumes' more labor than is nationally available; thus, self-sufficiency is not possible under realistic assumptions. Moreover, the US has benefited from jobs – especially in services – generated by the world economy. Referring to Albee's famous play about living in illusions, we use 'Virginia Wu' as a Chinese version of 'Virginia Woolf' to argue that the perceived threat of China (Virginia Wu) is only an illusion.

Christian Lutz, Maximilian Banning, Lara Ahmann & Markus Flaute

Energy efficiency and rebound effects in German industry – evidence from macroeconometric modeling.
Economic Systems Research.

Increases in energy efficiency are reduced by the rebound effect. Efficiency gains on the micro level do not lead to proportionate reductions of energy consumption on the macro level. The German energy-economy model PANTA RHEI is applied to better understand the rebound effect. To get more robust estimates micro data from a cost structure survey of the German manufacturing sector was used to derive price elasticities of energy demand. The mesoeconomic rebound effect of an autonomous increase in energy efficiency at the industry level in manufacturing is between 7% in 2021 and 12% in 2030. The macroeconomic rebound effect lies between 12% in 2021 and 18% in 2030. Inclusion of necessary investment and assumptions of higher elasticities of substitution increase the effects. Rebound effects limit the scope of technology-driven efficiency improvements and must be considered in the design of ambitious energy efficiency programs and climate policies.

Heran Zheng, Johannes Többen, Erik Dietzenbacher, Daniel Moran, Jing Meng, Daoping Wang & Dabo Guan

Entropy-based Chinese city-level MRIO table framework.
*Economic Systems Research.*

Cities are pivotal hubs of socioeconomic activities, and consumption in cities contributes to global environmental pressures. Compiling city-level multi-regional input-output (MRIO) tables is challenging due to the scarcity of city-level data. Here we propose an entropy-based framework to construct city-level MRIO tables. We demonstrate the new construction method and present an analysis of the carbon footprint of cities in China's Hebei province. A sensitivity analysis is conducted by introducing a weight reflecting the heterogeneity between city and province data, as an important source of uncertainty is the degree to which cities and provinces have an identical ratio of intermediate demand to total demand. We compare consumption-based emissions generated from the new MRIO to results of the MRIO based on individual city input-output tables. The findings reveal a large discrepancy in consumption-based emissions between the two MRIO tables but this is due to conflicting benchmark data used in the two tables.

Rossella Bardazzi & Leonardo Ghezzi

Large-scale multinational shocks and international trade: a non-zero-sum game.
Economic Systems Research.

International trade has improved living standards but has also become a major channel for spreading shocks on a global scale. The increasing relevance of intersectoral linkages and trade in intermediates renewed interest in input–output techniques. This paper enriches the literature on empirical trade models with an input–output/econometric approach including substitution effects and price spillovers. Our model shows that (a) trade elasticities and bilateral shares are not constant in time and differ across sectors and countries; (b) international price changes alter the relative competitiveness between competitors; (c) final demand components such as consumption and investment react to changes in international prices. Large multi-country shocks produce feedback effects in national economies as they adapt by import substitution across exporters, by changing the import content of domestic production and by adjusting final demand. These feedbacks affect the global demand producing an asymmetric non-zero-sum game.
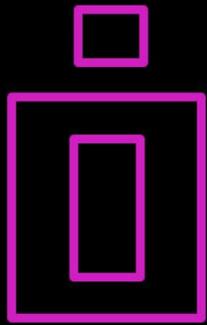
José L. Zofío, Julio González, Angel Prieto & Juan Vicente
Modelling the spatial and sectoral benefits of productivity enhancing innovations using a transport oriented multiregional IO framework: the 'megatruck' in Spain.
Economic Systems Research.

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.

Anton Pichler & J. Doyne Farmer
Simultaneous supply and demand constraints in input–output networks: the case of Covid-19 in Germany, Italy, and Spain.
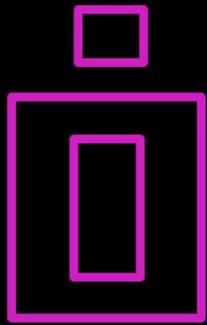*Economic Systems Research.*

Natural and anthropogenic disasters frequently affect both the supply and demand sides of an economy. A striking recent example is the Covid-19 pandemic which has created severe disruptions to economic output in most countries. These direct shocks to supply and demand will propagate downstream and upstream through production networks. Given the exogenous shocks, we derive a lower bound on total shock propagation. We find that even in this best case scenario network effects substantially amplify the initial shocks. To obtain more realistic model predictions, we study the propagation of shocks bottom-up by imposing different rationing rules on industries if they are not able to satisfy incoming demand. Our results show that economic impacts depend strongly on the emergence of input bottlenecks, making the rationing assumption a key variable in predicting adverse economic impacts. We further establish that the magnitude of initial shocks and network density heavily influence model predictions.

Timothé Beaufils & Leonie Wenz
A scenario-based method for projecting multi-regional input–output tables.
Economic Systems Research.

Multi-regional input–output (MRIO) data are a powerful tool to analyze complex interdependencies in the international trade and supply network. Their field of application is however limited by the fact that MRIO datasets are only available for past years whereas the structure of the international trade network has been found to change profoundly over time. We here propose the SPIN method, a simple and flexible algorithm that can project MRIO tables into the future based on transparent scenarios of how gross domestic product and trade relations may evolve in that time. By combining well-established input–output techniques, namely the Leontief quantity model and an RAS-type algorithm, our method provides a straightforward mean to convert quantitative scenarios of the world economy into consistent MRIO tables. We illustrate the functioning of the SPIN method by projecting the evolution of the trade network after the 2008 financial crisis under different alternative scenarios of recovery.

Jan Weinzettel

[Aggregation error of the material footprint: the case of the EU](#).
Economic Systems Research.

The material footprint (raw material consumption) was proposed as a basis for monitoring SDGs 8.4 and 12.2. However, there is no institutionalized procedure providing globally consistent national material footprints. The OECD aims to institutionalize the material footprint through the development of one official inter-country input–output (ICIO) database applicable for its calculation. Inherent to input–output analysis is the aggregation error, which may impair the results. Therefore, in the case of the EU I analyze the aggregation error which can be expected if NACE rev2 classification is utilized for this ICIO database, and investigate the most important disaggregations, depending on the desired focus of the results. I conclude that the disaggregation level should reflect the intended purpose of the RME indicators. For their deeper analysis, and determination of strategies for their decrease, I conclude that NACE rev2 classification is inappropriate, and recommend high disaggregation and utilization of hybrid units.

Yoshihiro Hashiguchi, Norihiko Yamano & Colin Webb

[How thick is your armour? Measuring economic resilience to shocks in global production networks](#).
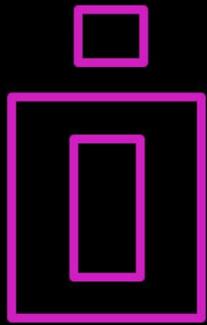*Economic Systems Research.*

When economic shocks occur, whether at home or abroad, economic agents are expected to react to reduce the negative impact or amplify the positive effects. The ability of a country to contain economic losses can be defined as the resilience to economic shocks. Using the OECD's annual Inter-Country Input–Output (ICIO) tables from 1995 to 2011, this paper investigates the relationship between changes in final demand and production structures for 61 economies. We found that, during economic downturns, countries that are able to prop up the economy through the domestic service sectors instead of domestic goods and foreign sectors are more resilient to negative shocks. Therefore, understanding the substitutability between goods and service sectors and between domestic and foreign sectors is crucial for gauging the potential risk to a country's domestic economy from shocks abroad – whether economic, environmental, health-related or political.

Arndt Feuerbacher, Scott McDonald & Karen Thierfelder

[Peasant farmers and pandemics: the role of seasonality and labor-leisure trade-off decisions in economy-wide models](#).
Economic Systems Research.

Pandemics attack the primary asset (labor) of peasant households and the rural poor. Peasant households must simultaneously allocate labor between farm and household activities, where the demand for agricultural labor is seasonal, which limits intra-temporal substitution, without perfect foresight. A pandemic reduces the supply of labor, through deaths and morbidity, with the scale of reductions in labor supply depending on the seasons in which a pandemic occurs. The analyses, using a recursive dynamic economy-wide model for Bhutan, demonstrate that outbreaks in high labor demand seasons cause increases in wage rates almost three times as high as for outbreaks in low labor demand seasons. Increases in wage rates induce peasant households to reallocate labor time between farm and household activities through the labor-leisure trade-off mechanism. Such changes in the allocation of labor time are important elements of peasants' mitigation responses, and can reduce the negative economic implications of a pandemic.

INTERNATIONAL
INPUT-OUTPUT ASSOCIATION

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.
Economic Systems Research.

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.

Syeda Tasnia Hasan, Michael Oliver Wood & Simron Singh

Revealing embedded carbon emissions within the Comprehensive and Progressive Agreement for Trans-Pacific Partnership.
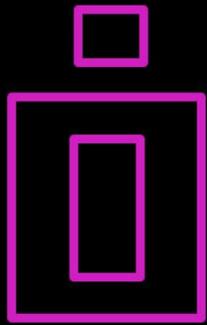*Economic Systems Research.*

The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), representing approximately USD 13.5 trillion of the global GDP, is one of the largest free-trade agreements in the world. This trade agreement considers many important issues yet fails to address climate change or carbon dioxide (CO_2) emissions. CO_2 emissions in trade are critical as all CPTPP parties have made significant carbon emissions reduction commitments of between 8-36% through the COP21- Paris Agreement. Herein lies a paradox. This study assesses the amount of embedded CO_2 emissions in the CPTPP through an input-output analysis of consumption-based emissions in ten carbon-intensive sectors, under three scenarios. The results reveal that as trade between partners increases, so will CO_2 emissions across those sectors. These findings are essential for policymakers who are striving to grow Partnerships (Sustainable Development Goal 17) while seeking to address Climate Action (Sustainable Development Goal 13), which appear to be conflicting goals.

Arianto A. Patunru & Prema-chandra Athukorala

Measuring trade in value added: how valid is the proportionality assumption?.
Economic Systems Research.

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.

Cristian Mardones & Claudio Brevis

[Constructing a SAMEA to analyze energy and environmental policies in Chile](#).
Economic Systems Research.

In this study, a social accounting matrix with environmental accounts (SAMEA) for Chile is built based on the 2016 input-output tables, socioeconomic household survey, expenditure survey, among other information sources. The SAMEA has high disaggregation of the electricity sector that is not currently available in national accounts. Complementary information on the operating costs of different electricity subsectors (thermoelectric, solar, wind, hydro, and biomass) from national and international studies are obtained. Then, intersectoral indicators, accounting multipliers, and simulations of shocks (subsidy on the non-conventional renewable energy subsectors and environmental taxes) are calculated. The main findings of the study show that each electricity subsector has different production technology and emission intensity. In consequence, energy and environmental policies simulated with intersectoral models that do not disaggregate the electricity sector would produce significant biases in the results.

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Hubert Escaith

[Withering Globalization? The Global Value Chain Effects of Trade Decoupling](#).
MPRA Munich Personal RePEc Archive.

For better understanding its economics, this Addendum presents and discusses the supply and demand curves, i.e. the markets, that are hidden behind Fig. 5.2 from Rethinking IO Analysis. Thus, it shows how this combination actually comprises an extension of the basic – non-interacting – Leontief price and quantity models shown in Fig. 6.3a of Rethinking IO Analysis. Finally, it is discussed how this combination of these two dual IO models may be further disaggregated and applied in practice.

Jacob Fry, Arne Geschke, Sarah Langdon, Manfred Lenzen, Mengyu Li, Arunima Malik, Ya-Yen Sun, Thomas Wiedmann

[Creating multi-scale nested MRIO tables for linking localized impacts to global consumption drivers](#).
Journal of Industrial Ecology.

Industrial Ecology Virtual Laboratories (IELabs) enable the construction of national-to-local-scale multi-regional input–output (MRIO) models.

These IELabs have been proven to be especially important for analyzing research questions that warrant sub-national spatial detail. The field of industrial ecology has clearly progressed from the time of national-only input–output tables. Here, we present a newly developed tool called NLab— "nested IELab"—that nests sub-national MRIO tables within global country-scale MRIOs. This capability allows for the investigation of interactions between sub-national production and consumption systems, with global systems interlinked via international trade. We provide a technical and mathematical roadmap for construction of nested input–output tables in the NLab, and demonstrate this capability through a real-world assessment of the Western Australian wine industry. Our results suggest that nested MRIO tables provide an added layer of detail at a regional level, when undertaking consumption-based footprint assessments, leading to improved assessment of quantification of regional impacts. The NLab presented in this work provides tools for analysis of complex trade linkages between industries at various scales, which has the further potential to open avenues for policy-makers to analyze the implications of local decisions at a global level, and vice versa.
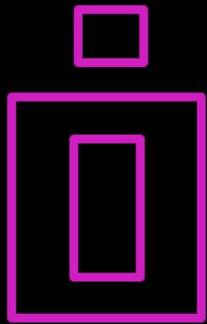
Thomas Wiedmann, Guangwu Chen, Anne Owen, Manfred Lenzen, Michael Doust, John Barrett, Kristian Steele

Three-scope carbon emission inventories of global cities.
Journal of Industrial Ecology.

A major challenge for cities taking action on climate change is assessing and managing the contribution of urban consumption which triggers greenhouse gas (GHG) emissions outside city boundaries. Using a novel method of creating city-level input–output tables, we present the first consistent, large-scale, and global assessment of three-scope GHG inventories for 79 members of the C40 Cities Climate Leadership Group. These inventories cover the emissions from sources located within city boundaries (Scope 1), emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam, and/or cooling (Scope 2), and all other GHG emissions that occur outside the city boundary as a result of activities taking place within the city (Scope 3). We find that, by only accounting for territorial emissions, without Scope 3, the 79 C40 cities under-report 4% of global annual GHG emissions from six key infrastructure-related transboundary sources (73%) and from service-related sectors (27%). In contrast, when only accounting for consumption-based emissions, the C40 cities would miss the mitigation target on 41% of their territorial emissions.

We argue that cities should complement their GHG inventories, adding full Scope 3 to Scopes 1 and 2, and develop low-carbon consumption strategies in addition to current infrastructure-focused action on climate change.

Alberto Franco-Solís & Claudia V. Montanía

Dynamics of deforestation worldwide: A structural decomposition analysis of agricultural land use in South America.
Land Use Policy.

Deforestation, mainly caused by the conversion of forest land to agriculture, threatens the achievement of multiple goals across the 2030 Agenda. This environmental issue is particularly marked in the area formed by Argentina, Brazil, and Paraguay (ABP region), where a net forest loss of more than 5,5 million hectares per year and a simultaneous net gain in agricultural land of almost 3 million hectares were registered during 2000–2015. To identify the main contributors to the growth in agricultural land use driving regional deforestation, a Structural Decomposition Analysis (SDA) is applied on multiregional input-output tables. Results suggest that changes detected within ABP were mainly influenced by shifts in domestic demand and exacerbated by the influence of Brazil within the Mercosur trade agreement.

Outside ABP, results show that consumption per capita and population expansion in developed and developing economies (the EU28, the US, and China) are major drivers of regional deforestation. Although globalization led to a surge in the ABP's land displaced to other countries, our results indicate that outsourced agricultural activities did not affect the growth in ABP's agricultural land use. There is thus a need of designing mitigation measures with a global sense that also addresses co-responsibility mechanisms among countries in the region.

Su B., Ang B.W. & Liu Y.

Multi-region input-output analysis of embodied emissions and intensities: Spatial aggregation by linking regional and global datasets.
Journal of Cleaner Production.

The multi-region input-output (MRIO) model has been widely adopted to capture feedback effects in energy/emission studies. For regional emission studies, linking regional and global datasets is essential to capture both interregional and international feedback effects. However, this will lead to spatial aggregation. This paper deals with spatial aggregation issues in the MRIO analysis of regional embodied emissions/intensities when linking regional and global datasets. When such data are available for two different years, there are also spatial aggregation issues in the structural decomposition analysis (SDA) that may be conducted to investigate the driving forces of changes of regional embodied emissions/intensities between the two years.
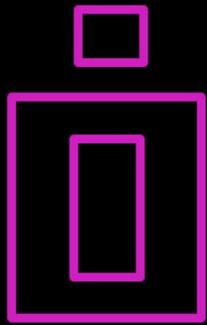
In this paper, we discuss four such spatial aggregation schemes with different data requirements. An empirical study linking the data of China's 30 regions and 43 world countries for 2007 and 2012 and analyzing the impacts of spatial aggregation on China's regional embodied emissions and intensities and their driving forces between these two years is presented. The study shows the impacts of spatial aggregation on the regional results. It is found that the spatial aggregation has a greater impact on the sectoral results than the regional results. Implications of the findings on regional emission studies are discussed.

Gao C.X., Tao S.M., He Y.Y., Su B., Sun M. & Mensah I.A.
Effect of population migration on spatial carbon emission transfers in China.
Energy Policy.

Large-scale population migration entails changes in productive and consumptive activities, which has enormous implications on the spatial relocation of carbon emissions. This study uses multiple methods to empirically assess the impact of interprovincial population migration of China on its trade-induced carbon transfers from a spatial view over 2002–2012. We constructed two networks of migration and carbon transfers, and based on the analysis of their topological structure, we inferred that carbon flows and migration are complements–larger migration flows typically correlate with larger trade-related carbon flows.

Furthermore, we analyzed how migration affects interprovincial carbon transfers; in addition, we explored the geographical factor by dividing Chinese provinces into five subregions. The results illustrated that trade-induced carbon emissions situation in China was shaped partly by interprovincial migration at the national level. While the contribution of migration varies markedly across subregions owing to the unbalanced regional economic development and carbon intensity, migration-focused emission control strategy should be enhanced discriminatively to better understand China's inter-provincial joint energy conservation and emission reduction policy.

Enrique Gilles, Mateo Ortiz, María-Ángeles Cadarso, Fabio Monsalve & Xuemei Jiang
Opportunities for city carbon footprint reductions through imports source shifting: The case of Bogota.
Resources, Conservation and Recycling.

Achieving the Paris Agreement goals calls for higher ambition across actors. In this article, we address the carbon emission responsibility of the city of Bogota from a consumption-based perspective, by assessing the carbon footprint for the whole city. We use an environmentally extended multiregional input-output model where a survey-based input-output table of Bogota is nested, avoiding the downside of using assumptions regarding the production and trade structure of the city.

We identify city's emissions hotspots across the globe, mainly in China and the United States, proving that consumption-based accounting is required when highly open systems as cities are under analysis, to finally propose source shifting scenarios as mitigation strategies. Our results indicate that Bogota is a net importer of CO_2 emissions and, the city's carbon footprint almost double direct emissions generated within its territory. China, the rest of Colombia, and the United States are heavily affected by Bogota's carbon footprint as those three regions bear 38% of the city's footprint. The main drivers of those emissions are Electrical equipment, Computers, Vehicles and Machinery, goods that are imported and consumed by Bogota's residents. Important opportunities for emission reductions arise when sourcing changes from China to the US and Latin American countries, which provide fresh evidence for national and local authorities to improve their efforts on reducing emissions.
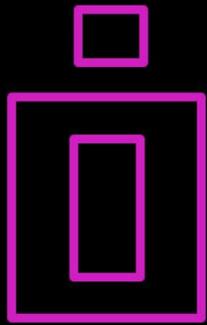
Juan Manuel Valderas-Jaramillo & José Manuel Rueda-Cantuche

The multidimensional nD-GRAS method: Applications for the projection of multiregional input–output frameworks and valuation matrices.
Papers in Regional Science.

We present a multidimensional generalization of the GRAS method (nD-GRAS) for the estimation of multiple matrices in an integrated framework. The potential applications of this method in regional and multi-regional input–output analyses based on national/regional accounts frameworks are many. We provide two real applications, a 3D-GRAS that estimates a use table at basic prices jointly with valuation matrices for Denmark; and a 4D-GRAS for estimating intercountry input–output tables with OECD data. We show that higher dimensional GRAS methods provide more consistent and accurate estimates than those with lower number of dimensions. We provide the analytical closed-form solution and the RAS-like algorithm for an easy operationalization.

Konstantin Stadler

Pymrio – A Python Based Multi-Regional Input-Output Analysis Toolbox.
Journal of Open Research Software.

Pymrio is an open source tool for Environmentally Extended Multi-Regional Input-Output (EE MRIO) analysis developed in Python. It provides a high-level abstraction layer for global EE MRIO databases in order to simplify common EE MRIO data tasks. Among others, Pymrio includes parsers for several openly available EE MRIO databases (EXIOBASE v1 – v3, WIOD, Eora26, OECD-ICIO) as well as methods for production and consumption based accounts calculation, aggregation, stressor origin estimation and visualization. The use of a consistent storage format including meta data and modification history for MRIOs allows to exchange data with other analysis tools, aiming for an increased interoperability of Industrial Ecology analysis software.

The package source code is on github (https://github.com/konstantinstadler/pymrio) and all contributions are welcome.

An extended documentation is available at https://pymrio.readthedocs.io/

Andre Carrascal Incera, Anastasios Kitsos & Diana Gutierrez Posada

Universities, students and regional economies: a symbiotic relationship?.
Regional Studies.

This paper examines the heterogeneous effect of student spending in UK NUTS-2 regions. Impact analyses of the more than £45 billion students spend each year have so far been agnostic of the regional absorptive capacity to benefit from this expenditure. Building a multi-regional input–output model for the UK and combining it with data on student expenditure, domicile and level of study, the paper finds significant regional heterogeneity in gross value added and employment multipliers as well as in interregional spillovers. The analysis shows how important student expenditure is for regional economies and the symbiotic relationship between student spending and regional industrial structures that produce varying impact outcomes.
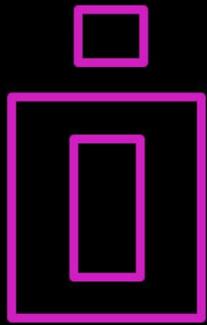
Islam, K. M. N., Kenway, S. J., Renouf, M. A., Wiedmann, T. & Lam, K. L.

A multi-regional input-output analysis of direct and virtual urban water flows to reduce city water footprints in Australia.
Sustainable Cities and Society.

This study focused on understanding what sector-region combinations could be targeted to reduce total city water footprints? We used multi-regional input-output analysis of direct and virtual water, across five Australian capital cities and their supporting regions. The key novelty of this study is the high spatial resolution policy-relevant sub-sectoral analysis to identify sector-region combinations to reduce city water footprints. Virtual water footprints were 8-10 times higher than direct water consumption (per capita) in all studied cities. Virtual water from outside the city boundary is almost 20 times higher than the virtual water sourced from within the city boundary in all studied cities. Water-efficiency programs can significantly reduce the virtual water footprints of the studied cities. This includes water-efficiency and recycling on farm, and in food processing (e.g. livestock feed growing, dairy cattle farming, vegetable growing and processing) in rural regions of New South Wales, Queensland, and Victoria. The results are relevant to strategic city water footprints reduction, sustainable sourcing and planning for future disturbance of product supply, and water-sensitive city developments considering both direct and virtual water flows.

Christa D. Court, João-Pedro Ferreira, Geoffrey J.D. Hewings & Michael L. Lahr

Accounting for global value chains: rising global inequality in the wake of COVID-19?.
*International Review of Applied Economics.*

Using the World Input-Output Database, we show how a hypothetical decline in the worldwide consumption of a set of non-essential sectors affects the global distribution of GDP and employment. While richer countries consume relatively more non-essential goods and services, we find, by considering the interdependencies among developed and developing economies, that low-income countries are likely to suffer steeper declines in their GDP and employment. Specifically, for each 1% decline in the demand for non-essential products, the GINI index across nations is expected to rise by 0.3%. That is, global inequality is likely to rise, contradicting some earlier findings. Finally, we show that economies with less-diverse sets of industries are more vulnerable to such global shocks. This study highlights the role of value chains in analyzing the spatial spread of the impacts and their contribution to amplifying world imbalances.

Recent I-O Books

Thijs ten Raa (Utrecht School of Economics, The Netherlands)
Efficiency and Input-Output Analyses: Theory and Applications.

Efficiency is the most important objective in economics and this book shows how it can be analyzed using input and output data at all levels of the economy. After his "Input-Output Economics: Theory and Applications", Thijs ten Raa has extended his research to efficiency analysis. He has contributed to the microeconomic theory of performance measurement, made applications to industries, national economies and international trade, and written on the history of economic thought. Twenty-five new papers, published in the last decade are now collected and interrelated by an introduction, amounting to a unification of theory and applications in efficiency and input-output analyses.

Efficiency analysts measure firm performance relative to the best practice, which is determined by a firm (or collection of firms) operating on the frontier of the production possibilities. More precisely, efficiency is relative productivity, where the latter is essentially output per "unit" of input. On the other hand, input-output analysts study input per "unit" of output. The concept of the one is the inverse of the other and this insight will help resolve open issues in either branch of economic science. Environmental objectives are shown to be achievable by reallocations of production. Benchmarking theory is developed and used to measure how well (or poor) industries and economies are organized. Papers on the history of economic thought round out the volume.
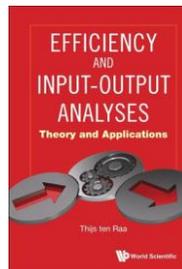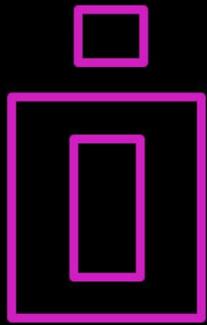
Special Issues in Journals

Economic Systems Research Special Issue
Integrated Assessment Models and Input-Output Analysis

Guest Editors: **Arunima Malik** *(The University of Sydney) and* **Roberto Schaeffer** *(Universidade Federal do Rio de Janeiro)*

Economic Systems Research
Journal of the
International Input-Output Association
Volume 29 Number 3 September 2017

Context

The IPCC uses Integrated Assessment Models (IAMs) as their core analytical capability for assessing future scenarios and mitigation strategies. Many IAMs incorporate Computable General Equilibrium (CGE) and Input-Output (IO) models. IAMs stand at the intersection of economics and industrial ecology. A very recent hot topic is the question of whether and to what extent degrowth has to play a role in achieving the 1.5 degrees target. The rationale here is that affluence is the main driver of greenhouse gas emissions (a finding supported by IO analysis), and hence should be considered as a mitigation lever. Of course, growth and therefore degrowth, are topics central to IO analysis. The Special Issue will therefore also have a special focus on degrowth.

In the political area, emerging technologies are seen as the saviours of the planet. The US Climate envoy, John Kerry, states: "[People] don't have to give up a quality of life to achieve some of the things that we know we have to achieve…50% of the reductions we have to make to get to net zero are going to come from technologies that we don't yet have". The rationale for this statement is unclear. It has been previously shown that the feasibility risks are high in quick deployment of renewable energy technologies, whilst degrowth scenarios minimise key feasibility-related risks.

For this special issue, we welcome research from all aspects of IAMs and IO analysis, with some component of inter-industry content required for inclusion in **Economic Systems Research**.

Queries and submission process

Please contact the guest editors:
Arunima Malik – arunima.malik@sydney.edu.au
Roberto Schaeffer - roberto@ppe.ufrj.br

Deadline for submissions

Submissions will be accepted until **31 December 2021**, however early submissions are encouraged. Early submissions will be added to the webpage of ESR, following peer-review. Hence, if you submit early, your article will not be held up waiting for other articles.
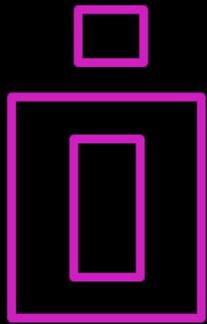
Job Positions

The **Department of Economics, University of Strathclyde, Glasgow, UK**, is seeking to recruit a **Research Assistant/Research Associate** to undertake research on a project funded by the ESRC titled, "**The sectoral economic impacts of COVID_19 on the tourism economy: a regional analysis focused on Scotland**" which runs until 31st August 2022. The overall aim of this project is to provide an evidence base for decisions affecting the Scottish tourism industry to be developed with interaction between academics, policymakers and stakeholders from across the industry, and to deliver outputs which can help to fill the current quantitative knowledge gap and identify appropriate policy responses to be effective in supporting economic recovery.

As a Research Assistant/Associate, you will assist, contribute or lead in the delivery of research activities as part of a team under the general supervision of senior colleagues. You will be involved all the phases of the research including gathering information and data for simulation of economic models, running modelling frameworks and collating results and findings. You will be expected to write up the results of research activities and contribute to the production of relevant reports and publications, which will take a variety of forms including blogs, policy briefs, presentations and academic outputs. Under the guidance of senior colleagues leading the project, you will liaise directly with external partners to provide support with the terms of the programme. You will also input as a team member to administrative activities.

To be considered for the role, you will be educated to a minimum of Degree level (and PhD for grade 7 Research Associate) and you will have sufficient breadth or depth of knowledge in the use of multisectoral economic modelling techniques, including Input Output and Computable General Equilibrium analysis. You will have an ability to plan and prioritise your own workload, with general supervision, and you will have an ability to work within a team environment. You will have excellent interpersonal and communication skills, with the ability to listen, engage and persuade, and to present complex information in an accessible way to a range of audiences.

Whilst not essential for the role, applications are welcomed from candidates with: a higher Degree in a relevant discipline, some relevant work experience, membership/working towards membership of a relevant Chartered/professional body (including the Higher Education Academy), experience of relevant student supervision and teaching activities.

The role is advertised as either a Research Assistant (Grade 6) or Research Associate (Grade 7), and the successful candidate will be appointed to the Grade relevant for their skills and experience. Candidates should make clear which Grade they are applying for in their application.

Separate job descriptions are provided below for Research Assistant and Research Associate level.

More information in the **Link**

Informal enquiries about the post can be directed to Grant Allan, Reader in Economics and Principal Investigator (grant.j.allan@strath.ac.uk).

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University of Strathclyde
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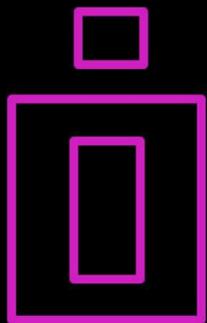
INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Job Positions

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Cast positions

Code: COM_1_2015_FGIV
Call for expressions of interest: Researchers - Function group IV - COM/1/2015/GFIV – Research

Info: 📧   APPLY

Energy, Transport and Climate

Auxiliary Contract Staff positions

Code: 2021-SVQ-C6-FGIV-018168 - SEVILLE
FGIV - Project Officer on Climate Economic Modelling

Deadline: 07/09/2021 23:59 Brussels time Info: 📧   APPLY

Sustainable Resources

Auxiliary Contract Staff positions

Code: 2021-SVQ-D4-FGIV-018268 - SEVILLE
FG IV – Project Officer – Economic Researcher

Deadline: 15/09/2021 23:59 Brussels time Info: 📧   APPLY

Growth and Innovation

Auxiliary Contract Staff positions

Code: 2021-SVQ-B7-FGIV-018092 - SEVILLE
FGIV - Economic Analyst - Industrial Innovation and Dynamics

Deadline: 30/09/2021 23:59 Brussels time Info: 📧   APPLY

Auxiliary Contract Staff positions

Code: 2021-SVQ-B7-FGIV-017808 - SEVILLE
FGIV - Economic Analyst – General Equilibrium Modeller

Deadline: 15/09/2021 23:59 Brussels time Info: 📧   APPLY
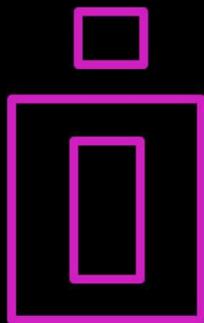
Support Services

Auxiliary Contract Staff positions

Code: 2021-SVQ-R1-FGIII-018248 - SEVILLE
FG III - Health and Safety Assistant - Security Assistant - Environment Management Assistant

Deadline: 06/09/2021 23:59 Brussels time Info: 📧   APPLY

More info in the Link

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.

Esteban Fernández Vázquez – Full Professor, Applied Economics Department and REGIOlab, University of Oviedo (Spain)

1) My story with input output analysis is more similar to meeting again with an ex rather than love at first sight. My first contact with input output techniques was in my first year as a bachelor student of economics. As in other school of economics in Spain by that time, we had an introductory course to input-output analysis. But I must confess that I was not particularly impressed by the course: for me it was just a way of arranging macroeconomic data in the form of a fancy matrix that we later inverted it. But I was not able to fully understand the potential (or limitations) of such type of modelling for empirical economic analysis, so IO and I parted ways. It was only several years after, when I was pursuing a topic to work on my PhD project when I was re-introduced to IO analysis and "I saw the light". By that time, I was exploring the possibility of focusing my PhD thesis on issues related to income distribution and inequality, and a professor (Carmen Ramos, who later became one of my PhD advisors) suggested me to have a look at papers that used SAMs for that. So, I discovered this branch of IO analysis, and it was a turning-point in my career: I quickly became interested, and it finally led to write a thesis on issues related to SDA and the use of entropy econometrics.

2) My first IIOA conference was Beijing 2005 and I still keep very good memories from it. The only bad ones were the extremely hot weather and that I had to present my paper right after my plane landed in Beijing. I had time only to go to the hotel, take a quick shower and go to the conference venue, so my presentation was not particularly brilliant. But the rest of my memories are just excellent. Only a few months before the conference, I had spent some time in Groningen finishing my thesis with my other PhD advisor Bart Los, and I had already found the IO group there to be friendly and supportive to young researchers. This impression was only reinforced when I discover the broader international community in the IIOA. And an unexpected side effect of that conference was that I found that there were more people in Spain working in IO that I had originally thought. Several of the researchers that I first met there are now colleagues with whom I collaborate regularly, and we have become close friends. So, I guess that the moral of the story is: attend the IIOA conferences!

3) Difficult question for me. The papers that I found inspiring when I was a PhD student were relatively technical papers on SDA like Dietzenbacher and Los (1998): Structural Decomposition Techniques: Sense and Sensitivity, Economic Systems Research, 10(4) or the use of entropy for IO analysis like Golan, Judge, and Robinson (1994): Recovering information from incomplete or partial multisectoral economic data, Review of Economics and Statistics, 76. But lately I am finding more inspiration in papers that, by using effectively "good old" IO analysis and new IO databases, deal with issues that have not been traditionally of interest for the IO community. One example could be the analysis of voting behavior in Los, McCann, Springford and Thissen (2017): The mismatch between local voting and the local economic consequences of Brexit. Regional Studies, 51(5).
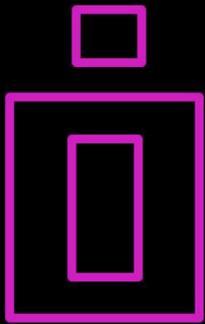
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Clio Ciaschini – Research Fellow in Economic Statistics, Department of Social Sciences, School of Economics "Giorgio Fuà", Università Politecnica delle Marche (Italy)

1) When I was a little girl, my father, an input-output (IO) scholar and erstwhile IIOA Council member, told me that my given name, Clio, was the muse of history in Greek mythology. A few years later, however, I learned that CLIO was also the acronym used for "Input-Output Classification". Well, this was my first interaction with the IO world (in Latin "*nomen omen*"). So it seemed to me that IO was an inevitable destiny.

This feeling strengthened when, later in the childhood, I had the opportunity to meet Professor Wassily Leontief who gifted me with a rag doll, one that I still keep with care. Well, I later, during my undergraduate studies, fulfilled my Latin destiny when I began to focus on IO analysis in Professor Elvio Mattioli's economic statistics course. My interest in the topic grew because of his detailed and precise way of explaining the various mechanisms at the foundations of IO flows and direct requirements matrices. In fact, linkage analysis I chose that as the topic for my bachelors degree. During my masters degree studies I broadened my explorations into agent-based models and other more statistically and econometrically grounded analyses. I applied

the latter approaches in my Masters thesis on violence against women (VAW), which explored this social and legal issue from a statistical and economic point of view. During the course of working on my thesis, the idea of addressing the theme of VAW from a multisectoral point of view occurred to me. It seemed to me that an IO framework could be a great way to estimate the total social welfare burden of VAW.

While working on Ph.D. degree, I had the great opportunity for a visiting period in Groningen under the supervision of Professors Albert Steenge and Erik Dietzenbacher and to whom I am grateful for giving me a deeper insight into the multisectoral framework and its application to current topics, such as innovation, technological change and labour productivity. This period in Groningen enabled contacts with many other young researchers in IO. One, Dr. Andre Carrascal Incera, advised me on how to properly use more advanced IO techniques and introduced me to the exploration of the interesting but tricky world of CGE modelling, a topic that I hope to probe into more deeply in the future.

2) My first IIOA conference? Well, it depends on which side of the desk we intend to consider. My first IIOA Conferences I attended with my family, starting in New York in 1998. I, of course, attended that in my home town of Macerata and other thereafter. My activities, however, were limited to participating in coffee breaks and social dinners. But in 2014, in Lisbon, just after I had obtained my M.S., I attended an International School of Input- Output Association (ISIOA) class on CGE models lead by Professors M. Alejandro Cardenete and Ana-Isabel Guerra. As a speaker, my first IIOA conference was Glasgow in 2019: there I presented my work about VAW in a multisectoral framework, written in collaboration with Prof. Francesco M. Chelli, and obtained much feedback from specialists in IO among which Professor Geoffrey Hewings from the University of Illinois and Professor Michael Lahr from Rutgers University.
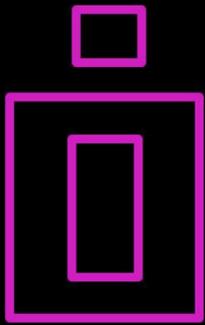
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3) My experience in IO topics started with linkage analysis and topics related to the relationships among economic sectors within the economic system. I remain prone to papers on that topic. I remain particularly fascinated by Rasmussen's pioneering work on linkages and the literature linkages that followed. This includes the literature on "fields of influence" co-developed by Professor Geoffrey Hewings. It focuses on the process through which changes are introduced in the rest of economic system.

Michael Sonis , Geoffrey J. D. Hewings & Jiemin Guo (1996) Sources of Structural Change in Input–Output Systems: A Field of Influence Approach, *Economic Systems Research*, 8:1, 15-32.

In relation to my interest of exploring IO frameworks, in particular the social accounting matrices (SAMs), with reference to VAW or, in general, with gender issues, I suggest

Raghavendra, S., Duvvury, N., & Ashe, S. (2017). Macroeconomic loss due to violence against women: The case of Vietnam. *Feminist Economics*, 23(4), 62–89.

It uses Vietnam's 2011 SAM to quantify the macroeconomic loss due to VAW, in terms of income.