

**Newsletter**  
Number 47, February 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 Newsletter*. Many thanks to all of you that have contributed sending your inputs.

This issue contains information about the next IIOA online activities, the latest ESR articles, highlights in Journals and recent I-O books, but also next events including the next IIOA Webinar by Maureen Rimmer. You can also find the Tale of the Trade-Scan, a tool developed by the European Commission's Joint Research Centre (JRC), three calls for articles for different special issues and some job positions. The Social Accounting Corner brings this time conversations with Kirsten Wiebe and Geoffrey Hewings, and the February Crossword is an amazing Acrostics Puzzle created by Michael Lahr. It is not easy, but I am sure you will enjoy it a lot!

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

Newsletter E-mail: [newsletter@iioa.org](mailto:newsletter@iioa.org)

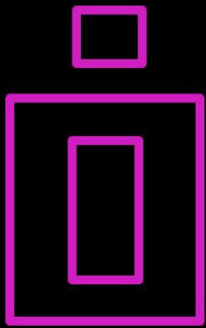
Personal E-mail: [carrascalandre@uniovi.es](mailto:carrascalandre@uniovi.es)

Would you like to contribute to the IIOA  
newsletter?

Send us your news at [newsletter@iioa.org](mailto:newsletter@iioa.org)

## In this issue

Welcome from the Editor.....	<u>1</u>
IIOA Online Activities 20-21.....	<u>2</u>
Trade-SCAN.....	<u>3</u>
In memoriam.....	<u>6</u>
Published papers and books in IOA....	<u>8</u>
- Latest <i>ESR</i> articles.....	<u>8</u>
- Highlights in journals.....	<u>21</u>
- Recent I-O Books.....	<u>25</u>
Events.....	<u>26</u>
- Next IIOA Webinar.....	<u>26</u>
- Other workshops.....	<u>26</u>
Special issues in Journals.....	<u>28</u>
Job positions.....	<u>29</u>
The Social Accounting Corner.....	<u>30</u>
- February crossword.....	<u>32</u>



**Newsletter**  
Number 47, February 2021

# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## IIOA ONLINE ACTIVITIES 20-21

Dear valued IIOA members,

I hope you and your beloved ones all remain safe and healthy, despite the difficulties that we face in our lives today.

Over the past months, the IIOA Council and the Local Organising Committee of the Malaysian conference have thought about every possibility of reactivating the conference, originally planned last year, in 2021. However, due to the ongoing uncertainty about the pandemic we jointly came to the conclusion that the IIOA conference in Malaysia has to be postponed for another year, as the IIOA Secretary has indicated to you earlier. It was indeed a difficult choice, and I, as the President of the IIOA, deeply share the pain of local organisers, yet sincerely respect their brave decision based on an objective assessment of the situation.

Now with the year 2021 in its early days and our hopes for an end of this bitter time of lockdowns and severe personal restrictions increasing, what can we expect from the IIOA for the year to come?

Well, here is a plan:

It is my greatest pleasure to announce the official launch of the

### “Virtual IIOA Campaign”

This campaign is a full-scale challenge by the IIOA Council to catch up with a rapidly changing research environment. The campaign is intended not only to make up for lost opportunities caused by the cancellation of the 2021 conference, but also to exploit new possibilities brought upon by modern communication technologies increasingly available to us.

The project is deemed to evolve throughout the year, with continuous augmentation and upgrading, but let me introduce our initial set of ideas:

- [IIOA Webinar Series](#)
- [IO School Online \(ISIOA Online\)](#)
- [IIOA Development Programme Online](#)
- [CafeterIO](#)

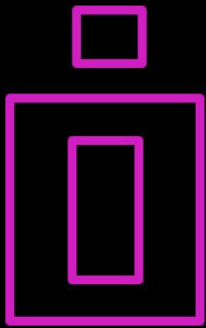
See all details in the attachment of this message.

As you can imagine, these initiatives are designed to simulate/substitute for certain segments of a conventional conference, but we are expecting to extract even more benefits, especially in terms of broadening opportunities for those who may find it difficult to attend a real physical conference due to locational/financial/institutional disadvantages they may face.

The pandemic has brought unprecedented disorder at a global scale, but at the same time it pushed us towards new and different ways of thinking. So, let us agree to move forward like the IIOA always attempts to do. Please pay attention to further pieces of information from us about the upcoming events and be prepared for active and joyful engagements!!

[Attachment](#)

Best wishes,  
Satoshi INOMATA (President of the IIOA)



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Tales from the I-O world: Trade-SCAN: understanding global value chains

In everyday life, we are used to buy smart phones (e.g. iPhone) that are designed in United States and assembled in China. We are used to fly in airplanes that are made of components brought together from all around the world and assembled in France (e.g. Airbus). We are also used to buy cars produced in Germany (e.g. BMW) that incorporate software made in United States (Apple). Moreover, the Nutella fans would also like to know that it is made of Brazilian sugar, Turkish hazelnuts and Nigerian cocoa.



*The underside of any Apple product is a motto of globalisation (see [the GVC of iPhone](#))*

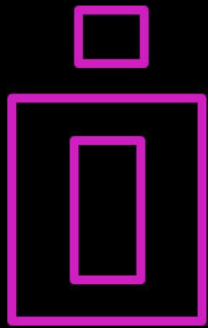
More than ever the world has become into a global factory where goods and services are produced along global value chains, with sliced production processes located in different parts of the world and thus, generating value added, GDP and jobs worldwide. The concept of “made in” has therefore become meaningless. In the fifties, the whole production process was typically located in one single country and gross exports used to be a good measure of competitiveness and growth.

With globalisation however, value added and jobs directly or indirectly linked to the final goods and services exported do not necessarily have to remain within the headquarters’ country of residence anymore, rather the opposite if we also take into account fiscal optimisation.

Hence, i.e. measuring how much value added is retained in the EU for every million EUR exports of German cars is critical. Similarly, it would also be interesting to know how many (e.g. high skilled, female...) jobs or environmental pressures (e.g. carbon dioxide emissions) in the EU depend on such exports, be they not only within the car industry but also within other supplying industries as well. In any case, such research questions can only be addressed using complex models based on highly specialised economic statistics and a thorough methodological knowledge that policy makers quite often lack.



Trade-SCAN (Trade-Supply Chain ANalysis) comes to bridge this gap and provides policy makers, trade experts, think tanks, economic specialists and the academia a user-friendly tool developed by [the European Commission’s Joint Research Centre \(JRC\)](#), in cooperation with BC3 ([Basque Centre for Climate Change](#)) and the [University of Groningen](#), to analyse the social, economic and environmental impacts of international trade and global value chains based on [Arto et al. \(2019\)](#). Trade-SCAN allows users to focus on analysis rather than on the data management required to do it.

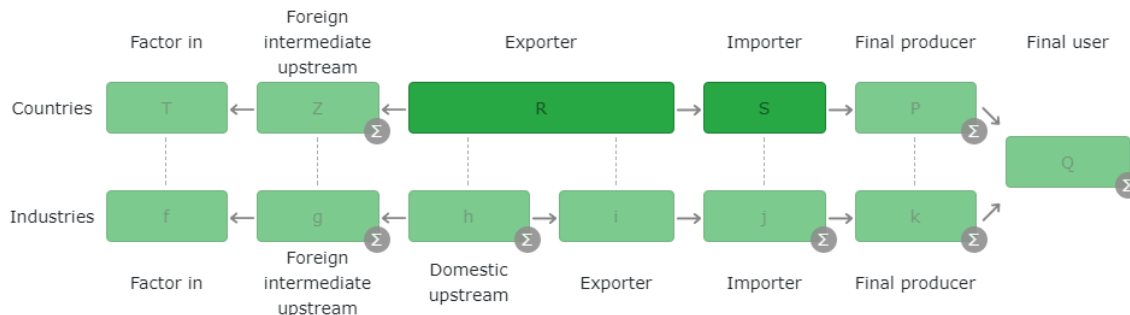


# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Tales from the I-O world: Trade-SCAN: understanding global value chains

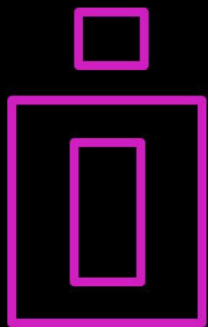
$$\begin{aligned}
 e_i^{rs} = & \underbrace{\sum_{h,j,k} \sum_{p,q} v_h^r (b_{hi}^{rr} - l_{hi}^{rr}) a_{ij}^{rs} b_{jk}^{sp} y_k^{pq}}_i \\
 & + \underbrace{\sum_{f,g,h,j,k} \sum_{p,q,z \neq r, t \neq r} v_f^t (b_{fg}^{tz} - c_{fg}^{(r)tz}) a_{gh}^{zr} l_{hi}^{rr} a_{ij}^{rs} b_{jk}^{sp} y_k^{pq}}_{iii} \\
 & + \underbrace{\sum_h v_h^r (b_{hi}^{rr} - l_{hi}^{rr}) y_i^{rs}}_v \\
 & + \underbrace{\sum_{f,g,h} \sum_{z \neq r, t \neq r} v_f^t (b_{fg}^{tz} - c_{fg}^{(r)tz}) a_{gh}^{zr} l_{hi}^{rr} y_i^{rs}}_{vii} \\
 & + \underbrace{\sum_{h,j,k} \sum_{p,q} v_h^r l_{hi}^{rr} a_{ij}^{rs} b_{jk}^{sp} y_k^{pq}}_{ii} \\
 & + \underbrace{\sum_{f,g,h,j,k} \sum_{p,q,z \neq r, t \neq r} v_f^t c_{fg}^{(r)tz} a_{gh}^{zr} l_{hi}^{rr} a_{ij}^{rs} b_{jk}^{sp} y_k^{pq}}_{iv} \\
 & + \underbrace{\sum_h v_h^r l_{hi}^{rr} y_i^{rs}}_vi \\
 & + \underbrace{\sum_{f,g,h} \sum_{z \neq r, t \neq r} v_f^t c_{fg}^{(r)tz} a_{gh}^{zr} l_{hi}^{rr} y_i^{rs}}_{viii}
 \end{aligned}$$

Model equations: complex methodology for the decomposition of exports



Model equations using the Trade-SCAN interface in a user-friendly manner

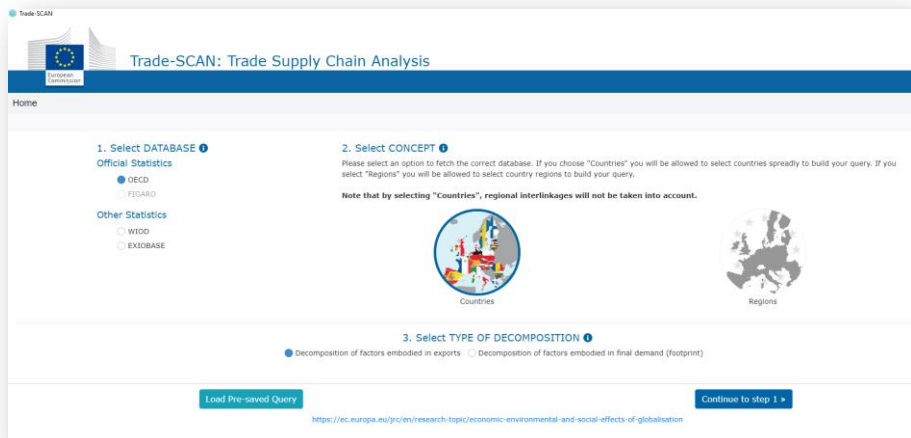
Previous versions of Trade-SCAN were used successfully to produce statistical pocket books (2012, 2015) on GVC impact indicators related to the EU exports to the rest of the world, such as for [employment](#), [income](#), and [environmental pressures](#). Later on, it was extended to cover the employment and income effects of [intra-EU trade](#). Some of all these figures reached the top and were used in the State of the Union speeches of the European Commission's President J.C. Juncker (2016, 2017), the [EC reflection paper on harnessing globalization](#) and various EU Commissioner for Trade speeches, among other Commission reports. The incredible success of the experience made the European Commission go one-step beyond and brought the methodology and calculations closer to the policy makers by designing a user-friendly toolbox that was used for important files such as the TTIP and Brexit negotiations. This initiative was crucial to respond safely and timely to urgent queries coming from policy makers without the risk of making ad-hoc manual adjustments to the codes and scripts for every request. Trade-SCAN might well be a good example of knowledge management since it could also be transferred to policy makers if these are adequately trained, for instance at the 9<sup>th</sup> Edition of the International School of Input-Output Analysis in Glasgow (2019).



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Tales from the I-O world: Trade-SCAN: understanding global value chains

A detailed [user guide](#) of Trade-SCAN was published in summer 2020. Trade-SCAN allows the use of three different data sources: [OECD](#) (v. 2018), [World Input-Output Database](#) (v. 2016) and [Exiobase](#) v3.4 covering a different number of countries (43-64), industries (34-163), variables and environmental pressures. Trade-SCAN can be now [downloaded](#) for running it as a standalone application by worldwide researchers or for teaching, labs and dissertations. The latest publications with Trade-SCAN results are related to the value added, jobs and CO<sub>2</sub> emissions generated by EU residents in the EU and in non-EU countries ([employment](#), [income](#), [CO<sub>2</sub>](#)).



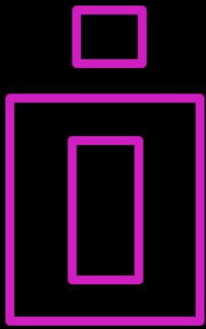
Home screen of Trade SCAN v2

During the COVID-19 pandemic, Trade-SCAN has also proven to be useful to provide quick responses to the multiple challenges that came up from demand disruptions and their effects on GDP and employment in the EU, euro area, EU countries and a selection of non-EU countries. Part of this work was used in the [Spring Economic Forecast](#) and in other JRC models as input (e.g. [EUROMOD](#), [Rhomolo-IO](#)) for the economic analysis of the COVID-19 pandemic.

This year 2021 is full of new challenges for Trade-SCAN. More updated and higher quality databases will be incorporated (e.g. new release of OECD and the [FIGARO database](#) - the Eurostat's official Inter-Country Input-Output tables, also developed by the JRC in collaboration with Eurostat), the tool will be accessible through a dedicated JRC webpage and additional (on-line) trainings.

Trade-SCAN is a very good example of public service to the citizens, putting the best of the European Commission efforts into delivering high quality methodologies and empirical evidence to policy officers' requests, researchers, businesses and the public in general.

The Trade-SCAN team consisted of the following researchers: José M. Rueda-Cantuche, Antonio F. Amores and M. Victoria Román (European Commission, JRC); Iñaki Arto, Ignacio Cazcarro and Miguel Pérez (BC3); and Erik Dietzenbacher (University of Groningen).



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## In memoriam

### Professor Johannes Bröcker (1950-2021)

Johannes died after a short heavy illness (not corona) on January 19 in his birth town Kiel. With him we lost a brilliant, amicable and modest economist, who was a great researcher, teacher and supervisor. He got his undergraduate in Freiburg and his master, doctoral (summa cum laude) and Habilitation in Kiel. Except for the period 1993-2000, when he occupied the Chair in Macroeconomics and Regional Science at the University of Dresden, he worked at the Christian-Albrechts-University in Kiel. There he retired after holding the Chair in International and Regional Economics, and the Directorship of the Institute of Environmental, Resource and Spatial Economics for the period 2000-2015. In Kiel he was the successor of Karin Peschel, who was also his first and second doctoral supervisor.

Johannes was a frontrunner in the development of spatial computable general equilibrium (CGE) models and very active in their application to a series of European Union policy areas, especially, the evaluation of new infrastructure projects, and transport and cohesion policies. Hence, not surprisingly, he also contributed to the integration of general equilibrium and transportation models (Bröcker and Mercenier, 2011). One of his highly cited articles (Bröcker, 1995) developed an operational, interregional, interindustry CGE model with monopolistic competition and love of variety at product markets.

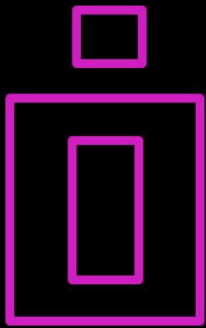
The model simultaneously provides a solid micro-economic foundation for the empirically intensively used gravity specification of interregional transport and trade flows. More recently, he ingeniously added an endogenous growth dimension to his earlier Chamberlinian CGE (Korzhenevich & Bröcker, 2013).

Personally, I first met Johannes on the island of Kalvø in southern Denmark, during an interregional trade workshop in the early eighties, where we with youthful enthusiasm passed the workshop breaks with dissected the – rightfully forgotten – attraction model. More than thirty years, and many inspiring meetings later, when I was already retired, we considered that enjoying a classical concert in Edinburgh castle during an infrastructure modelling workshop was equally joyful.

Jan Oosterhaven, emeritus, Groningen

### References

- Johannes Bröcker (1995) "Chamberlinian spatial computable general equilibrium modelling: a theoretical framework," *Economic Systems Research*, 7: 137–149.
- Johannes Bröcker and Jean Mercenier (2011) "General Equilibrium Models for Transportation Economics," in André de Palma, Robin Lindsey, Emile Quinet & Roger Vickerman (eds.) *Handbook of Transport Economics*, Vol. 1, Cheltenham, Edward Elgar: 21–45.
- Artem Korzhenevich & Johannes Bröcker (2013) "Forward looking dynamics in spatial CGE modelling," *Economic Modelling*, 31: 389-400.



**Newsletter**  
**Number 47, February 2021**

# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## In memoriam

### **Alfred Franz (1939 – 2021)**

With deep regret the IIOA announces that Alfred Franz, one of the founding members of our Association, passed away on 14 January 2021. Alfred Franz was born in 1939 in Upper Austria. He studied law at the University of Vienna, Austria. After his studies he became a staff member of the Austria Central Statistical Office (today: Statistics Austria) and was in charge of the development of official national accounts statistics in Austria. He can be considered a true pioneer in the field of Input-Output statistics: He was engaged in the compilation of the first Input-Output tables for Austria for the reference years 1961 and 1964 and participated in the compilation of the first regional table in Austria for Styria. One of the main projects in his area as head of the National Accounts Department was the implementation of Supply and Use tables as backbones of national accounts.

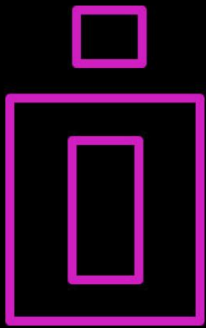
He had also teaching obligations at the Technical University of Vienna and the University of Innsbruck and from 1989 to 2009 he was Honorary Professor of Economic and Social Statistics at the University of Vienna. He also organised international conferences on Input-Output statistics.

His scientific interests were very broad but always strongly related to the conceptual basis of national accounts and its systems approach. He made important conceptual contributions to Regional Accounts, Tourism Economic Accounts, Environmental Accounts, Gender Accounting, Hidden Economy, or International Purchasing Power Parities. Many of these concepts were developed for international organisations. Even after his retirement in 2002 he carried out studies for the World Bank, the IMF, the OECD, Eurostat and some other organisations. In all phases of his professional career Alfred Franz put a lot of emphasis on the fundamental basics of official statistics such as statistical units and statistical classifications. Numerous publications and conference contributions document the broad variety of his intellectual interests and output.

We lost a widely recognised international expert in official statistics and a true scientist who was aware that “concepts matter”. Many of us also lost a good friend.

Norbert Rainer

For more information see his homepage: <http://www.vgr.cc/cms/>



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Published papers and books in IOA and related methods

### Latest ESR articles

[Economic Systems Research](#)

[Journal of the IOA](#)

[Volume 32, Issue 4, 2020](#)



**Albert E. Steenge & Rachel C. Reyes,**  
[Return of the capital coefficients matrix,](#)  
*Economic Systems Research, 32:4, 439-450.*

A core ingredient of post-disaster input-output recovery models is the reconstruction of lost production capacity. Therefore, one would expect a set of models endowed with capital coefficients matrices to be available for analysis. However, this is not the case, possibly due to earlier negative experiences with such models. Nevertheless, in this paper, we aim to show that there is a class of problems that can be addressed successfully with a dynamic input-output model with a fully functioning capital coefficients matrix. We put forward that if reconstruction is tightly planned, investment and therewith gross output essentially become pre-determined. This also means that traditional final demand becomes an endogenous residual,

with the model being transformed into a distribution and allocation model. We begin with a reordering of variables and equations as proposed in Leontief's dynamic inverse, and then move on directly to the newly proposed model. Suggestions for further work are given.

**Carl-Johan H. Södersten & Manfred Lenzen**  
[A supply-use approach to capital endogenization in input-output analysis,](#)  
*Economic Systems Research, 32:4, 451-475.*

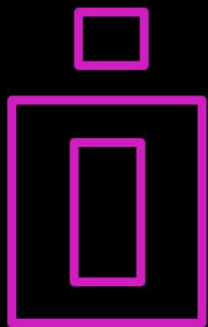
Input-output analysis currently treats capital investment as exogenous to the inter-industry system despite capital goods being used further in production processes. Previous studies have applied the Leontief calculus to include impacts of capital in footprint calculations. Here, we adopt a supply-use approach to incorporating capital into footprint calculations, by constructing capital supply-use tables (KSUTs) that enable differentiating capital goods. As the new KSUT formalism is compliant with the Supply-Use formalism in the UN's System of National Accounts, we can keep full transparency throughout the process of calculating impact multipliers. We demonstrate the usefulness of the KSUT framework in a case study of the Australian economy, with environmental extensions from the EXIOBASE3 database.

If consumption-based emissions were considered for the UN's Framework Convention on Climate Change, the KSUT framework would provide a consistent and transparent foundation for working out countries' responsibility for carbon emissions from both current use and capital investment.

**Nino Mushkudiani, Jeroen Pannekoek & Li-Chun Zhang**  
[Uncertainty measures for economic accounts,](#)  
*Economic Systems Research, 32:4, 476-501.*

The problem of adjusting large systems of estimated economic or social accounts such that they fulfill known functional relationships can be quite complex. For such complex systems, evaluating the accuracy of the estimates after the adjustment is difficult since these estimates are defined by unadjusted initial estimates, the accounting equations and the adjustment method. In this paper, we consider such accounting systems as a single entity and develop scalar uncertainty measures that are based on the first two moments of the joint distribution of final adjusted estimates. Scalar measures can help to effectively communicate to the users the relevant uncertainty of disseminated macro-economic accounts and can assist the producer in choosing and improving adjustment method and input estimators.





# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

The proposed approach is illustrated both analytically and by simulation. Applications to supply and use tables and to time series data are presented.

**Francesca Severini, Rosita Pretaroli, Claudio Soggi, Jacopo Zotti & Giancarlo Infantino**

**[The suggested structure of final demand shock for sectoral labour digital skills.](#)**

*Economic Systems Research, 32:4, 502-520.*

International data seem to confirm that countries with a relative abundance of highly-skilled labour with digital competences grow faster than others. For this reason, digital competences and skills in general are progressively assuming a central role in labour market policies. In this article, we show the potential of the disaggregated multisectoral analysis with the macro multipliers approach as a tool of economic policy. Such analyses allow identifying a set of endogenous policies in which specific objectives do not clash with growth objectives. The identification and the quantification of the macro multipliers is based on an extended multi-industry, multi-factor and multi-sector model, which accounts for the representation of the income circular flow as in the social accounting matrix (SAM). The SAM constructed for this exercise allows for a proper disaggregation of the labour factor by formal educational attainment, digital competences and gender for the case of Italy.

**Julio Gustavo Fournier Gabela**

**[On the accuracy of gravity-RAS approaches used for inter-regional trade estimation: evidence using the 2005 inter-regional input-output table of Japan.](#)**

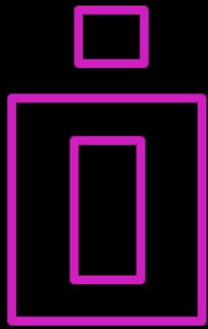
*Economic Systems Research, 32:4, 521-539.*

In contrast to international trade, it is still difficult to find regional trade statistics within a nation. Given that the gravity model continues to be very popular, we test two gravity-RAS approaches used for interregional trade estimation: a standard one and an extended version, which additionally estimates intra-regional flows. We assess the accuracy with the help of two measures and for different sectoral aggregation levels. For that, we use the survey-based 2005 interregional input-output table of Japan as a benchmark. Results show high overall accuracy levels for the standard approach, better than when using international data, albeit with heterogeneous errors for sectors and regions. We further find that the results of a multiregional input-output model are highly sensitive to the trade estimation approach and that errors slightly increase for increasing sectoral disaggregation levels. Results from an experiment based on a random number generator show how RAS influences results.

**Hao Xiao, Bo Meng, Jiabai Ye & Shantong Li**  
**[Are global value chains truly global?](#)**

*Economic Systems Research, 32:4, 540-564.*

Are global value chains (GVCs) truly global or are they more of a regional phenomenon? We provide a new perspective on this issue using network analysis based on the measure of trade in value added. We first show that GVC activities can be consistently identified and grouped into three types of networks, i.e. traditional, simple, and complex trade networks, according to the number of times that factor contents cross national borders in global production sharing. Further investigation on the changes in topology and structure of various networks reveals that, GVCs are more likely organized regionally and dominated by large countries, like the US, China, and Germany. However, at the sector level, what GVCs look like largely depends on the perspective (supply or demand) and the type of networks adopted. This can help better understand the possible structural change of GVCs brought by the US-China trade war and the COVID-19 pandemic.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Eduardo A. Haddad, Fatima Ezzahra Mengoub & Vinicius A. Vale**

**[Water content in trade: a regional analysis for Morocco.](#)**

*Economic Systems Research, 32:4, 565-584.*

This paper aims at evaluating the virtual water content in trade in an intra-country perspective and discussing potential tradeoffs between the use of natural resources and value added creation. We develop a trade-based index that reveals the relative water use intensities associated with specific interregional and international trade flows. The index is calculated considering the measures of water and value added embedded in trade flows associated with each regional origin-destination pair using an interregional input-output matrix for Morocco together with information on sectorial water use. We add to the literature on virtual water by encompassing the subnational perspective in a country that shows a clear 'climate divide'. Furthermore, we contribute to the literature by proposing an index that may be applied to different economies to evaluate multidimensional trade-offs associated with the pressure of specific economic flows to the use of natural resources relative to its economic relevance.

**[Economic Systems Research](#)**

**[Journal of the IIOA](#)**

**[Latest articles \(up to 29-Oct.\)](#)**

**Tsujimura, M. and Tsujimura, K.**

**[Flow-of-funds structure of the U.S. economy 2001–2018.](#)**

*Economic Systems Research.*

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.

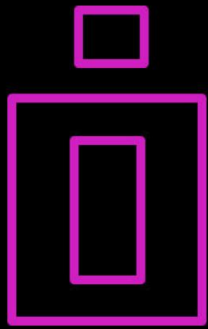


**Mainar-Causapé, A. J., Philippidis, G. and Sanjuán-López, A. I.**

**[Constructing an open access economy-wide database for bioeconomy impact assessment in the European Union member states.](#)**

*Economic Systems Research.*

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.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Parys, W.**

**[David Hawkins and the making of the Hawkins-Simon conditions.](#)**

*Economic Systems Research.*

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.](#)**

*Economic Systems Research.*

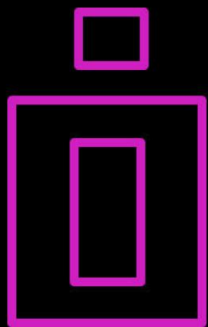
Cedar Rapids, IA, offers a unique case study in planning for increased resilience. In 2008, Cedar Rapids experienced severe flooding. Rather than simply rebuilding, the city of Cedar Rapids began to invest in a resilient flood control system and in the revitalization of its Downtown neighborhood. This 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.

**Ciaschini, C. and Chelli, F. M.**

**[Evaluating the impact of Violence Against Women in the macroeconomic Input-Output framework.](#)**

*Economic Systems Research.*

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.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Wang, Z., Zhang, Y., Niu, M. and Fan, Z.**

**[How important is domestic and foreign demand for China's income growth by business function?](#)**

*Economic Systems Research.*

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.

**Maria Llop**

**[Defining prices in an inter-regional SAM system.](#)**

*Economic Systems Research.*

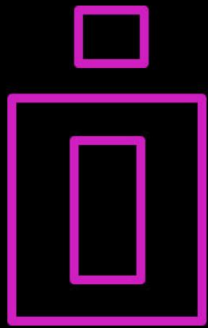
The literature of inter-regional social accounting matrices (SAM) focuses on quantity-oriented models that determine the transmission of income impacts. This paper develops a price version to identify the channels of price transmission at the inter-regional (or inter-country) level. The method proposed 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.

**Carvalho, T. S., Santiago, F. S. and Perobelli, F. S.**

**[Demographic change in Brazil and its impacts on CO2 emissions.](#)**

*Economic Systems Research.*

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.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**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.

**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?.](#)

*Economic Systems Research.*

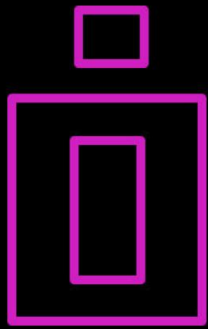
We provide a critical evaluation about how updating the input-output data of a computable generation equilibrium model can affect policy results, an assessment that is rarely done in existing literature. Specifically, we explore how datasets with different fossil energy cost shares alter results of policy 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.

**Umed Temursho**

[On the Euro method.](#)

*Economic Systems Research.*

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.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Zhou, L. and Chen, Z.**

**[Are CGE models reliable for disaster impact analyses?](#)**

*Economic Systems Research.*

This study investigates a fundamental issue of computable general equilibrium (CGE) modeling: are CGE models reliable for measuring the economic consequence analysis of disasters? We assess the outputs of CGE analyses after controlling for various modeling factors such as data, type of model, and modeling mechanisms via a meta-analysis of 253 CGE simulations in 57 empirical studies. Our study arrives at three major findings. First, we confirm that resilience significantly reduces business disruptions from disasters. Second, results using either real-world or hypothetical data tend to vary substantially by hazard type. Third, results are quite sensitive to model assumptions and modeling structure. Overall, we suggest that future impact assessments of disasters should be conducted more cautiously in terms of adopting appropriate data, models, and shock scenarios, in order to improve the validity of CGE modeling outcomes.

**Duan, Y., Ji, T. and Mei, D.**

**[Tariff costs embodied in product prices: a dynamic analysis from global value chain perspective.](#)**

*Economic Systems Research.*

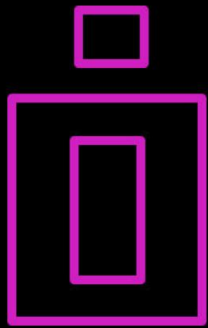
The present study examines a measure, the embodied tariff, which is defined as the sum of all tariffs imposed on intermediate inputs at various stages of productions. It captures the total tariff costs in products in the context of the global value chain. We estimate the embodied tariff for 44 economies and 56 sectors, decompose it by tariff source, and also decompose its temporal changes using structural decomposition analysis. The embodied tariff is more than twice the size of the traditional direct input tariff, indicating a non-negligible value chain effect. This demonstrates an overall declining pattern over time, which reflects a dominating effect of decreasing customs tariffs over increasing international production fragmentation. Since 2011, however, the decline in international production fragmentation has also decreased embodied tariffs. A country's customs tariff is sizably translated into the embodied tariff of its own products, creating a competitive disadvantage for domestic producers.

**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.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Moya-Martínez, P., Bermejo, F. and del Pozo-Rubio, R.**

**[Hard times for long-term care systems? Spillover effects on the Spanish economy.](#)**

*Economic Systems Research.*

Since the end of the last century, demographic aging has led to an increased demand for new social protection services. Universalizing these to meet the needs of the most vulnerable requires the design of policies that ensure the sustainability of the system. Consequently, the economic structure of a country and its productive fabric are affected. Assessing the impact of this growing demand is not an easy task, although extended input-output models can help. With this aim, we determine the spillover effects of the demand shocks arising from the increase in public spending allocated for the implementation of the Spanish long-term care system. The results reveal that such spending proves efficient in sustaining 116,000 jobs, most of which are in social work activities, entailing a large amount of direct but low-skilled employment. In addition, 5,000 million euros are generated in value added, including a fiscal return of 1,400 million euros.

**Carlos Llano, Julián Pérez, Fatima El Khatabi & Federico Steinberg**

**[Weaponized trade policy: the impact of US tariffs on the European automobile sector.](#)**

*Economic Systems Research.*

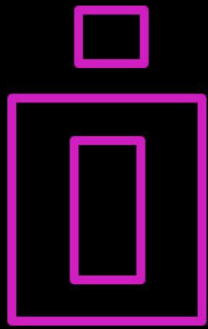
With trade tensions running high, the Trump Administration is considering new tariffs on imported automobiles, and the main target would be the European Union, traditionally America's closest ally. In this paper we combine disaggregated models to estimate the impact of these tariffs worldwide, and especially 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.

**Allan, G. J., Connolly, K. and McIntyre, S. G.**

**[Developing an electricity satellite account \(ELSA\): an application to Scotland, UK.](#)**

*Economic Systems Research.*

Within the system of national accounts the electricity sector is typically reported as a single entry representing generation, transmission, distribution and trade. The ways in which these components interact with the economy differ greatly, a feature lost within the standard accounting framework. In this paper we propose an Electricity Satellite Account (ELSA) approach to better understand the linkages between the electricity sector and economy, with a particular focus on generation technologies. In developing this framework, we draw parallels with Tourism Satellite Accounts (TSAs). To illustrate the practical steps in constructing ELSAs, we develop an ELSA for Scotland for 2012, and show how the ELSA framework gives an improved understanding of the economic contribution of the electricity sector, which is critical in improving the usefulness of such accounts for climate, energy, and economic policy.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Aroche Reyes, Fidel**

[On growth regimes, structural change and input coefficients.](#)

*Economic Systems Research.*

The input-output (IO) model assumes that the technical coefficient matrix changes as an economic system develops, following either of two tendencies; one, the entries of the matrix shrink, due to increased efficiency on the production lines; two, they expand, while productivity gains concentrate in the use of factors. Further, the economic structure grows more complex, as industries become more tightly (vertically) integrated and the development process evolves. Both phenomena have seldom been analysed together, despite the apparent connections they may have with the evolution of economic structures and the development opportunities countries may face. This paper intends to examine the implications of these tendencies for the evolution of economic systems in regards to the dynamics the growth process may adopt. Two indicators are presented here useful to characterise such dynamics, later tested on the Mexican IO data.

**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.

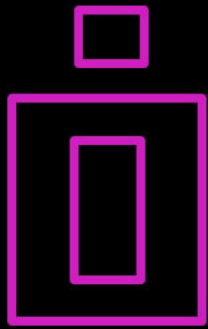
**Miroudot, S. and Ye, M.**

[Decomposing value added in gross exports.](#)

*Economic Systems Research.*

Several papers using intercountry input-output tables have developed frameworks to decompose value added in gross exports and to remove potential double-counting in intermediate inputs. But these papers rely on different definitions for the domestic value added, foreign value added and double-counting terms, depending in particular on the perspective from which gross exports are decomposed (world level, country level or bilateral level). At this stage, it is very difficult for any user of value-added trade statistics to know what is calculated and which type of decomposition should be used. In this paper, we provide a general framework that relies on extraction matrices to unambiguously and consistently define domestic and foreign value-added terms in the world, country and bilateral perspective. This framework allows us to classify existing decompositions based on the perspective taken and their definition of double-counting. We also indicate the most relevant decompositions for different types of trade analysis.





# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Ángela García-Alaminos, Mateo Ortiz,  
Guadalupe Arce & Jorge Zafrilla  
[Reassembling social defragmented  
responsibilities: the indecent labour footprint  
of US multinationals overseas.](#)  
*Economic Systems Research.*

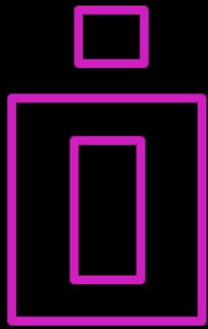
Multinational corporations (MNEs) have been at the forefront of the geographical disintegration of production chains in search of lower salaries, among other reasons, which led to a global race to the bottom in labour standards. Therefore, significant amounts of indecent work are currently embodied in 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.

Bartłomiej 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.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**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<sub>2</sub> 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.*

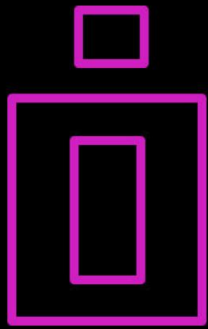
Two frameworks, hypothetical extraction and betweenness centrality analysis, can be used to identify environmentally important sectors in complex supply chains. This study derives an analytic expression for the relationship between hypothetical extraction and betweenness centrality analysis. Second, 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<sub>2</sub>-reduction policies 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.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**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.*

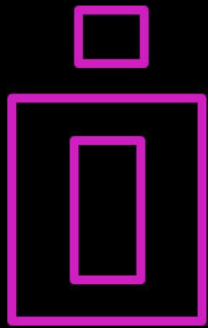
Multisectoral models usually have a single representative household. However, more diversity of household types is needed to analyse the effects of multiple phenomena (i.e. ageing, gender inequality, distributional income impact, etc.). Household consumption surveys' microdata is a rich data source for 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.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**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 Hambj e**

**[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.

**Cristian Mardones & Claudio Brevis**

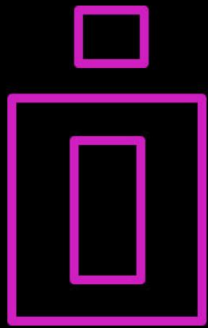
**[Constructing a SAMEA to analyze energy and environmental policies in Chile.](#)**

*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.

**[See all latest articles in ESR, volumes and issues](#)**

**Submit an article**



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Highlights in journals

Umed Temursho , Jan Oosterhaven & M. Alejandro Cardenete

[A multi-regional generalized RAS updating technique.](#)

*Spatial Economic Analysis.*

We present an extension of the generalized RAS (GRAS) technique to a multi-regional (MR) or multi-national setting. The framework is applicable to updating/regionalizing/balancing any partitioned matrix that needs to conform to new row sums, column sums and additional non-overlapping aggregation constraints. The technique, which we refer to as MR-GRAS, also handles non-exhaustive constraints, in which case the missing values are endogenously generated in the updating process. We derive the closed-form solution of MR-GRAS, propose a simple iterative algorithm for its computation, and discuss the main analytical properties of the method as well as the normalization and interpretation of MR-GRAS multipliers. From a wide range of possible MR-GRAS applications, several updating frameworks of national and interregional supply and use tables are examined.

José M. Rueda-Cantuche, Tamas Revesz, Antonio F. Amores, Agustín Velázquez, Marian Mraz, Emanuele Ferrari, Alfredo J. Mainar-Causapé, Letizia Montinari & Bert Saveyn

[Improving the European input-output database for global trade analysis.](#)

*Journal of Economic Structures.*

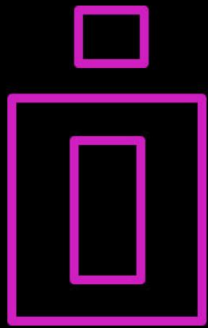
There are increasing numbers of published articles in the field of input-output analysis and modelling that use the GTAP input-output database; particularly, in relation to the estimation of carbon, energy and water footprints and the analysis of global value chains and international trade. The policy relevance of those topics is also increasing, thus calling for consistently linking these databases with official statistics. Although, so far, GTAP has been using their own classification and reconciliation methods, this paper develops a new conversion method for the EU that guarantees that the EU-GTAP database respects the new statistical standards and Eurostat official statistics. We recommend for future updates, a shift of the current GTAP classification of industries to the new official standard classifications to which countries are progressively moving to. Otherwise, the lack of matching official data would jeopardize the usefulness of such database. This method can be extended to other similar input-output databases with different classification schemes from the original input data sources.

Mateo Ortiz; Luis-Antonio López; María-Ángeles Cadarso

[EU carbon emissions by multinational enterprises under control-based accounting.](#)

*Resources, Conservation and Recycling.*

The territory-based conception of environmental commitments disregards the crucial role of multinational enterprises (MNEs) in the global generation of greenhouse gases. Such a misconception discourages MNEs from pledging own emissions reduction goals as global agents and exempts their origin country of any responsibility for the emissions they generate abroad. We propose a new allocation criterion based on who has the ability to take MNEs' decisions called the control-based accounting. We apply it for the first time to the MNEs' foreign affiliates operating in the EU and estimate the CO<sub>2</sub> emissions responsibility of EU countries under the control-based criterion, that is, assigning emissions generated by foreign-controlled companies to the origin country of the firms (controlling country) instead of the host country (as in the territory-based approach). We found that Germany and France are the EU countries with the highest control-based responsibilities; whereas Poland, the Czech Republic and Hungary bear significantly less responsibility under this approach compared to other allocation methods. The United States is the non-EU country with the greatest responsibility for emissions physically generated within the EU's territory through foreign affiliates.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Marcelino Sánchez-Rivero, Vicente Royuela & Alberto Franco Solís**

[Residents' perception and economic impact of bullfighting: the case of Feria del Toro \(Olivenza, Spain\).](#)

*Current Issues in Tourism.*

Despite being a controversial spectacle, bullfighting is a cultural event with relevant touristic and economic impacts. Consequently, local support for bullfighting may be influenced by perceptions of the economic returns generated as a result of hosting this spectacle. This paper characterizes bullfight tourism, computes the economic effect of a bullfighting fair, and examines the extent to which perceived economic impacts affect its local support. As a case study, we investigate the bullfighting fair in Olivenza (Spain). After conducting a survey to nearly 700 attendees of the fair, we estimate this event's economic impact through an input-output model. An ordered probit regression and a logit model are next estimated to evaluate whether residents' support for the fair is connected with the perceived economic effect. Findings reveal that local support, especially from those attending the fair, is influenced by perceptions of positive impacts.

**Zhong, S., Su, B.**

[Assessing the effects of labor market dynamics on CO2 emissions in global value chains.](#)

*Science of the Total Environment.*

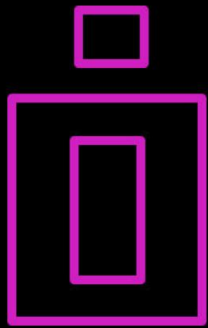
International production fragmentation has led to substantial changes in labor market, such as job creation/job loss, changing labor market structure and labor productivity. Such changes are perceived to affect CO2 emissions of those economies that participate in different parts of global value chains. This paper develops an accounting framework relating CO2 emissions to labor market shaped by global value chains. It analyses the influential factors driving CO2 emissions, and documents several pervasive empirical patterns. This is based on the recent environmental accounts developed by the European Commission and the World Input-Output Database over 2000–2014. The results show that the growth of CO2 emissions is primarily reduced by intensity effect, followed by labor market structural change due to participation in value chains, while it is driven by labor productivity effect and job creation. In particular, the foreign job creation effect is mostly emission-increasing, even in those economies with shrinking domestic employment. These results highlight the role of labor market and global value chains in climate policymaking.

**Su, B., Ang, B.W.**

[Demand contributors and driving factors of Singapore's aggregate carbon intensities.](#)

*Energy Policy.*

Singapore is an island city state. It lacks conventional energy resources and is alternative energy disadvantaged. Yet its aggregate carbon intensity, given by the ratio of carbon emissions to GDP, dropped by 30% from 2005 to 2014. Currently it has a relatively low carbon intensity. Using I–O analysis, we study Singapore's aggregate carbon intensity and the factors contributing to its changes at different levels, i.e. final demand, sector, and transmission levels. It is found that domestic exports accounted for nearly two-thirds of Singapore's aggregate carbon intensity, followed by private consumption and investment. At the sectoral level, the top three contributors were the petroleum, petrochemical, and land transport sectors. Improvements in emission intensity and final demand structure were major factors contributing to reductions in carbon intensity. Our study contributes to the literature in two aspects. Methodologically, it deals with embodied emission intensity and analyzes its changes from the demand perspective. This differs from most studies in the literature from the production perspective. Empirically, the findings and policy implications are unique as they are applicable to a major city. With urbanization taking place in many developing countries, cities' role in emissions and environmental sustainability are growing in importance but not many in-depth analyses similar to our study have been reported.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Yongming Huang, Jamal Khan, Eric Girardin, Umair Shad**

**[The Role of the Real Estate Sector in the Structural Dynamics of the Chinese Economy: An Input-Output Analysis.](#)**

*China & World Economy.*

Market-oriented housing reforms and the rapid urbanization process have led to spectacular growth in the Chinese real estate sector (RES). However, the changes in the role played by this sector in the structural dynamics of the Chinese economy have not been examined sufficiently. Accordingly, we analyze the inter-sectoral structural changes to the Chinese RES, its linkages with the rest of the economy, and its growth sources, using four Chinese input-output tables from 2002 to 2017. We depart from existing work on the RES by using the causative matrix approach and structural decomposition analysis, and obtain three main results. First, the RES, which received little non-RES feedback during the 2002–2007 period, has subsequently received much more substantial feedback. Second, the impact of the RES on China's economic growth stems mainly from its forward linkages. Third, the growth in the RES has been driven mainly by domestic demand expansion. Our results highlight that the Chinese RES, which plays a key role in value chains, is highly dependent on its own final demand and a fall in its demand would impede economic development. An important implication of these results is that developing the national economy by stimulating the RES would not be as effective as developing the RES through stimulating the national economy.

**M<sup>a</sup> Victoria Román de Lara, José M. Rueda-Cantuche and Antonio F. Amores**

**[What does value chain upgrading mean for \(female\) job opportunities in the EU? in Understanding Value Chains.](#)**

*In Understanding Value Chains, Nova Science Publishers.*

*Understanding Value Chains* first examines the process of the institutionalization of the main theoretical foundations of the global value chain since its conception in the academic field and, subsequently, in international organizations.

The authors in the Second Chapter analyse the evolution of Mode 5 services jobs and salaries in the EU, assessing whether there are signs of functional upgrading and how it affects female jobs and the gender pay gap.

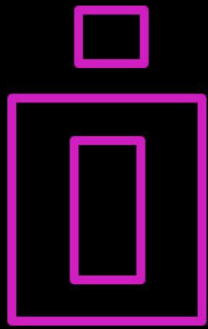
**Henryk Gurgul & Łukasz Lach**

**[Linkages-based indicators of production-source sectoral eco-efficiency with application to Polish data.](#)**

*Journal of Cleaner Production.*

The goal of this paper is twofold. First, a new approach to measuring production-source sectoral eco-efficiency in generalized input-output models is presented. The procedure may be used as a supplementary method to the traditional framework that is usually based on various decomposition techniques.

Due to its simplicity and low data requirements, the approach provides a useful and flexible tool that allows a more general insight to be obtained into levels of emissions associated with production, which in turn is essential for constructing more sound indicators of eco-efficiency. Second, in order to trace the factors driving the dynamics of the proposed indicators of eco-efficiency, a two-step procedure based on combination of multiplicative structural decomposition analysis and a new variant of sensitivity analysis based on mathematical programming is outlined. In order to illustrate the potential applications of the new approach, an empirical analysis based on national input-output tables and environmental accounts for Poland is conducted. The empirical results provide solid evidence to claim that the sector Electricity, Gas and Water Supply plays a dominant role in shaping the structure of backward and forward linkages of all sectors of the Polish economy in the CO<sub>2</sub>-emission-oriented generalized IO models. As a consequence, lowering the emission-output ratio in this particular sector has a particularly strong impact on improving production-source eco-efficiency of all sectors operating in Polish economy.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Yousaf Ali, Muhammad Bilal and Muhammad Sabir**  
**[Impacts of transport strike on Pakistan economy: An inoperability Input-Output model \(IIOM\) approach.](#)**

*Research in Transportation Economics.*

The transport sector has backward and forward linkages with other sectors of the economy. A strike in the transport sector can be disruptive for other interdependent sectors of the economy. This study investigates the macroeconomic impacts of a transportation strike using the Inoperability Input-Output (IIOM) model. The study uses 25 sectors Input-Output tables of Pakistan economy and combines IIOM approach with Monte Carlo Simulations to quantifies the impacts of 21 days (during 2012) transport strike on Pakistan economy. The results indicate that the most affected sector of that strike was financial intermediation sector followed by the food & beverages sector and petroleum, chemical & non-metallic mineral products sector being the second and third most affected sectors, respectively. The study is an application of IIOM in transportation strikes and has usefulness for the policymakers, researchers, and readers that has an interest in application and extensions of Input-Output based analysis.

**Yousaf Ali, Rosita Pretarolli, Muhammad Sabir, Claudio Socci and Francesca Severini**

**[Structural changes in carbon dioxide \(CO<sub>2</sub>\) emissions in the United Kingdom \(UK\): an emission multiplier product matrix \(EMPM\) approach.](#)**

*Mitigation and Adaptation Strategies for Global Change.*

The increasing emissions of carbon dioxide (CO<sub>2</sub>) have been a major concern for most of the countries around the world; and as a result, every country is concerned about setting appropriate strategies to curtail it. This study proposes emission multiplier product matrix (EMPM), a novel approach that integrates CO<sub>2</sub> emissions with input-output (I-O) tables for estimating pollution generated by inter-industry activities. In combination with structural decomposition analysis (SDA), the proposed EMPM can be used to measure emissions and identify its key drivers such as changes in technology and demand variations. Instead of generalised strategies, this approach is helpful in devising sector-specific pollution reduction strategies. This study applies the proposed EMPM approach in combination with SDA to the UK's economy by using I-O tables and emission data for the period 1995–2009. The study finds that, overall, UK's carbon emission can be reduced through a disaggregated policy aiming to curtail industrial emissions and ensuring a more efficient transport sector.

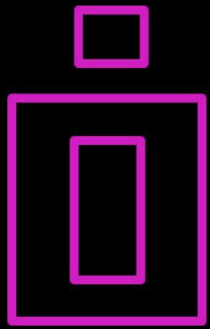
**Yousaf Ali, Sania Binte Saleem and Muhammad Sabir**

**[Structural Decomposition Analysis to Investigate the Changes in Energy Consumption in Pakistan.](#)**

*Journal of Systems Science and Complexity.*

The world energy demand is increasing due to rapid growth in the global economy, industrialization, and urbanization. Pakistan is also confronted with increasing energy demand on one hand and is confronted with the challenge of energy demand-supply gap on the other hand. Since energy is the major driver for growth, it becomes important to investigate the trends of energy consumption in a country and the factors that are most affecting the changes in the use of energy. This particular study aims to investigate the use of energy by all the economic sectors of Pakistan during 2000–2012. The major contribution is the first time application of structural decomposition analysis (SDA) for energy usage along with using Input-Output data for the period of 2002–2012. The results show the fluctuation of the energy intensity of the sectors throughout the study period. Also, the overall effect of energy intensity is negative on energy consumption and it shows a negative contribution value of –80.90% for the study period. Furthermore, the focus on more energy-intensive products like cement, automobiles, iron, steel products and the increasing final demand of the economy contributes to the growth of energy consumption in Pakistan during 2000–2012.





# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Nooraddin Sharify & Fatemeh Najari**

**The Iran Input-Output Table in the World Table.**

*Journal of Economic Research (Tahghighat-e-Eghtesadi). [In Persian]*

The input-output tables provide useful information regarding the economic and social situations of countries. The world input-output database (WIOD) enables simultaneous comparison of economic and social situations of countries worldwide. The Europe Commission has provided the WIOD for 27 members of the commission, 16 large non-Europe countries and rest of the world from 1995 to 2014. The input-output of the economic sectors of Iran are aggregated with those of the rest of the world. Hence, it is not possible to study the situation of Iran in the world table. In addition, it is not possible to examine the reciprocal effects of the economic policy of Iran or other countries on production sectors of each other properly. To this end, the Iran input-output table for the year 2011 is highlighted, where, in the same year, Iran stood 44th in WIOD. Thus, in addition the new table allows the researcher to study the situation of Iran in the world economy, it make possible to reveal the effect of internal policy on economic sectors of other countries and vice versa.

**Hossein Aliasgharpour Moziraji & Nooraddin Sharify**

**Comparison of Iran National and Provincial Economic Structure Using the Input-Output Approach.**

*The Quarterly Journal of Economic Research. [In Persian]*

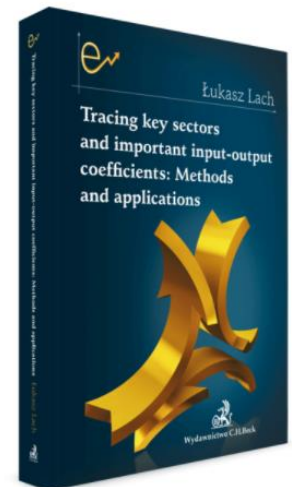
One of the basic functions of input-output analysis is to identify the economic structure of regions and countries. This research seeks to identify the key sectors of Iran ('39')s provinces and to compare them with national key sectors. The data is extracted from the national input-output table and regional accounts of the Statistical Center of Iran in 2011. The results show that based on the "total gross backward and forward linkages" criterion, there are 17 and 20 key sectors, respectively, with and without considering the "dispersion of the linkages", at national level. With same criterion, every province has at least one and two key sectors, respectively. However, some key sectors of provinces are not listed as national key sectors, and are not included in the central planning. On the contrary, a number of national key sectors are not categorized as key sectors in the provincial level.

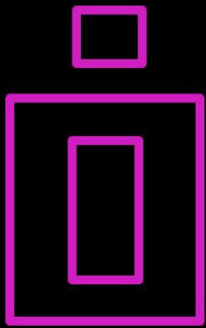
## Recent I-O Books

**Łukasz Lach**

**Tracing key sectors and important input-output coefficients: Methods and applications.**

The main purpose of the theoretical part of the book is to present a number of methods for identifying key sectors and tracing important coefficients in input output (IO) models. In general, key sectors are defined as sectors with relatively high potential for spreading growth impulses in the economy. In turn important coefficients are usually understood as those IO coefficients in the case of which a small change in the levels has a large impact on the result of calculations/forecasts obtained on the basis of a given IO model. Selected methods presented in the theoretical part of the book are Author's original methodological proposals. All the presented methods are used to carry out an extensive and original analysis of the role that sectors of the Polish economy play in the global economic system. The results of the analysis are presented and discussed in detail in the empirical part of the text.





# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Events

### Next IIOA Webinar

Block your calendars: IIOA Webinar!

On **Wednesday February 17**, the **first IIOA Webinar** will take place.

**Maureen Rimmer** (Centre of Policy Studies, Victoria University, Melbourne) will give a talk titled "**Historical Simulations: A CGE Technique for Updating Input-Output Tables and Estimating Technology and Preference Trends**". All IIOA members and other interested colleagues are most welcome to attend! The webinar will start at **11am Central European Time**. Maureen will present for about 30 minutes, after which 15 minutes are available for discussion. The webinar will use MS Teams. It will be recorded and made available after the webinar. This should ensure that interested people living in "unfavorable" time zones can still learn about Maureen's work.



More information about participation/registration and an abstract will be disseminated soon!

Best wishes,  
Sanjiv Mahajan, Douglas Meade and Bart Los.

## Other workshops

Call to Join

### 13. *Online* Input-Output-Workshop

Hochschule Bochum  
Bochum University  
of Applied Sciences **BO**

**U** Universität Bremen

**GLIS** SPECIALISTS IN  
EMPIRICAL ECONOMIC  
RESEARCH

This year's workshop takes place online. Please hand in your abstract (max ½ page in pdf format) **until January 31st, 2021** to [moennig@gws-os.com](mailto:moennig@gws-os.com). Participants without presentation are welcome. You can register for the workshop after the program has been announced. It will be possible to register for single sessions only. For technical reasons, the number of participants is limited.

Organising Team: Anke Mönnig (GWS), Prof. Dr. Jutta Günther (University of Bremen), Prof. Dr. Tobias Kronenberg (Bochum University of Applied Sciences)

**March 22nd – 24th, 2021**

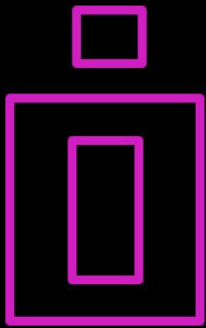
Important dates:

Online Participation:

- Daily afternoon
- Per lecture 40 minutes of which max 20 minutes presentation
- Each session has a session chair
- Number of participants is limited
- Conference language is German and English.

- Submission of abstract **January 31st, 2021**
- Confirmation of participation and Workshop programme **February 19th, 2021**

For questions please contact Anke Mönnig:  
Email: [moennig@gws-os.com](mailto:moennig@gws-os.com)  
Phone: +49 (0)541 40933-210  
<https://www.gws-os.com/de/index.php/die-gws/io-workshop.html>



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Events

Sociedad Hispanoamericana de Análisis  
Input-Output



Dear IIOA community,

Given the excellent reception of last year's SHAIO webinars, we are happy to announce **the new cycle of webinars for 2021!!**

These webinars allow us to keep the networking alive within the IO community and to be aware of the last contributions from our colleagues around the world with the firsthand explanation from authors. This year, we are pleased to kick off our webinar series with Professor **Geoffrey Hewings** on **February 25 at 17:00 (CET)**.

If you have an outstanding contribution that you would like to share with the IO community, don't hesitate to send your abstract to the call of papers for filling some of the **webinars** spot during 2021. Deadline for sending papers will be **1st of March**. For further information on future seminars or the call for papers, please visit:

<http://webinars.shaio.es/en>

Although we really enjoy sharing online discussion, in SHAIO we love the face-to-face discussion. For this reason, we will attempt to celebrate the **8th SHAIO Permanent Workshop** that will be held in **León** (Spain) in the last quarter of the year if the sanitary circumstances allow us. We will keep you informed in our website.

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 follow the presentations of last year's webinars on our **Youtube channel**. From SHAIO, we wish you and your families all the best.

Stay healthy!!

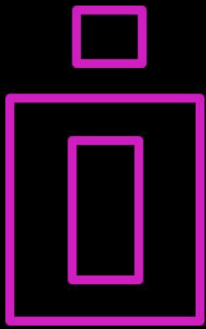
The SHAIO Council.

SHAIO WEBINARS  
2021 Edition

SHAIO  
webinars.shaio.es

GEOFFREY J.D. HEWINGS  
opening session - next Thursday 25 February, 17:00 (CET)

www.pixabay.com



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Special Issues in Journals

### Special Issue "Achieving a Just Transition in the Pursuit of Global Sustainability"

The objective of the Special Issue is—by analyzing the social, economic, and environmental outcomes and tradeoffs of policy choices in an integrated way—to break the sustainability deadlock, which is caused by the belief that economic growth and environmental sustainability are conflicting goals. By identifying potential winners and losers, policies need to be designed to maximize positive social, economic, and environmental outcomes while protecting and offering solutions to countries, industries, companies, workers, and communities which may be negatively impacted by the restructuring. We are especially inviting contributions from the field of input-output analysis.

Dr. Kirsten Svenja Wiebe  
Mr. Marek Harsdorff  
*Guest Editors*



Deadline for manuscript  
submissions:  
**31 March 2021.**

[Link to the webpage](#)

### Special Issue "Carbon Emissions: Economic Consumption"

Global supply chains spread the environmental impacts to producers, which are no longer necessarily related with consumers. Carbon emissions triggered by consumption deserves to be better viewed in the cohesive and dynamic context of globalization, aging society, and economic growth.

This Special Issue will publish high-quality research papers on the inter-disciplinary field of carbon emissions related with economic consumption in the context of diverse socioeconomic backgrounds at a global or regional scale. We also welcome submissions focusing on demand-side mitigation strategies at a customer level.

Dr. Heran Zheng  
Dr. Zengkai Zhang  
Dr. Yuli Shan  
Dr. Ou Jiamin  
*Guest Editors*



Deadline for manuscript  
submissions:  
**15 May 2021.**

[Link to the webpage](#)

## Transformations collection

The journal Global Sustainability invites contributions to a new collection of articles on the topic of Transformations. This Collection is guest-edited by IIOA member Tommy Wiedmann and aims to bring together theoretical and practical knowledge from systematic research in transformations towards sustainability. Contributions from the IIOA community are welcome.

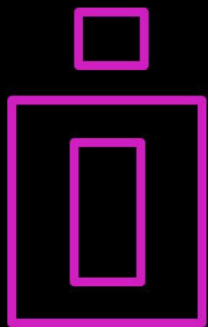
**Thomas Wiedmann**  
(Guest editor,  
Editorial Board  
member)

**Heide Hackmann**  
(Guest editor)

Global Sustainability

Deadline for submissions to  
the collection is **31<sup>st</sup> March  
2021.**

[Link to the webpage](#)



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Job Positions



As the science and knowledge service of the Commission, the mission of DG Joint Research Centre is to support EU policies with independent evidence throughout the whole policy cycle.

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

<https://ec.europa.eu/jrc/>

The Fiscal Policy Analysis Unit of JRC-Seville wishes to recruit an economic modeller to provide quantitative modelling support for EU fiscal policy. This will be delivered within the support framework to DG EMPL, DG ECFIN and DG TAXUD, and involve contexts such as the EU fiscal surveillance framework and the European Semester.

More information about the unit is available here:

<https://ec.europa.eu/jrc/en/research-topic/fiscal-policy-analysis>

The unit has currently the following five vacancies:

### 1) General equilibrium modeller - pension reforms (1 post)

The successful candidate will be expected to support the analysis of pension reforms, through the maintenance and development of an overlapping generation model. Research and analytical work will involve collaboration with other European Commission services and other relevant international organisations and research institutions.

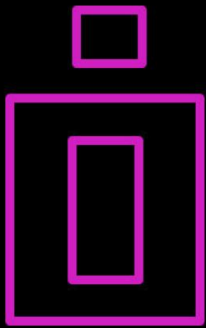
### 2) General equilibrium modeller - corporate taxation (2 posts)

The successful candidates will be expected to support the analysis of corporate tax reforms using applied general equilibrium modelling. The candidates should either have experience in tax policy, or a strong motivation to learn, with a solid knowledge of computable general equilibrium modelling techniques.

### 3) Economic Analyst - Microsimulation modelling (2 posts)

The successful candidates will contribute to the maintenance, update and documentation of the EUROMOD model in close collaboration with EUROMOD national teams and ESTAT. They will contribute to the timely public release of the model and to the preparation of EUROMOD annual country reports. The successful candidates will provide modelling support for the analysis of tax and social reforms in the EU, in particular in the context of the European Semester policy cycle.

[More info in the Link](#)



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## 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.

**Kirsten Svenja Wiebe – Research Scientist,  
SINTEF Department of Sustainable Energy  
Technology (Norway)**



1) I applied for a research job after my masters' degree and the institute (GWS) had all these input-output models described on their website. But I couldn't quite figure out what it was all about, except that it had a lot of numbers, was probably related to some macro-economic analysis, seemed to use matrix algebra, and that you had to have some background in programming to work with the models. That was enough to convince me that it was going to be interesting. During the job interview, when I was asked whether I'd come across input-output models before, I remembered reading this one article for my master thesis on the linear ordering polytope and that it can also be used to order industries in an input-output model. My boss to be seemed happy with that answer, at least he hired me.

2) 2012 in Bratislava. Manfred Lenzen asked me to present in a special session on global multi-regional IO databases (my paper was under review in ESR at that time). So I presented the Global Resource Accounting Model (GRAM), a multi-regional IO database applied to estimate emissions embodied in trade for the Austrian Energy and Climate Fund. Since none of the global multi-regional databases were published at that point, I had developed GRAM based on the OECD input-output tables and bilateral trade data. And of course I had read all the literature and also that other such databases were under construction. And then I was there and read through the programme and all the people who'd written those papers were going to be there.

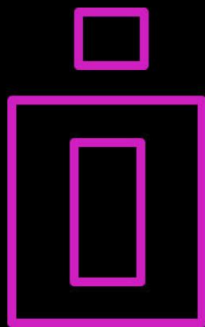
I was really excited. After my presentation, Nori Yamano from OECD (wow, I was impressed) came up to me and was really interested and nice. And Anne Owen started talking to me and she already knew so many people, so it was easy to meet more. Anne and I ended up spending a couple of months in Sydney that (European) winter working with Manfred, and I got to work at OECD with Nori. So for my part, I can highly recommend going to the IIOA conferences!

3) Risking that I might sound boring: I really like the Leontief 1970 paper 'Environmental Repercussions and the Economic Structure: An Input-Output Approach'. I still get inspired by the simplicity for inclusion of technology and environment. I'm also always surprised how few people nowadays have read it. For a more recent paper I can recommend 'New priorities for climate science and climate economics in the 2020s' by Stainforth & Calel. It's not directly IO related, but it emphasises the importance of interdisciplinary in research, learning from other models, and critically challenging modelling outcomes.

**Geoffrey J.D. Hewings – Emeritus Director (SC<sup>3</sup>),  
Regional Economics Applications Laboratory  
(REAL), University of Illinois (USA)**



1) Charlie Tiebout's class at the University of Washington was entitled Regional Income Analysis and it was here that I was introduced to the new field of regional economics and especially to input-output models. Tiebout's charismatic approach to teaching, his wicked sense of humor and his demonstrable enthusiasm for his research quickly struck a resonant chord. During the class, he asked us to review drafts of chapters of Nourse's (1968) book on Regional Economics, adopting an innovation of having students react to a proposed new textbook (Tiebout used the honorarium he received for reviewing the book to host a party at his house as a way of rewarding our efforts).



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## 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.

I learned two important lessons – exposure to this interesting methodology (IO analysis) and the idea that doing research and enjoying friendships were complementary not competing goods. The latter philosophy was the foundation of the Regional Economics Applications Laboratory that I co-founded in 1989.

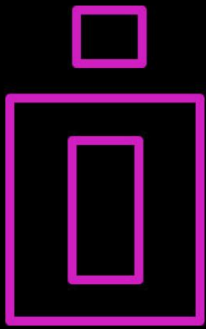
2) First IIOA conference was a UN Conference in Geneva that predated IIOA and held bi-annual conferences sponsored by the UN. This was in 1970 and it was there that I met Leontief, Stone and many others but especially important was renewing meeting with Jack Cumberland who was one of the pioneers in linking IO and environmental analysis and William Miernyk, the leader of the emerging subfield of regional IO analysis and the founder of the Regional Research Institute at West Virginia University.

3) Richard Stone's articles advancing IO-style analysis applied to demographic modeling; apart from many innovations, I loved his characterization of death as "final demand."

Ken'ichi Miyazawa's book *IO Analysis and the Structure of Income Distribution*. I came across this at a time when my research was revealing that there was a concentration of inverse important coefficients in the household row/household column yet most attention was centered in the interindustry part of the IO accounts. Miyazawa's book appeared in the U of Illinois library while Peter Batey from the University of Liverpool was visiting and we were pleased to see potential explorations of what are now referred to as demo-economic models. Model linkage has always been of interest and finally Batey and I prepared a paper together 44 years after this discovery!

Graham Pyatt (ESR 2001) also explored these early linkages between enhanced income accounts and IO systems, making the important distinction between factor (e.g., wages and salaries) and institutional income (factor income plus non-wage and salary income, profits, dividends, rents, transfers).

Finally, if there is one book I would encourage every young scholar to download (it is free) it is Clopper Almon's *The Craft of Economic Modeling*. It is the best applied econometrics book available and shows how he carefully built what is now the INFORUM suite of models. This is one of the first econometric-input-output models, a set of options that is gaining increasing interest now that there is pressure to estimate parameters in economy-wide models. Almon's book is a wonderful reference. Interestingly, Stone, Miyazawa, Pyatt and Almon all paid attention to the role of households in their models and accounting systems.



**Newsletter**  
Number 47, February 2021

# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## The Social Accounting Corner

February 2021 Puzzle

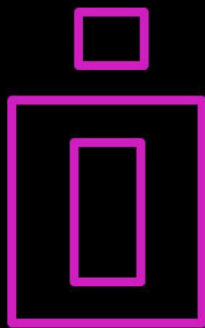
### IIOA Newsletter Acrostics Puzzle #1

contributed by Michael L Lahr

Acrostic puzzles, also known as anacrostics and crostic crosswords, are kind of a combination of the game “hangman” and a traditional crossword puzzle. Each puzzle has a list of clues that is ordered by letter, here from A to MM. The clues are something akin to "What's the capital of Lichtenstein?" you then write the answer (“Vaduz,” if you're wondering) into the adjacent, (five) numbered blanked spaces. Then, you copy those letters into the appropriate boxes of the grid (the crossword-like diagram). Each box of the grid has an alphanumeric symbol (such as “26 K”) that refers to a letter in each clue’s (here hypothetical clue K) answer. In the acrostic here, the boxes are consecutively numbered from 1 to 250.

But that's not all. When finished, the words in the grid form a quote or famous saying. In this case, it is a quote from a source generally well known to members of the IIOA. And there’s more! The clues are ordered in such a fashion that the first letter of each, yields the last name of the author and the title of the resource from which the quote is cited when read from top to bottom (from clue A to clue MM). Have fun!

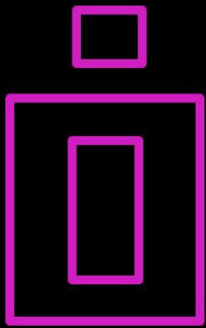




# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

The Social  
Accounting  
Corner

	1	AA	2	P	3	II	4	LL	5	R	6	C		7	G	8	N	9	JJ	10	E	11	C	12	T		13	N	14	B	15	O	16	M	17	A	
18	E	19	H	20	L		21	GG	22	N	23	KK		24	Q	25	GG	26	W		27	M	28	CC	29	H	30	N	31	J	32	A	33	BB	34	FF	
35	MM		36		37	HH	38	BB	39	N		40	Q	41	T	42	X		43	Q	44	U	45	JJ	46	C	47	J	48	G		49	M	50	T		
	51	X	52	J	53	CC	54	EE	55		56	DD	57	T	58	KK	59	I	60	KK	61	T	62	B	63	A	64	O		65	U	66	L		67	H	
	68	Y	69	KK	70	D	71	G	72	N	73	O	74	AA	75	Q	76	HH	77	K		78	E	79	AA	80	LL	81	F		82	M	83	X			
84	Y	85	G	86	S	87	O	88	MM	89	A	90	L	91	Q		92	D	93	G	94	R	95	LL	96	A	97	C		98	FF	99	X	100	AA	101	M
102	II	103	J		104	MM		105	U	106	Y	107	W	108	X	109	BB	110	KK	111	LL	112	A	113	E	114	H		115	A	116	KK	117	II	118	AA	
119	C		120	K	121			122	R	123	U	124	C		125	FF	126	X	127	B	128	V	129	A	130	E	131	CC	132	HH	133	S	134	J	135	Z	
	136	I	137	G		138	MM	139	H	140	Y		141	Q	142	F	143	E	144	II	145	GG	146	X	147	MM	148	K	149	T	150	FF		151	CC		
152	CC		153	II	154	MM	155	M		156	DD	157	P	158	G	159	K	160	C	161	II	162	Z	163	Y	164	W		165	V	166			167	R		
168	S	169	HH	170	CC	171	P	172	EE	173	A	174	U		175	Y	176	O	177	LL	178	Z	179	CC	180	N	181	B		182	S	183	V		184	C	
185	Q	186	L		187		188	K	189	F		190	K	191	BB	192	DD		193	W	194	G	195	U	196	Z	197	Y	198	B	199	W	200	R	201	X	
	202	W	203	D	204	B	205	EE	206	K		207	JJ	208	S		209	GG	210	LL		211	K	212	R	213	E	214	GG	215	L	216	M	217	C		
	218	S	219		220	L		221	R	222	O	223	HH	224	G	225	Y	226	EE	227	L	228	X		229	Q	230	Y	231	I		232	A	233	E		
234	W	235	L	236	Z	237	B	238	V	239	M	240	Q		241	C	242	X	243	EE		244	FF	245	KK	246	Z	247	H	248	R	249	P	250	GG		



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## The Social Accounting Corner

A. Leontief inverse's column sum

89 63 112 17 173 115 129 232 8 32

B. instead of the power-series approach

62 198 127 14 204 181 237

C. biological community

6 160 241 46 217 124 184 119 97

D. biproportional adjustment

70 203 92

E. system of equation symbols

10 130 78 113 143 18 213 233

F. Japanese currency

189 81 142

G. important industry

7 137 93 48 224 85 71 194 158

H. Thjs

247 19 29 114 139 67

I. kept latent

136 59 231

J. related to turnpike growth

47 52 103 31 134

K. major statistical agency

211 159 77 120 206 148 188 190

L. the father

235 186 215 66 220 90 227 20

M. relating to production, distribution,  
and consumption

155 239 82 16 49 216 101 27

N. Sonis

180 72 30 39 22 96 13

O. areal wealth and resources

11 73 15 87 222 64 176

P. musical/foot

2 171 157 249

Q. coefficient of A

40 240 91 185 24 141 43 229 75

R. German author like Maass

94 212 248 122 200 221 5 167

S. professional workplace

86 218 208 182 168 133

T. Leontief leisure occupation

50 57 12 41 149 61

U. ramification

65 195 105 44 174 123

V. null

183 165 238 128

W. J. Asger Olsen's aggregation

202 199 107 234 164 193 26

X. not regulated

99 242 83 42 108 201 146 228 126 51

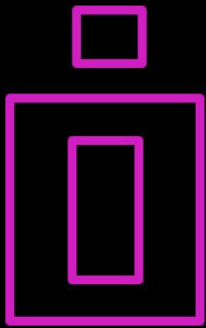
Y. row-column interchange

225 163 106 230 140 68 197 175 84

Z. not input

246 236 135 196 162 178

(continued on the next page)



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## The Social Accounting Corner

AA. money lent at high rates

74 118 1 100 79

BB. unthick

38 191 109 33

CC. retirement pay

131 179 170 53 151 28 152

DD. not Make

56 156 192

EE. subject of an idea

205 226 243 172 54

FF. appended

244 125 98 34 150

GG. limited in scope

214 209 250 145 25 21

HH. André Carrascal, for one

76 132 37 223 169

II. a shadow price variable

3 117 153 144 102 161

JJ. not me

9 207 45

KK. German Herman

23 110 116 245 69 60 58

LL. colmnwise transactions

4 210 80 111 95 177

MM. prices in the dual

147 154 104 35 88 138

IIOA Newsletter Editor:

**Andre Carrascal Incera** [newsletter@iioa.org](mailto:newsletter@iioa.org)  
University of Oviedo, Spain