

# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Welcome from the Editor



Dear IIOA member,

I am pleased to release to you the latest issue of the *International Input-Output Newsletter*.

This issue features information about the next IIOA Conference in Glasgow, Scotland. We hope to see all of you there.

There also information about Latest ESR articles, Highlights in Journals and books, Next courses.

You can also find a Call for International Conference on Input-Output Modelling of Green Growth, 26th APDR Congress, 59th ERSO Congress, 8th Conference of SHAIIO – Sociedad Hispanoamericana de Análisis

Input-Output (Hispanic-American Input-Output Society) and 66th Annual North American Meetings of the Regional Science Association International.

I hope you enjoy it! Any feedback, comments or suggestions are greatly appreciated.

### **Vinicius de Almeida Vale**

*IIOA Newsletter Editor*

Federal University of Parana, Brazil

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# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Conference Programme

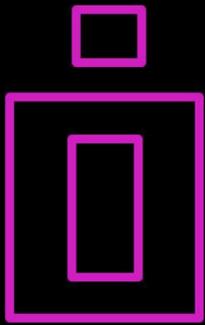
Check the links below for more information about the IIOA Conference in Glasgow:

27 <sup>th</sup> International Input-Output Association Conference in Glasgow, Scotland Technology and Innovation Centre (TIC), University of Strathclyde 30 <sup>th</sup> June - 5 <sup>th</sup> July 2019 Conference Programme Overview (as at 12 <sup>th</sup> May 2019)						
	Sunday 30 <sup>th</sup> June	Monday 1 <sup>st</sup> July	Tuesday 2 <sup>nd</sup> July	Wednesday 3 <sup>rd</sup> July	Thursday 4 <sup>th</sup> July	Friday 5 <sup>th</sup> July
07:30 - 08:00						
08:00 - 08:30	Main Desk and Registration Open (18.00 - 20.00) TIC Foyer - Level 2	Main Desk and Registration Open (18.00 - 20.00) TIC Foyer - Level 2	Main Desk and Registration Open (18.00 - 20.00) TIC Foyer - Level 2	Main Desk and Registration Open (18.00 - 20.00) TIC Foyer - Level 2	Main Desk and Registration Open (18.00 - 20.00) TIC Foyer - Level 2	Main Desk and Registration Open (18.00 - 20.00) TIC Foyer - Level 2
08:30 - 09:00						
09:00 - 09:30		Opening Ceremony TIC Auditorium	Panel Competition Session 1 TIC Auditorium	Panel Competition Session 2 TIC Auditorium	Panel Competition Session 3 TIC Auditorium	
09:30 - 10:00	IIOA Session 1 TIC Rooms 1-5	Primary Session Keynote Speaker Professor John Bennett TIC Auditorium	Primary Session Keynote Speaker Professor David Simpson TIC Auditorium	Primary Session Keynote Speaker Dr Sam Street-Webster TIC Auditorium		Parallel Session 8 TIC - 12 rooms
10:00 - 10:30						
10:30 - 11:00	Refreshment break TIC Foyer - Level 2	Refreshment break and Poster Exhibition TIC Foyer Level 2 and 3	Refreshment break and Poster Exhibition TIC Foyer Level 2 and 3	Refreshment break and Poster Exhibition TIC Foyer Level 2 and 3	Refreshment break and Poster Exhibition TIC Foyer Level 2 and 3	Refreshment break TIC Foyer Level 2 and 3
11:00 - 11:30						
11:30 - 12:00	IIOA Session 2 TIC Rooms 1-5	Parallel Session 1 TIC - 11 rooms	Parallel Session 4 TIC - 11 rooms	Panel Session on "Sustainability, Input Output and the Low Carbon Path" TIC Auditorium	Parallel Session 9 TIC - 12 rooms	
12:00 - 12:30						
12:30 - 13:00	International Input-Output Association Annual Council Meeting	Lunch break TIC Foyer - Level 2 and 3	Lunch break TIC Foyer - Level 2 and 3	Lunch break TIC Foyer - Level 2 and 3	Lunch break and Closing Ceremony TIC Foyer - Level 3 (Education Food Pods)	
13:00 - 13:30	IIOA Council Members and TIC Executive Rooms A					
13:30 - 14:00	IIOA Session 3 TIC Rooms 1-5	Parallel Session 2 TIC - 12 rooms	Parallel Session 5 TIC - 12 rooms	Annual General Assembly TIC Auditorium	Choice of one of four excursions organised • Edinburgh Castle Tour • Stirling Castle Tour • Loch Lomond and Trossachs • Oban Bay	
14:00 - 14:30						
14:30 - 15:00	Refreshment break TIC Foyer - Level 2	Refreshment break and Poster Exhibition TIC Foyer	Refreshment break and Poster Exhibition TIC Foyer	Refreshment break TIC Foyer		
15:00 - 15:30	IIOA Session 4 TIC Rooms 1-5	Parallel Session 3 Development Programme TIC - 12 rooms	Parallel Session 6 TIC - 12 rooms	Parallel Session 7 TIC - 11 rooms	AGB Report, and arrive back to (Breakfast)	
15:30 - 16:00						
16:00 - 16:30	1-2 Builders TIC Foyer - Level 2					Free time to explore Glasgow City and after
16:30 - 17:00						
17:00 - 17:30						
17:30 - 18:00						
18:00 - 18:30	International School of Input-Output Analysis (IIOA) Reception	Economic Systems Research (ESRA) Editorial Board Meeting (Invitation only) TIC Executive Room A				Wishing you a good trip back home, see you all in 2020 for the 28 <sup>th</sup> IIOA Conference.
18:30 - 19:00	ESRA Students, Trainers and IIOA Council Members					
19:00 - 19:30	Welcome to the 26 <sup>th</sup> IIOA Conference TIC Foyer - Level 2	Young Researcher's Night at Dunlop Brewery City Chambers	Optional Fringe Event "Dinner with legends" at Glasgow University (Not included in the Conference Registration fee)	IIOA Conference Dinner and Open Scottish Caskie at City Hall and Old Fruitmarket (Exceedingly) (Last drink orders 22.30 and close by 23.00)		
19:30 - 20:00						
20:00 - 20:30						
20:30 - 21:00						
21:00 - 21:30						

Check the Conference Programme [here!](#)



- [The Conference](#)
- [Conference Vision](#)
- [Conference Location](#)
- [Conference Programme](#)
- [Keynote Speakers](#)
- [Panel Session Speakers](#)
- [Supporting Organisations](#)
- [Local Organising Committee](#)
- [Scientific Programme Committee](#)
- [Paper submission using COPASS](#)
- [Abstracts and Papers](#)
- [Travel Grants](#)



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Keynote Speakers



### **Professor John Barrett – Career profile**

John Barrett is a Professor in Energy and Climate Policy at the Sustainable Research Institute, University of Leeds with over 20 years of experience in energy and climate policy. John's research interests include energy demand, resource productivity, energy and economy modelling, carbon accounting and exploring low carbon transitions.

John has been the Director of a number of large research centres that has employed a range of modelling approaches, including Multi-Regional Input-Output Models to understand how changes in production and consumption can contribute to a low carbon future.

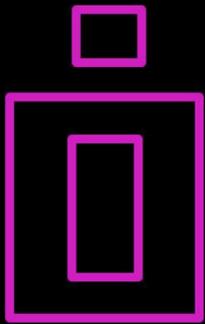
John was the Director of the Centre for Industrial Energy, Materials and Products (CIE-MAP – [www.ciemap.ac.uk](http://www.ciemap.ac.uk)), a GBP 4 million initiative funded by the UK Research Council. The centre explored how using material and products differently could contribute to the UK carbon targets. John is now a Co-Director for the Centre for Research in Energy Demand Solutions (CREDS – [www.creds.ac.uk](http://www.creds.ac.uk)). This GBP 19 million initiative is a new research centre established in 2018 with a vision to make the UK a leader in understanding the changes in energy demand needed for the transition to a secure and affordable, low carbon energy system.

John's research is applied in various arena having been an advisor to a number of UK Government departments, Government Select Committees and agencies such as the Committee on Climate Change. John's research team are responsible for providing annual headline Government indicators that rely on their UK MRIO model, including an indicator on "Consumption-based GHG emissions" and "Resource Productivity". Their research findings have provided evidence and influenced many Government publications related to energy demand projections, climate policy and resources and waste strategies. John was also a lead author for the International Panel on Climate Change, Working Group III.

### **John's presentation theme**

Using a wide range of examples, John will demonstrate how the use of MRIO models in the UK have had a real impact on environmental policy. Ranging from changing the way we monitor the impact to setting meaningful carbon targets and exploring the mitigation potential on a range of production and consumption based strategies.





# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Keynote Speakers



### **Michelle Chivunga Nsanzumuco – Career profile**

Michelle studied at the University of Surrey obtaining 1<sup>st</sup> Class Honours Degree in Business / Tourism at the International Tourism and Hospitality School at the University of Surrey. Michelle progressed her higher education studies evaluating housing and economic development models. Michelle started her career working in consultancy in the hotel investment sector and then analysing/influencing UK government policy and designing policy/economic frameworks.

Michelle then joined the Corporate Finance Division at the British Bankers Association (now known as UK Finance) leading the development of various financing frameworks and instruments as well as supporting businesses in accessing capital and diversification initiatives. Michelle also analysed the impacts of macro-economic/financial policy developments post the crisis, supporting the financing/banking sector recovery programs and working in partnerships with EU/Global finance leader. Michelle spent time leading the UK representation at global level, well recognised for contributions in a wide range of working groups engaging with institutions such as the European Commission, European Banking Federation, World Bank, HM Treasury and British Chambers of Commerce.

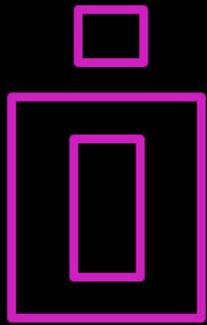
Michelle is currently Chair of the International Committee and Senior Regional Advisor (Africa) at the British Blockchain Association (BBA) exploring emerging technologies such as Blockchain technology. In particular, in the context of international development, climate change, trade, enterprise and sustainable development. Often referred to as a young thought leader in the Blockchain space, Michelle is a recognised leader with global experience working with many senior stakeholders, mainly reviewing the impact of emerging technology such as Blockchain for different segments of society and supporting women/business/government and others to educate and foster social and economic development.

Michelle is also part of the University of Surrey, having joined to evaluate emerging technologies including working on DLT/Blockchain projects within Surrey Business School's Centre for Digital Economy. Michelle leads in designing Surrey Business School executive education programs around leadership, digital economy and many other educational areas, designing innovative programs to support businesses, governments and other global institutions.

### **Michelle's presentation theme**

Michelle will cover the Blockchain technology. Michelle will tap into the innovative potential of Blockchain for value creation, transparency and trust– An introduction to Blockchain technology and its potential for more sustainable and inclusive global value chains.





# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Keynote Speakers



### **Professor David Simpson – Career profile**

David Simpson graduated from Edinburgh University in 1959 with a First Class Honours Degree in Economics. David gained his Ph.D. in 1963 from Harvard University, where he was the research assistant to Wassily Leontief from 1962 to 1964. With Jinkichi Tsukui, he published "The Fundamental Structure of Input-Output Tables", (Review of Economics and Statistics 1965).

From 1964 to 1965, David was attached to the Statistical Office of the United Nations in New York, where he prepared a manual on the compilation of Input-Output (I-O) Tables for the use of Government Statistical Offices. This was published by the UN in 1966 as "Problems of Input-Output Tables and Analysis". David then moved to the Economic Research Institute in Dublin working on Irish economic statistics, publishing "Some Tests of Stability in Interindustry Coefficients" (Econometrica 1969) with Jim McGilvray.

Both David and Jim moved to the University of Strathclyde in Glasgow where, with the help of many others, they began to construct a 78 industry I-O Table of the Scottish economy for the year 1973. Thereafter, the UK Government took over the responsibility of compiling I-O Tables for Scotland in conjunction with its national accounting exercise.

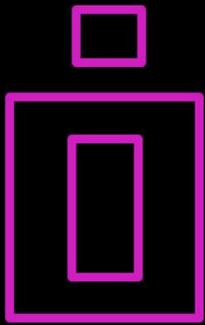
In 1988, David was appointed Economic Adviser to Standard Life, at that time Europe's largest mutual life assurance company. David retired from Standard Life in 2001, and in 2005 became Vice-Chairman of the Water Industry Commission for Scotland, the regulator of the publicly owned water monopoly Scottish Water.

David is the author of several books including "Rethinking Economic Behaviour" (2001) as well as articles in periodicals ranging from Scientific American to The Financial Times and The Spectator. David's latest book, "The Truth About The Economy" will be published in 2020.

### **David's presentation theme**

In his presentation, David will include personal recollections of Wassily Leontief, an account of some significant developments in I-O analysis in the 1960s and the construction of the first ever I-O Tables for Scotland. In addition, David will discuss the challenges and opportunities that lie ahead for today's young scholars.





# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Keynote Speakers



### **Dr Silke Stapel-Weber – Career profile**

Silke Stapel-Weber studied Macroeconomics and Statistics in Berlin and Novosibirsk gaining a Master's Degree in Macroeconomics in 1986. In 1989, Silke received her PhD for a study on the "Long-term effects of neglected maintenance and investment on the capital base and productivity of an economy, using hedonic methods".

Silke has over 25 years of knowledge and experience in official macroeconomic statistics and academia. Over this period, Silke has held various technical and management positions in the: Central Statistical Office of the former German Democratic Republic; German Federal Statistical Office; Publications Office of the European Union (EU); and Eurostat (the Statistical Office of the EU).

Silke's main responsibilities as Director for Macro-Economic Statistics at Eurostat from 2014 to 2019 included National Accounts (including Input-Output Tables and Supply and Use Tables), Prices and Balance of Payments. The responsibilities covered methodological development, regular data production and publication, development of new products, better meeting a wide range of user needs, compliance and quality management. This covered Eurostat as well as international cooperation across, and with each of, the 28 EU Member States and other international organisations. Silke has represented Eurostat in various professional bodies, including the Inter-Agency Group (which involves the UN, IMF, ECB, BIS, World Bank, OECD and the European Commission) and responsibilities in the G-20 context.

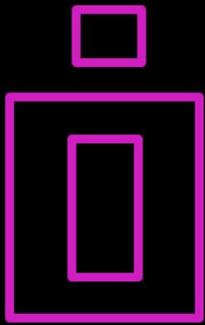
From the beginning of February 2019, Silke has become the General Director for Statistics at the European Central Bank (ECB). Silke will lead this Directorate-General of the ECB which provides statistical services to the ECB and its banking supervision arm as well as other ECB and European System of Central Banks tasks, and to the European Systemic Risk Board.

Silke is also an elected member of the International Statistical Institute and was nominated co-chair of the International Comparison Programme (ICP) Technical Advisory Group at the World Bank (2002-2007).

### ***Silke's presentation theme***

In her presentation, Silke will reflect on how she has used the I-O framework. In particular, in an increasingly globalised world where the I-O framework is key in providing a coherent and wider picture joining the various dots. Silke will describe the uses of I-O when working in East Germany, when helping EU Candidate Countries through to more recent developments like Global Value Chains and Trade in Value Added. Silke will discuss the rapidly growing importance of Input-Output Tables and Supply and Use Tables, for both producers (National Statistical Offices and international organisations) and users of official statistics (for example, a range of policy users).





# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Panel Session Speakers

Another innovation at the 2019 IIOA Conference will be the introduction of a Panel Session, which will be held on the Thursday, 4<sup>th</sup> July 2019.

There will be three Panel Session Members as well as a facilitator covering the topic:

### "Sustainability, Input-Output and the Low (or zero) carbon transition"

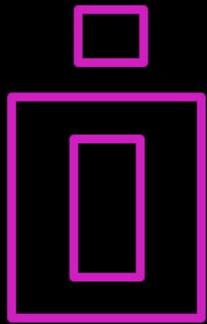
•The 2019 IIOA Panel Session Members will be:

- Ivo Havinga** (United Nations Statistics Division);
- Glenn Everett** (Office for National Statistics); and
- Professor Karen Turner** (University of Strathclyde).

The Panel Session Facilitator will be **Graeme Sweeney**, who Chairs the Main Board of the Children's Investment Fund Foundation and the Advisory Council of the European Technology and Innovation Platform for Zero Emission Plants.



➡ Check [here](#) for more information!



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Published papers and books in IOA and related methods

### Latest ESR articles

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

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

#### [Volume 31, Issue 2, 2019](#)



**Lin, C. and Nakamura, S.** [Approaches to solving China's marine plastic pollution and CO<sub>2</sub> emission problems.](#) *Economic Systems Research*, 31(2): 143-157.

Global contamination of the oceans by waste plastics is of increasing concern. Besides being the largest emitter of CO<sub>2</sub> in the world, China is suspected of being the largest contributor to marine plastic waste pollution. Responsible for the latter is the still inadequate management of waste in China, a significant improvement of which is necessary for addressing the issue of marine plastic pollution. Since plastics are hydrocarbons, submitting them to appropriate waste treatment/recycling technologies could contribute to mitigating the emission of CO<sub>2</sub>, indicating the possibility of addressing the two environmental issues simultaneously. Based on the combined use of waste input-output and

linear programming, we investigated options for mitigating CO<sub>2</sub> emissions under consideration of alternative waste treatment/recycling processes applied to waste plastics of China. It was found that of the nine processes considered, four could result in a net reduction in the emission: a win-win situation.

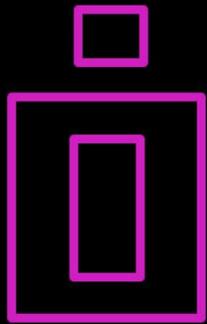
**Philippidi, G., Bartelings, H., Helming, J., M'barek, R., Smeets, E. and van Meijl, H.** [Levelling the playing field for EU biomass usage.](#) *Economic Systems Research*, 31(2): 158-177.

The threats of climate change, food security, resource depletion and energy security are driving society towards a sustainable low-carbon future. Within this paradigm, biomass plays an invaluable role in meeting the food, feed, energy and material needs of future generations. Current EU thinking advocates biomass for high-value materials, which is not aligned with EU public policy support for 'lower value' bioenergy applications. 'High-technology' and 'no bioenergy mandate' pathways explore market conditions that generate a more equitable distribution between competing biomass conversion technologies and competing biomass and fossil technologies. In achieving greater equity, these pathways ease biomass market tensions;

enhance EU food security; improve EU biobased trade balances; accelerate biomaterial sectors' output performance and favour macroeconomic growth. Moreover, an additional 80% increase in the oil price signals a tipping point in favour of first generation biofuels, whilst simultaneously boosting output in advanced material conversion technologies even more than the high-technology pathway.

**Guevara, Z., Molina-Pérez, E., García, E. X. M. and Pérez-Cirera, V.** [Energy and CO<sub>2</sub> emission relationships in the NAFTA trading bloc: a multi-regional multi-factor energy input-output approach.](#) *Economic Systems Research*, 31(2): 178-205.

The North-America Free Trade Agreement (NAFTA) has brought together the economies of Canada, Mexico, and the US into forming one of the largest trading blocs worldwide (within the top CO<sub>2</sub> emitters). However, the current global protectionist discourse threatens the agreement. This paper analyzes the energy and energy-related CO<sub>2</sub> emission relationships between NAFTA countries in 2014 to gain insights into the climate change implications of current integration and the possible cancellation of the agreement. The analysis is performed with a multi-regional version of the multi-factor energy input-output model.



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The results show that NAFTA has not built a single integrated energy system, though it has helped reduce energy-related CO<sub>2</sub> emissions. Moreover, if NAFTA is not revoked, further integration would depend on the capacity of the Mexican energy sector to converge to the performance of its trade partners' energy sectors. Conversely, a broken deal would induce negative environmental externalities.

**Piñero, P., Bruckner, M., Wieland, H., Pongrácz, E. and Giljum, S.** [The raw material basis of global value chains: allocating environmental responsibility based on value generation.](#) *Economic Systems Research*, 31(2): 206-227.

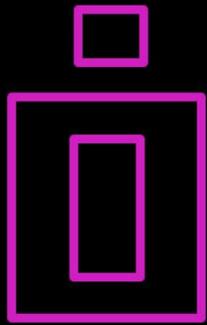
A new approach to allocate environmental responsibility, the 'value added-based responsibility' allocation, is presented in this article. This metric allocates total environmental pressures occurring along an international supply chain to the participating sectors and countries according to the share of value added they generate within that specific supply chain. We show that – due to their position in global value chains – certain sectors (e.g. services) and countries (e.g. Germany) receive significantly greater responsibility compared to other allocation approaches. This adds a new perspective to the discussions concerning a fair distribution of mitigation costs among nations, companies and consumers.

**Cordier, M., Poitelon, T. and Hecq, W.** [The shared environmental responsibility principle: new developments applied to the case of marine ecosystems.](#) *Economic Systems Research*, 31(2): 228-247.

Estuaries provide advantageous sites for both harbors and fish habitats. In many countries, harbor expansion in estuaries contributed to the decline of fish populations with impacts at the global scale. Restoring these habitats is important to prevent a global biodiversity crisis but is costly and potentially unaffordable for polluters under the Polluter Pays Principle. Such affordability issues prompt decision-makers to reduce environmental targets of restoration programs. Harbor infrastructures destroy fish habitats but generate benefits for society and contribute to the public interest, raising some questions on who is responsible for environmental degradations and who can afford environmental restoration costs? One way to allocate restoration costs is to analyze the amount of harbor services consumed by economic sectors. This paper addresses these questions by computing burden sharing scenarios with an input-output matrix. These scenarios are simulated under the shared responsibility principle to distribute restoration costs among stakeholders in the Seine estuary, France.

**Kanemoto, K., Hanaka, T., Kagawa, S. and Nansai K.** [Industrial clusters with substantial carbon-reduction potential.](#) *Economic Systems Research*, 31(2): 248-266.

To successfully reduce environmental emissions, companies need to expand the scope of their emissions accounting to include entire supply chains. A clustering approach has been used to find emission-intensive industry clusters. However, this approach did not include entire direct and indirect supply chains when forming high emission industry clusters. We propose a new method based on a modified normalized cut function with Leontief's input-output model and basic clustering algorithms to find industry clusters with high levels of embodied within-cluster emissions that are well separated in the supply chain network. We use this method to identify 58 carbon-intensive clusters of Japanese industries and visualize the within-cluster supply chains in terms of embodied carbon flows. We recommend that companies collaborate within clusters to reduce environmental emissions. Our results provide new insights on where to target emissions reduction actions and technology development within industrial supply chains.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Freire-González, J. and Ho, M. S.** [Carbon taxes and the double dividend hypothesis in a recursive-dynamic CGE model for Spain.](#) *Economic Systems Research*, 31(2): 267-284.

A carbon tax is potentially a policy that can reduce CO<sub>2</sub> emissions and mitigate climate risks, at lowest economy-wide costs. We develop a dynamic CGE model for Spain to assess the economic and environmental effects of a carbon tax, and test the double dividend (DD) hypothesis. We simulate the impact of three carbon taxes: €10, €20 and €30 per ton of CO<sub>2</sub>. For each tax, four 'revenue recycling' scenarios are examined: a reduction of taxes on capital, on labor, on value-added tax, and a scenario in which revenues are not recycled. We find a DD for taxes of €10/ton and lower, within five to seven years of implementation. We estimate an annual CO<sub>2</sub> emissions reduction of around 10% with this tax. Under some circumstances, the DD can be achieved for a tax of €20/ton. In any case, recycling revenues to cut pre-existing taxes reduces costs of imposing carbon taxes.

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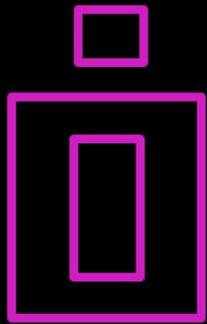


**Ulriche, P. and Ulrike, L.** [Economic effects of an E-mobility scenario – input structure and energy consumption.](#) *Economic Systems Research*.

The development of a strong domestic market for E-mobility is given a high priority and it is counted as an impulse for the transformation towards a Green Economy in Germany. Replacing the combustion engine by alternative drives can trigger a variety of macroeconomic effects. The paper presents the results of a model-based analysis. In particular, effects on the value chain of the automotive industry and the demand for consumer goods are explicitly modelled. An E-mobility scenario that meets the six million E-vehicles by a 2030 target is compared with a reference scenario. Assuming a substitution of inputs within the automotive industry by inputs from the electrical engineering sector, negative effects in vehicle production are offset by positive effects in energy technology production. For the macroeconomic effects, the development of imports and exports is crucial. In the scenario comparison presented here, short- to medium-term employment effects are slightly positive.

**Faturay, F., Sun, Y., Dietzenbacher, E., Malik, A., Geschke, A. and Lenzen, M.** [Using virtual laboratories for disaster analysis – a case study of Taiwan.](#) *Economic Systems Research*.

Due to its geographic location, Taiwan frequently experiences severe natural disasters (for example earthquakes and typhoons) that significantly interrupt business operations and subsequently cause extensive financial losses. Prior work on economic losses resulting from such natural disasters in Taiwan has not considered regional and sectoral spillover effects. In this work, we estimate the economic impacts resulting from the 1999 Chichi earthquake, the 2009 typhoon Morakot, the 2016 Tainan earthquake, and the 2016 typhoon Megi. We do so in the new TaiwanLab, a collaborative virtual laboratory that is capable of generating a time-series of subnational multiregional input-output (MRIO) tables, capturing interregional transactions among 267 sectors across Taiwan's 22 city-counties. We identify critical economic sectors in regions of high vulnerability to natural disasters. Our research is, thus, a credible reference to decision-making that determines regional and sectoral prioritisation for damage mitigation, improved resiliency, and faster recovery schedules.



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**Lenzen, M.** [Aggregating input-output systems with minimum error.](#) *Economic Systems Research.*

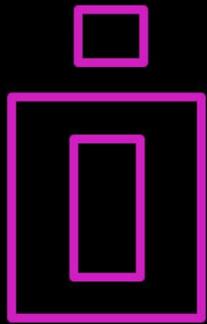
Recent advances in multi-region input-output (IO) table construction have led to large databases becoming available. Some of these databases currently demand too much computer memory or user cognition to be handled effectively outside high-performance environments, especially for applications such as virtual laboratories, computable general equilibrium modelling, linear programming, series expansion, or structural decomposition analysis, thus inhibiting their widespread use by analysts and decision-makers. Aggregation is an obvious solution; but there is a need for structured approaches to aggregating an IO system in a way that does not compromise the ability to effectively answer the research question at hand. In this article, I describe how structural path analysis can be used to realise a computationally inexpensive method for aggregating IO systems whilst minimising aggregation errors. I show that there exists no one-fits-all strategy, but that optimal aggregation depends on the research question at hand.

**Bagheri, M., Alivand, M. S., Alikarami, M., Kennedy, C. A., Doluweera, G. and Guevara, Z.** [Developing a multiple-criteria decision analysis for green economy transition: a Canadian case study.](#) *Economic Systems Research.*

Recent advances in multi-region input-output (IO) table construction have led to large databases becoming available. Some of these databases currently demand too much computer memory or user cognition to be handled effectively outside high-performance environments, especially for applications such as virtual laboratories, computable general equilibrium modelling, linear programming, series expansion, or structural decomposition analysis, thus inhibiting their widespread use by analysts and decision-makers. Aggregation is an obvious solution; but there is a need for structured approaches to aggregating an IO system in a way that does not compromise the ability to effectively answer the research question at hand. In this article, I describe how structural path analysis can be used to realise a computationally inexpensive method for aggregating IO systems whilst minimising aggregation errors. I show that there exists no one-fits-all strategy, but that optimal aggregation depends on the research question at hand.

**Sommer, M. and Kratena, K.** [Consumption and production-based CO<sub>2</sub> pricing policies: macroeconomic trade-offs and carbon leakage.](#) *Economic Systems Research.*

This paper applies a DYNK (Dynamic New Keynesian) model to compare the traditional environmental tax reform for greenhouse gas (GHG) emissions with a taxation scheme that taxes GHG emissions embodied in consumption within the framework of a unilateral policy of the EU-27. The embodied emissions of different commodities are taxed independently of their origin. The GHG tax rates applied are identical and new revenues are in both cases recycled via lower social security contributions of employers. The results show the macroeconomic results, driven by the different impact of the taxation schemes on price competitiveness of EU-27 firms. These differences drive the leakage and show negative leakage in the case of taxing embodied GHG emissions. Both taxation schemes are also regressive for household incomes emphasizing the importance of the choice of revenue recycling. In terms of emission reduction, we find the taxation of emissions embodied in consumption less effective.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Tian, K., Dietzenbacher, E. and Jong-A-Pin, R.** [Measuring industrial upgrading: applying factor analysis in a global value chain framework.](#) *Economic Systems Research.*

A key question for promoting international competition is how to improve the position of countries and industries in global value chains (GVCs). The first step is to properly measure industrial upgrading in GVCs. This is not a trivial issue because upgrading has not been defined unambiguously. Several authors have used different (and sometimes related) measures, all of which indicate certain aspects of upgrading. Rather than trying to find the single, ultimate measure of upgrading, we propose a different approach. We examine the multidimensionality of industrial upgrading, using eight indicators in factor analysis. Four of the eight indicators adopt the GVC perspective and include, for example, the growth of the share in value-added exports. We provide three quantitative dimensions of industrial upgrading: process upgrading, product upgrading, and skill upgrading. With these dimensions, we compare and analyze the upgrading of different countries and industries using the World Input-Output Database.

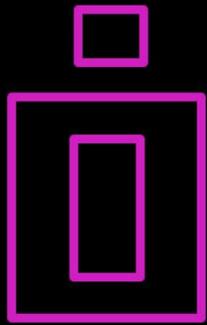
**Duarte, R., Sarasa, C. and Serrano, M.** [Structural change and female participation in recent economic growth: a multisectoral analysis for the Spanish economy.](#) *Economic Systems Research.*

Economic growth has different impacts on gender gaps. In recent decades the growing participation of women in the labour market has reduced the gender employment gap, however a notable gender pay gap still persists standing at around 15% on average in the European Union. In this context, this paper evaluates the impact of economic growth patterns on the evolution of gender employment and pay gaps. First, sectorial feminization, direct discrimination, and structural change factors are identified and evaluated as ways to explain changes observed in the gender pay gap. Second, we explore the influence of demand, technology, and intensity factors on the evolution of employment combining gender, skill, sectorial, and temporal perspectives. As a case study, we examine Spanish economic growth from 1980 to 2007 and the influences on the size, composition (by skill), and distribution (by sector) of female and male employment, as well as the consequences for gender gaps. Our results show that structural change contributed to reduce the gender employment gap in Spain; while the evolution of the gender pay gap is less conclusive, following a sort of inverted U-shape.

This paper shows the suitability and potential of the multisectoral input-output framework to analyse structural and technological changes and their impacts on the gender employment and pay gaps.

**Rodrigues, J. F. D., Amores, A. F. and Paulo, R.** [Bayesian selection of technology assumptions for the transformation from supply-use to input-output tables.](#) *Economic Systems Research.*

In the construction of input-output models from supply-use tables, technology assumptions disambiguate how an industry uses inputs in the production recipe of multiple outputs. This paper uses Bayes' theorem to select technology assumptions, taking into account empirical observations. The paper presents a formulation to explore hybrids between product and industry technology assumptions in product-by-product tables. We then present Markov chain Monte-Carlo techniques to implement the Bayesian method for selecting technology assumptions. We apply the method in a case study using Eurostat supply-use tables of 2004 and 2005, exhibiting a volume of secondary products of less than 13%, and 59 products and industries per country. The results show that the choice of technology is not important, given that there is no strong evidence in favour of any of them.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Zhang, N. and Zhao, X.** [Measuring global flow of funds: focus on China, Japan, and the United States.](#) *Economic Systems Research.*

This paper aims to establish a new statistical framework for measuring global flow of funds (GFF) based on its inherent mechanisms. It advances a previous theoretical discussion and develops a practical operational statistical matrix. Based on theoretical and practical possibilities the paper gets existing data from the International Investment Position, the Coordinated Direct Investment Survey, the Coordinated Portfolio Investment Survey, and International Banking Statistics are integrated for measuring GFF. The main outcome is a prototype GFF matrix that includes stock data geographically disaggregated by country/region and selected financial instruments. The paper presented GFF Matrix compiled with the pattern of 'Country vis-à-vis Country' matrix, and through using the GFF matrix to analyze the basic status, mutual relationship and existing problems between China, Japan, and the United States in the external financial positions.

**Dietzenbacher, E., van Burken, B. and Kondo, Y.** [Hypothetical extractions from a global perspective.](#) *Economic Systems Research.*

The hypothetical extraction method (HEM) has been widely used to measure interindustry linkages and the importance of industries. HEM considers the hypothetical situation in which a certain industry is no longer operational. HEM was developed for national economies, using national

input-output tables. When performing HEM, it is assumed (often implicitly) that the input requirements that were originally provided by the extracted industry are met by additional imports in the post-extraction situation. Applying HEM to global multiregional input-output tables then causes serious problems. It is no longer sufficient to assume that the required inputs are imported. Instead, it is necessary to indicate explicitly how much is imported from each origin to replace the original inputs. Our adaptation of HEM is the global extraction method (GEM). As an illustration, GEM is applied to the extraction of the motor vehicle industry in China, the US, and Germany, using the 2014 WIOD input-output table.

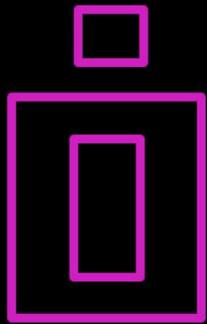
**Steenge, A., Bouwmeester, M. and Incera, A. C.** [Rents, resources, and multiple technologies; Ricardian mechanisms in input-output modelling.](#) *Economic Systems Research.*

To allow for 'multiple technologies' to produce a homogeneous output in input-output models, Duchin and Levine [(2011) [Sectors may use Multiple Technologies Simultaneously: The Rectangular Choice-of-technology Model with Binding Factor Constraints](#), *Economic Systems Research*, 23(3), 281–302] propose an optimization model constrained by primary resources. We show that the Duchin–Levine model contains two different mechanisms by which multiple technologies can arise. If a factor in short supply is shared by the original and the newly entering technology, the output of the original, lower-cost

technology will be reduced to make room for the higher-cost technology which is less intensive in that factor. In contrast, if the factor in short supply is technology-specific, a higher-cost technology supplements the original lowest-cost one, which stays fully active. Either mechanism implies a mechanism-specific set of prices, quantities and rents. We relate these results to classical views on comparative advantage, fixed output levels and the origin of rents.

**Torres-González, L. D. and Yang, J.** [The persistent statistical structure of the US input-output coefficient matrices: 1963–2007.](#) *Economic Systems Research.*

The paper finds evidence for the existence of a statistical structure in the US input-output coefficient (A) matrices for 1963–2007 and characterizes the identified statistical regularities. For various aspects of A matrices, we find smooth and unimodal empirical distributions (EDs) with a remarkable stability in their functional form for most of the samples. The EDs of all entries, row sums, and the entries of the (left- and right-hand) Perron–Frobenius eigenvectors are well described by fat-tailed distributions, while the EDs of column sums and eigenvalues' moduli are explained by the normal and the beta distribution. The paper provides several economic interpretations of these statistical results as well as some implications and potential uses for structural and stochastic input-output analysis.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Cai M. and Rueda-Cantucho, J. M.** [Bridging macroeconomic data between statistical classifications: the count-seed RAS approach.](#) *Economic Systems Research.*

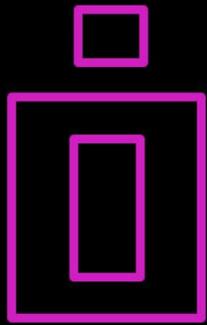
In applications, it is often necessary to link heavily aggregated macroeconomic datasets adhering to different statistical classifications. We propose a simple data reclassification procedure for those cases in which a bridge matrix grounded in microdata is not available. The essential requirement of our approach, which we refer to as count-seed RAS, is that there exists a time period or a geographical entity similar to the one of interest for which the relevant economic variable is observed according to both classifications. From this information, a bridge matrix is constructed using bi-proportional methods to rescale a seed matrix based on a qualitative correspondence table from official sources. We test the procedure in two case studies and by Monte Carlo methods. We find that, in terms of reclassification accuracy, it performs noticeably better than other expeditious methods. The analytical framework underlying our approach may prove a useful way of conceptualizing data reclassification problems.

**Mary, S., Phimister, E., Robert, D. and Santini, F.** [A Monte Carlo filtering application for systematic sensitivity analysis of computable general equilibrium results.](#) *Economic Systems Research.*

Parameter uncertainty has fuelled criticisms on the robustness of results from computable general equilibrium models. This has led to the development of alternative sensitivity analysis approaches. Researchers have used Monte Carlo analysis for systematic sensitivity analysis because of its flexibility. But Monte Carlo analysis may yield biased simulation results. Gaussian quadratures have also been widely applied, although they can be difficult to apply in practice. This paper applies an alternative approach to systematic sensitivity analysis, Monte Carlo filtering and examines how its results compare to both Monte Carlo and Gaussian quadrature approaches. It does so via an application to rural development policies in Aberdeenshire, Scotland. We find that Monte Carlo filtering outperforms the conventional Monte Carlo approach and is a viable alternative when a Gaussian quadrature approach cannot be applied or is too complex to implement.

**Valderas-Jaramillo, J. M., Rueda-Cantucho, J. M., Olmedo, E. and Beutel, J.** [Projecting supply and use tables: new variants and fair.](#) *Economic Systems Research.*

We have introduced in this paper new variants of two methods for projecting Supply and Use Tables that are based on a distance minimisation approach (SUT-RAS) and the Leontief model (SUT-EURO). We have also compared them under similar and comparable exogenous information, i.e.: with and without exogenous industry output, and with explicit consideration of taxes less subsidies on products. We have conducted an empirical assessment of all of these methods against a set of annual tables between 2000 and 2005 for Austria, Belgium, Spain and Italy. From the empirical assessment, we obtained three main conclusions: (a) the use of extra information (i.e. industry output) generally improves projected estimates in both methods; (b) whenever industry output is available, the SUT-RAS method should be used and otherwise the SUT-EURO should be used instead; and (c) the total industry output is best estimated by the SUT-EURO method when this is not available.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Okuyama, Y. and Yu, K. D.** [Return of the inoperability](#). *Economic Systems Research*.

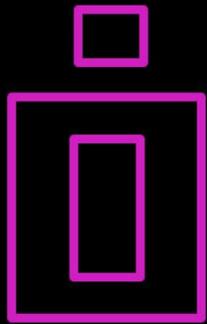
There has been unrest in the research community investigating the inoperability of an economic system under disaster situations. The inoperability input-output model (IIM), which is very popular in the risk management field, has become a center of argument, particularly from the input-output researchers, that IIM is a straightforward application of the standard Leontief input-output model. This paper revisits the concept of inoperability, rather than IIM, and proposes its new role in disaster impact analysis using a conventional tool, i.e. the RAS method, for illustrating how the inoperability of an economic system in the aftermath of disaster can be evaluated. The proposed framework is employed to examine the inoperability of industries resulting from the 1995 Kobe earthquake. The findings of the analysis reveal the usefulness of inoperability concept that can even incorporate resilience (gained operability) using the proposed framework of this paper.

**Chen, Q., Zhu, K., Liu, P., Chen, X., Tian, K., Yang, L. and Yang, C.** [Distinguishing China's processing trade in the world input-output table and quantifying its effects](#). *Economic Systems Research*.

Distinguishing processing trade is crucial to national input-output table-based research on China's international trade. This paper further investigates the importance of distinguishing China's processing trade in multicountry input-output table-based studies. We focus on the bias in China's bilateral trade in value added caused by China's undistinguished processing trade. We construct a product-by-product world input-output table capturing China's processing trade based on the World Input-Output Database. Empirical studies show that, if China's processing trade is undistinguished, the profile of China's bilateral trade in value added would be seriously distorted; China's bilateral net trade in value added with some economies, such as Japan, Korea and Taiwan, would be significantly underestimated, while it would be significantly overestimated for some other economies, such as the United States. Distinguishing processing trade in multicountry input-output tables is also crucial when China's bilateral trade in value added is considered.

**Schumacher, D.** [The integration of international financial markets: an attempt to quantify contagion in an input-output-type analysis](#). *Economic Systems Research*.

The increasing integration of international financial markets means that credit defaults in one country have to be covered by creditors in other countries. If the principle of creditor liability were applied systematically, the financial losses incurred by the financial institution that provided the credit and is thus directly affected by the default would be 'passed on' through its domestic and foreign shareholders and debt holders, as well as their creditors, to the original savers. In this paper, this contagion effect will be estimated by taking international capital linkages into account. Analogously to an input-output analysis of inter-industry linkages, savings used for investments in one country are traced back to the countries from which the funds originated. This also reveals the important role of international financial centers, which essentially serve as distributors of investment risks, while the financial losses are ultimately borne by larger countries with higher levels of savings.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Monsalve, F., Zafrilla, J., Cadarso, M. and García-Alaminos, A.** [Is the emperor wearing new clothes? A social assessment of the European Union 2007–2013 financial framework.](#) *Economic Systems Research*.

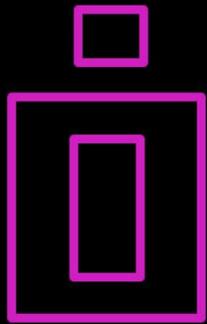
Over the years, European leaders have proudly waved a social flag as one of the European Union's (EU) constituent and differentiating elements. This commitment is assessed here through the social footprint of the European Union 2007–2013 multiannual financial framework among the EU countries and, worldwide, using an extended multiregional input-output model. The focus is on the quantity and the quality of income and jobs generated. We find that well-known differences among its northern, southern and eastern regions threaten the EU's intentions for high social standards, enabling first- and second-class winners. Core EU countries account for the most of the Funds and, thus, most of the positive economic and social impacts, mainly through spillovers from peripheral regions. Beyond the EU borders, Funds expenditures induce capital compensation boosts in emerging countries not balanced by a similar labor compensation impulse. Indeed, China captures the bulk of low-skilled and temporary employment.

**Gurgul, H. and Lach, L.** [Tracing VARDI coefficients: a proposal.](#) *Economic Systems Research*.

We propose a new approach for tracing the so-called 'value-added-(re)distribution-important coefficients' (in short the VARDI coefficients) in a world input-output model. From the perspective of a selected group of economies, VARDI coefficients may be defined as those elements in world input-output matrix in the case of which a small change in their levels leads to the maximization of a share of this group of economies in value added in global value chains. Due to the rapid development of the World Input Output Database, this approach may be easily applied in empirical research to different groups of countries and sectors in world IO models. In an illustrative empirical case study, we use the new approach in order to answer a question regarding what the main directions of the future macroeconomic policy of the U.S. could be in order to ensure the maximization of the country's share in global value added.

**Wei, D., Chen, Z., and Rose, A.** [Estimating economic impacts of the US-South Korea free trade agreement.](#) *Economic Systems Research*.

We analyze the economic impacts of the United States-South Korea Free Trade Agreement by applying the Global Trade Analysis Project (GTAP) computable general equilibrium model to highly disaggregated commodity flow data. The analysis calculates the impacts in terms of welfare effects, national economic indicators (such as GDP), and business performance metrics (such as sales revenue), which can be used by a variety of decision-makers. Our results suggest several trade-offs among these measures. Positive welfare gains between the US and South Korea are about the same in absolute terms, but favor the latter in relative terms, and very heavily so for GDP gains. Moreover, the US is projected to incur a loss of gross output (sales revenue) in several major manufacturing sectors that are heavily concentrated in geographic areas that have been promised a return of jobs by the Trump Administration.



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## Highlights in journals

**Ali, Y., Sabir, M., Bai, F. and Muhammad, N.** (2019) [A comparative input-output analysis of the construction sector in three developing economies of South Asia](#). *Construction Management and Economics*.

Construction is commonly regarded as one of the major industries of an economy that is receiving a significant attention in the developing countries. This paper uses the Asian Development Bank (ADB) input-output database at constant prices for the selected Asian countries, i.e. Bangladesh, Sri Lanka and Nepal to analyze and compare the performance of the construction sector in these economies. The novelty of this research is the application of multiple linkages methods. First, the standard measures of the backward and forward linkages are used to examine the induced output created by the demand push and supply pull effects of the construction industry. Second, the concept of Hypothetical Extraction Method (HEM) is applied to extract a sector hypothetically from an economic system and then to examine the influence of that extraction on the rest of the economy. The results indicate that the construction sector has a strong backward and weak forward linkages for all the three economies. Furthermore, results reveal that the 'pull effect' is very significant in these countries

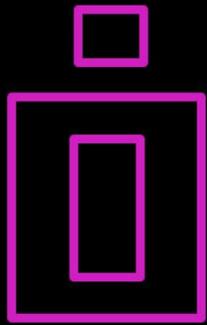
while the 'push effect' is very insignificant. With respect to the identification of the key sectors, the findings of the traditional methods are very different from those of the hypothetical extraction methods.

**Khalid, M. and Ali, Y.** (2019) [Analyzing economic impact on interdependent infrastructure after flood: Pakistan a case in point](#). *Environmental Hazards*.

A disaster such as floods can have a drastic impact on interdependent infrastructure and economic sectors. The resilience or the ability of the critical sector to recover quickly from the disruption can also reduce the consequences of the disaster. In this paper, through resilience and recovery time Dynamic Inoperability Input-Output model (DIIM) is applied. Thus, Input-Output (I-O) table is constructed for Pakistan's economic system and a case study is performed on the flooding in Pakistan 2011–12. The purpose of this study is to provide a ballpark estimate of the system-wide impact and ripple effect on the sectors that lasted for several days after the disruption. Furthermore, to analyze the inoperability and economic loss in the sectors caused by the disaster in a developing country. The findings of the research show that most of the critical sectors are associated with agriculture and service sector in terms of inoperability and economic loss respectively. The outcome of the study will be essential for the policy makers, disaster management authorities and health departments to respond accordingly.

**Bruckner, M., Häyhä, T., Maus, V., Giljum, S., Fischer, G., Tramberend, S. And Börner, J.** (2019) [Global land use driven by the EU non-food bioeconomy](#). *Environmental Research Letters*.

A rapidly growing share of global agricultural areas is devoted to the production of biomass for non-food purposes. The expanding non-food bioeconomy can have far-reaching social and ecological implications; yet, the non-food sector has attained little attention in land footprint studies. This paper provides the first assessment of the global cropland footprint of non-food products of the European Union (EU), a globally important region regarding its expanding bio-based economy. We apply a novel hybrid land flow accounting model, combining the biophysical trade model LANDFLOW with the multi-regional input-output model EXIOBASE. The developed hybrid approach improves the level of product and country detail, while comprehensively covering all global supply chains from agricultural production to final consumption, including highly processed products, such as many non-food products. The results highlight the EU's role as a major processing and the biggest consuming region of cropland-based non-food products, while at the same time relying heavily on imports. Two thirds of the cropland required to satisfy the EU's non-food biomass consumption are located in other world regions, particularly in China, the US and Indonesia, giving rise to potential impacts on



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Indonesia, giving rise to potential impacts on distant ecosystems. With almost 39% in 2010, oilseeds used to produce for example biofuels, detergents and polymers represented the dominant share of the EU's non-food cropland demand. Traditional non-food biomass uses, such as fibre crops for textiles and animal hides and skins for leather products, also contributed notably (22%). Our findings suggest that if the EU Bioeconomy Strategy is to support global sustainable development, a detailed monitoring of land use displacement and spillover effects is decisive for targeted and effective EU policy making.

**Ferreira, J. P., Ramos, P., and Lahr, M. L.** (2019) [The rise of the sharing economy: guesthouse boom and the crowding-out effects of tourism in Lisbon.](#) *Tourism Economics*.

At the urban scale, tourism activities can compete for spaces formerly used by housing and rendering opposing structured economic consequences. As tourism can generate jobs, there is the idea among urban residents that they can become victim of tourism increase. In this work, we apply a multiregional input-output model to assess the economic impacts of guesthouse boom in Lisbon city according to three scenarios and a hypothetical distribution of residential choices between the center and the periphery. This is particularly poignant because the supply of guesthouse units has risen from

100 in 2010 to more than 10,000 units in 2018. We find that Lisbon guesthouses were responsible by creating a total of more than 29,400 jobs nationwide and by increasing the national gross domestic product by 0.5%. At the regional level, only about 50% of the positive economic impacts of tourism were retained by Lisbon—the rest is split between the city's suburbs and the rest of the country. Also, we conclude that the regional distribution of gains becomes even more unbalanced if the city center observes a large exodus of its residents to the periphery.

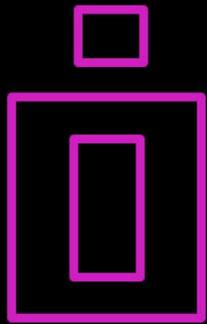
**Malik, A., McBain, D., Wiedmann, T. O., Lenzen, M. and Murray, J.** (2019) [Advancements in Input-Output Models and Indicators for Consumption-Based Accounting.](#) *Journal of Industrial Ecology*.

The use of global, multiregional input-output (MRIO) analysis for consumption-based (footprint) accounting has expanded significantly over the last decade. Most of the global studies on environmental and social impacts associated with consumption or embodied in international trade would have been impossible without the rapid development of extended MRIO databases. We present an overview of the developments in the field of MRIO analysis, in particular as applied to consumption-based environmental and social footprints. We first provide a discussion of research published on various global MRIO databases and the differences between them,

before focusing on the virtual laboratory computing infrastructure for potentially making MRIO databases more accessible for collaborative research, and also for supporting greater sectoral and regional detail. We discuss work that includes a broader range of extensions, in particular the inclusion of social indicators in consumption-based accounting. We conclude by discussing the need for the development of detailed nested MRIO tables for investigating linkages between regions of different countries, and the applications of the rapidly growing field of global MRIO analysis for assessing a country's performance toward the United Nations Sustainable Development Goals.

**Wang, S., Zhao, Y. and Wiedmann, T.** (2019) [Carbon emissions embodied in China–Australia trade: A scenario analysis based on input-output analysis and panel regression models.](#) *Asia-Pacific Journal of Cleaner Production*.

Understanding carbon emissions embodied in trade is an important prerequisite for the effective formulation of climate mitigation policies. Based on input-output analysis and panel regression models, this study proposes a multi-step forecasting procedure to simulate carbon emissions embodied in bilateral trade. We calculate carbon emissions embodied in the trade between China and Australia during 2000–2014 and forecast the same for the period 2015–2022



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under four different development scenarios. The results show that, during 2000–2014, net carbon outflow from China to Australia increased from 2.2 to 15.5 Mt CO<sub>2</sub>, concentrated in textile and heavy manufacturing sectors. The simulation results show that, the forecasts of “R&D focus” and “GDP focus” scenarios constitute the lower and upper bounds of embodied emissions, and the latter is more than two times of the former in 2022 both for embodied emissions in Australia's exports and China's exports. Finally, conclusions are drawn and policy implications are discussed.

**Li, M., Wiedmann, T. and Hadjikakou, M.** (2019) [Towards meaningful consumption-based planetary boundary indicators: The phosphorus exceedance footprint.](#) *Global Environmental Change*.

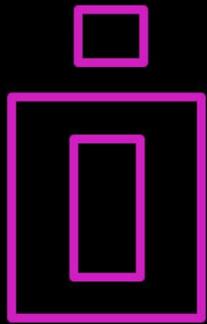
The idea of measuring humanity's footprint against planetary boundaries has attracted wide academic attention but methods to implement the theory in sustainability accounting remain underexplored. To help nations take collective actions to stay within a safe operating space, footprinting approaches need to be revised to accommodate biophysical limits. Here we develop a novel sustainability indicator, the phosphorus exceedance footprint (PEF) that measures countries' contributions to the transgression of the planetary boundaries for phosphorus. Adopting a consumption-based perspective reveals how nations contribute to environmentally unsustainable phosphorus pollution in their

trading partners. This captures country-specific transgression through supply chains in a way that complements conventional footprinting. In 2011, 27% of the world's PEF was associated with international trade flows. Wealthier countries tend to reduce their domestic phosphorus fertiliser exceedance, thus preserving their own natural environment, while increasing their share of imported P-embodied products through trade. A pattern of highly uneven distribution of phosphorus-compromised economies is revealed, with 76% of the worldwide exceeded phosphorus embodied in exports supplied by only four countries: China (42%), Brazil (19%), India (10%) and New Zealand (54%). All countries transgress phosphorus planetary boundaries, even those that do not exceed their own territorial boundaries. Our findings highlight that mitigation strategies need to include international cooperation on increasing the efficiency of fertiliser use and reducing the demand of products that cause phosphorus exceedance.

**Wakiyama, T., Lenzen, M., Faturay, F., Geschke, A., Malik, A., Fry, J. and Nansai, J.** (2019) [Responsibility for food loss from a regional supply-chain perspective, Resources, Conservation and Recycling.](#) *Resources, Conservation and Recycling*.

Reducing food waste and food loss generated through the whole food supply chain has, in actuality, become a global requirement. A Sustainable Development Goal (SDG) aims to

ensure sustainable consumption and production patterns. The government in a nation strives efforts to reduce the amount of the wasted edible food to achieve the SDG target. This paper examines edible food loss at the stage of vegetable production in Japan. Vegetables are not delivered to a market, but are instead discarded in the field. As described herein, we identify the amount of food loss at the regional level in Japan, and elucidate relations between production and consumption by examining multi-regional trading within Japan. Using a footprint analysis particularly addressing vegetables that are discarded in fields, we identify where food loss occurs and where agricultural products that are discarded in fields are presumed to be delivered and consumed. Clarifying the linkage of the food loss from production sites to intended consumers by prefecture helps farmers to make a crop production and distribution plan and to cooperate with other farmers to reduce annual food losses. Our food loss footprint analysis can provide opportunities for consumers to realize their own responsibilities and to raise awareness about food loss. Furthermore, it identifies environmental burdens by producing the crops discarded in a field. The findings from our analysis can facilitate producer-consumer communication to avoid overproduction and to highlight alternative destinations for overproduced agricultural products to markets with a shortage of agricultural crops.



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**Gabriel, L. and Ribeiro, L. C. S..** (2019) [Economic growth and manufacturing: An analysis using Panel VAR and intersectoral linkages.](#) *Structural Change and Economic Dynamics.*

This paper aims to investigate how manufacturing affects economic growth over time, especially in developing countries. We apply Panel Vector Autoregression (PVAR) for fixed effects approach, and then we estimate impulse-response functions (IRF) and forecast-error variance decomposition (FEVD) for a sample of 115 countries from 1990 to 2011. Furthermore, we apply Hirschman-Rasmussen (HR)'s Index for 29 countries for 1995, 2000, 2005 and 2010 as well as Field of Influence for this group of countries for 1995 and 2010. The main results indicate that manufacturing industry can work as "engine of growth" in developing countries. Moreover, manufacturing is the only strategic key sector in terms of driving economic growth for most developing countries in all the period analyzed. However, manufacturing has lost its relative importance in developed and developing countries in terms of linkages.

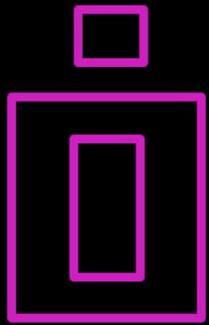
**Wang, H., Wang, W., Liang, S., Zhang, C., Qu, S., Liang, Y., Li, Y., Xu, M., and Yang, Z.** (2019) [Determinants of Greenhouse Gas Emissions from Interconnected Grids in China.](#) *Environmental Science & Technology.*

While direct greenhouse gas (GHG) emissions by China's power sector from the generation side have been widely investigated, driving forces from the electricity consumption perspective and inter-regional electricity transmission have been overlooked to a large extent. This study quantified relative contributions of six factors to changes in GHG emissions from interconnected grids in China during 2008–2015. These six factors include three generation-side factors (i.e., fuel mix of thermal power generation, energy efficiency of thermal power generation, and electricity structure), two consumption-side factors (i.e., electricity efficiency of GDP and GDP), and electricity transmission structure. GDP growth and changes in fuel mix of thermal power generation are two major drivers of increased GHG emission during 2008–2015, especially for the North China Grid. In contrast, changes in electricity transmission structure (especially in East China Grid and Southern China Grid), the increase in electricity efficiency of GDP (except for Northwest China Grid), improvements in energy efficiency of thermal power generation (especially in North China Grid and Central China Grid), and changes in electricity structure (especially in Southern Power Grid) are major factors offsetting GHG emission increments.

Findings of this study can provide multiple-perspective policy implications for GHG mitigation in China's power sector.

**López, L.-A., Cadarso, M.-Á., Zafrilla, J., Arce, G.** (2019) [The carbon footprint of the U.S. multinationals' foreign affiliates.](#) *Nature Communications.*

Multinational enterprises (MNE) need to be a part of the solution in the fight against climate change, as claimed by investors and consumers, reducing emissions within their operations and supply chains. This paper measures the carbon footprint of U.S. MNE foreign affiliates (US-MNE) operating beyond the U.S. borders. Using a multiregional input-output model and information about US-MNE activities, the US-MNE carbon footprint ranks US-MNE as the 12th top emitter of the world. In relative terms, one dollar of value added generated by US-MNE affiliates operating abroad requires higher emissions than the domestic average and the ratio increases when only developing host countries are considered. Only 8% of total carbon footprint returns to the U.S. as virtual carbon embodied in the U.S. final consumption. Potential technology transfers between the U.S. parent company and affiliates to reduce US-MNE carbon footprint have been performed to evaluate potential rippled effects of mitigation actions.



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**Zhang, P., Yuan, H., Bai, F., Tian, X. and Shi, F.** (2018) [How do carbon dioxide emissions respond to industrial structural transitions? Empirical results from the northeastern provinces of China.](#) *Structural Change and Economic Dynamics*.

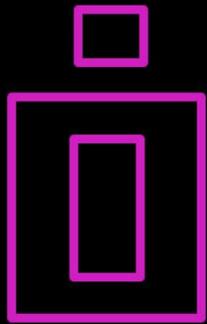
Upgrading the industrial structure under the constraints of CO<sub>2</sub> emission reduction policies is an urgent challenge for northeastern China, which has experienced slow industrial growth. We analyze the impacts of industrial structure transitions on CO<sub>2</sub> emissions and reveal significant impacts across the three provinces. Machinery and light manufacturing have shown rapid growth, and their CO<sub>2</sub> emissions related to CO<sub>2</sub> intensity and production structure changes have exhibited a significant decline. However, traditional carbon-intensive industries such as resource-related manufacturing and mining still emit a large amount of CO<sub>2</sub> and existing improvements in production structure are far from sufficient. Construction is one of the largest and fastest growing emitters, yet improvements in CO<sub>2</sub> intensity and production structure have only been observed in Liaoning and Jilin. In conclusion, changing the industrial structure is helping northeastern China mitigate their CO<sub>2</sub> emissions; however, more effective and targeted strategies are required for sustainable future industrial development.

**Rodrigues, J. F. D. and Lahr, M. L.** (2018) [The reconciliation of multiple conflicting estimates: Entropy-based and axiomatic approaches.](#) *Entropy*.

When working with economic accounts it may occur that multiple estimates of a single datum exist, with different degrees of uncertainty or data quality. This paper addresses the problem of defining a method that can reconcile conflicting estimates, given best guess and uncertainty values. We proceeded from first principles, using two different routes. First, under an entropy-based approach, the data reconciliation problem is addressed as a particular case of a wider data balancing problem, and an alternative setting is found in which the multiple estimates are replaced by a single one. Afterwards, under an axiomatic approach, a set of properties is defined, which characterizes the ideal data reconciliation method. Under both approaches, the conclusion is that the formula for the reconciliation of best guesses is a weighted arithmetic average, with the inverse of uncertainties as weights, and that the formula for the reconciliation of uncertainties is a harmonic average.

**Ali, Y., Memoona, A., Socci, C. And Saleem, S. B.** (2018) [Can coal replace other fossil fuels to fulfil the energy demand in Pakistan? An environmental impact analysis.](#) *Asia-Pacific Journal of Regional Science*.

Energy is considered as the backbone of an economy since all the production is dependent on energy consumption. Fossil fuels are currently the major energy source in most of the developing and developed countries. The use of fossil fuels as energy source does not seem to support the concept of sustainability but in developing economies like Pakistan, the use of the indigenous fossil resources is vital to fulfill the energy demand of the country and to improve the socio-economic status of the people. In this study, we have used environmental input-output (EIO) analysis for the estimation of direct and indirect CO<sub>2</sub> emissions from fossil fuel consumption by the economy in year 2012. Keeping in view the huge coal reserves in Thar Desert of Pakistan, we have developed a policy scenario in which coal is substituted by 100% for other fossil fuel types. Total CO<sub>2</sub> emissions for this case are noted to be 16% higher than those estimated for 2012. CO<sub>2</sub> emissions per capita come out to be 0.85 tons which is still less than that of India, China, USA, Middle East and Europe. This study recommends the use of indigenous coal as a short-term solution to the energy crisis in the country. Research and development activities should be escalated for a gradual transition toward more sustainable energy systems.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Khan, M. A., Zada, N., and Mukhopadhyay, K.** (2018) [Economic implications of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership \(CPTPP\) on Pakistan: a CGE approach](#). *Journal of Economic Structures*.

The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) is one of the recently negotiated multilateral free trade agreements which aims to establish a free trade agreement between 11 economies (after US exit) on both sides of the Pacific. The formation and implementation of this proposed partnership is a valid threat for other economies, particularly for Pakistan. Pakistan will likely to suffer from this agreement due to trade diversion of textile and apparels in favor of the CPTPP members. The reason can be extended in terms of the likely 'yarn forward rule,' according to which, it is obligatory for the CPTPP member economies to import all the components of manufactured products from other CPTPP member economies. So, the implementation of the CPTPP will have an impact on global supply chain of textile and apparels. With this backdrop, this study evaluates the likely impacts of the CPTPP on the regional trade flows and other macroeconomic aggregates of Pakistan using a global computable general equilibrium model. The economy-wide results show the proposed CPTPP will have a negative impact on Pakistan's real GDP, sectoral exports and imports and at household level. However, if Pakistan joins CPTPP, there is an overall positive impact on Pakistan's economy. Thus, keeping in

view Pakistan's ideal geographical and strategic location and its potential to be a transit economy with a junction of south Asia, west Asia and central Asia, this study suggests that Pakistan's proposed entry to CPTPP will not only yield a wide gain to the region but will reduce the gap between poor and rich in Pakistan and hence will have a positive impact on overall income inequality in Pakistan.

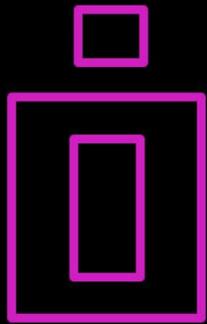
**Lenzen, M., Sun, Y., Faturay, F., Ting, Y., Geschke, A., and Malik, A.** (2018) [The carbon footprint of global tourism](#). *Nature Climate Change*.

Tourism contributes significantly to global gross domestic product, and is forecast to grow at an annual 4%, thus outpacing many other economic sectors. However, global carbon emissions related to tourism are currently not well quantified. Here, we quantify tourism-related global carbon flows between 160 countries, and their carbon footprints under origin and destination accounting perspectives. We find that, between 2009 and 2013, tourism's global carbon footprint has increased from 3.9 to 4.5 GtCO<sub>2e</sub>, four times more than previously estimated, accounting for about 8% of global greenhouse gas emissions. Transport, shopping and food are significant contributors. The majority of this footprint is exerted by and in high-income countries. The rapid increase in tourism demand is effectively outstripping the decarbonization of tourism-related technology. We project that, due to its high carbon intensity and continuing growth,

tourism will constitute a growing part of the world's greenhouse gas emissions.

**Guerra, A. and Sancho, F.** (2018) [Positive and normative analysis of the output opportunity costs of GHG emissions reductions: A comparison of the six largest EU economies](#). *Energy Policy*.

Any policy that aims at reducing GHG emissions by way of modulating the structure of an economy will entail resource reallocation and therefore an implicit economic cost. In this paper, we present a novel answer to this question using positive and normative analyses in such a way that they complement one another. From a positive perspective, we first propose a new look at the analysis of sectors' distributed GHG forward emissions on the basis of absolute rather than marginal effects. Using this information, we then move to a normative viewpoint using an environmental extended input-output linear programming system and compute lower bounds for the potential gross and net output losses for each production unit when facing emissions reduction targets, such as those proposed by the European Union in their 20-20-20 Directive. The originality of our approach relies on two aspects, namely, the introduction of an Armington assumption to link domestic and imported output and that, differently to previous works, total final demand drives the optimal adjustments to reach emissions cuts while minimizing output losses. Our empirical exercise compares the results of these normative and positive analyses for the six largest economies in the European Union.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Tobarra, M. A., López, L. A., Cadarso, M. A., Gómez, N., and Cazarro, I.** (2018) [Is Seasonal Households' Consumption Good for the Nexus Carbon/Water Footprint? The Spanish Fruits and Vegetables Case.](#) *Environmental Science & Technology.*

Proximity and in-season consumption criteria have been suggested as solutions for fruits and vegetables consumers to drive the economy to a more sustainable development. Using a new concept, seasonal avoided footprint by imports, we disentangle the role of period and country of origin. Although, as a general rule, consumers could reduce the footprint by choosing domestic produce, this is not always the case. Due to the high efficiency of Spanish domestic production in terms of both CO<sub>2</sub>e and water use (except for scarce water), imports from some regions, like Africa (green beans, peppers, tomatoes, bananas, strawberries, oranges), contribute to significantly increasing both water and carbon impacts. However, a monthly basis analysis shows unsustainable hotspots for domestic production. Importing from France (apples, potatoes) or Portugal (tomatoes, strawberries) reduces both footprints, so Spanish local consumption would be bad for the environment. Hotspots are mainly concentrated in scarce water and, especially, for out-of-season vegetables during 11 months a year (savings up to 389%), nine months for out-of-season fruits, and five months for in-season fruits. The results suggest

the difficulty to generalize an easy environmental recommendation based on buying local fruits and vegetables: consumption must be analyzed on monthly/seasonal, product, and country bases.

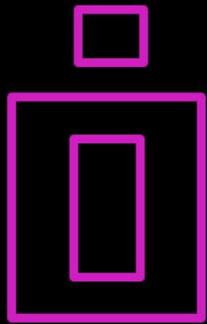
**Jiang, X, Guan, D. and López, L.A.** (2018) [The global CO<sub>2</sub> emission cost of geographic shifts in international sourcing.](#) *Energy Economics.*

In this paper we simulated the global direct CO<sub>2</sub> emission cost of geographic shift of international sourcing for the period 1995–2011 by comparing the scenarios with and without geographic shift. Our simulations indicate that in 2011, had the share of trade by the sourcing economy remained at the level of 1995, 2000, 2005, and 2008 whereas the global final demand remained the same, global CO<sub>2</sub> emissions in production processes would have been 2.8 Gt, 2.0 Gt, 1.3 Gt, and 540 Mt., respectively, lower than the actual emissions. As there is a general outsourcing trend shifted from developed economies to developing economies, the overall direct emission costs have always been significantly positive. Further investigations by economy and industry show that such a geographic shift was mainly dominated by developed economies themselves and occurred in high-tech industries, such as production of Information and Communication Technology (ICT) goods and machinery, leading to positive emission cost in developing economies, especially China. Moreover, there is potentially even larger influence of geographic shift of sourcing on global CO<sub>2</sub> emissions, as such a shift would stimulate

the economic growth and consumptions in developing economies, consequently this may bring additional energy demand and CO<sub>2</sub> emissions. Our results addressed the urgency of eliminating in carbon emission intensity gap between developing and developed economies and the successful development of new, scalable low carbon energy sourcing and technologies across the world.

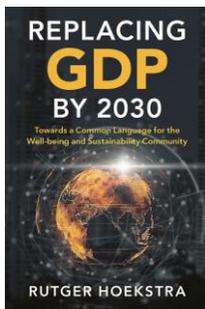
**Reynolds, C., Agrawal, M., Lee, I., Zhan, C., Li, J., Taylor, P., Mares, T., Morison, J., Angelakis, N. and Roos, G.** (2018) [A sub-national economic complexity analysis of Australia's states and territories.](#) *Regional Studies.*

A sub-national economic complexity analysis of Australia's states and territories. *Regional Studies.* This paper applies economic complexity analysis to the Australian sub-national economy (nine regions with 506 exported goods and services). Using a 2009 Australian multi-regional input-output table for base data, we determine the number of export goods or services in which each state and territory has a revealed comparative advantage, and visualize the complexity of Australia's interstate and international exports. We find that small differences in industrial capability and knowledge are crucial to relative complexity. The majority of states (especially Western Australia) export primarily resource-intensive goods, yet interstate trade has many complex products that are not currently internationally exported.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Highlights in Books



**Replacing GDP by 2030:  
Towards a Common  
Language for the Well-being  
and Sustainability  
Community**

Rutger Hoekstra

How did Gross domestic product (GDP) become the world's most influential indicator? Why does it still remain the primary measure of societal progress despite being widely criticised for not considering well-being or sustainability? Why have the many beyond-GDP alternatives not managed to effectively challenge GDP's dominance?

The success of GDP and the failure of beyond-GDP lies in their underlying communities. The macro-economic community emerged in the aftermath of the Great Depression and WWII. This community formalised their 'language' in the System of National Accounts (SNA) which provided the global terminology with which

to communicate. On the other hand, beyond-GDP is a heterogeneous community which speaks in many dialects, accents and languages. Unless this changes, the 'beyond-GDP cottage industry' will never beat the 'GDP-multinational'.

This book proposes a new roadmap to 2030, detailing how to create a multidisciplinary Wellbeing and Sustainability Science (WSS) with a common language, the System of Global and National Accounts (SGNA).

In the SGNA, input-output tables and analysis play an important role. The framework for the environment, society and the economy are all based on input-output accounting in various units (physical and monetary). Not only is the input-output framework perfect for stock-flow accounting purposes, it also provides a network representation of nature, society and the economy which will be crucial in modelling in the future.

The book is now available at [Cambridge](#), [Amazon US](#), [Amazon UK](#), [Bol.com](#), [Donner](#) and other book stores.

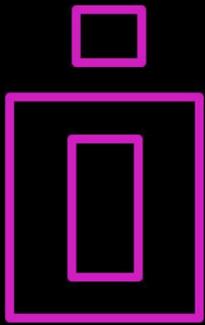
## Others

**Dig into the FIGARO  
publication**

Isabelle Remond-  
Tiedrez and Jose M.  
Rueda-Cantuche (Ed.)



Eurostat, in collaboration with the Joint Research Center (both part of the European Commission) has just published a new statistical working paper describing the whole process of compiling the European Union inter-country supply, use and input-output tables, the so-called FIGARO tables, for the reference year 2010. Two areas of applications are developed in the book. The first relates to EU air emissions embodied in EU exports to the rest of the world and the second quantifies the number of EU jobs embodied in extra-EU exports.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

The FIGARO tables were released in April 2018 for the reference year 2010 as the first EU intercountry input-output tables based on official statistics.

After this first phase, the project continues with FIGARO Act I. Its objective is twofold: First, to produce time series from 2010 to 2018 by the end of 2020, followed by annual regular FIGARO tables and second, to contribute to the global inter-country input-output tables in collaboration with international organisations such as the OECD and the UN.

## New look for SUIOT in the European Union

Eurostat, the Statistical Office of the European Union, gives a new look to the supply, use and input-output data. Visit the pages [here](#), look at the highlights and dig into the EU data.

The screenshot shows the Eurostat website interface. At the top, there's a search bar and navigation links. The main heading is 'Supply, Use and Input-Output tables - Overview'. Below this, there's an 'INTRODUCTION' section with sub-headings: 'What are supply and use tables?' and 'What are input-output tables?'. The text explains that supply and use tables (SUT) are matrices by product and industry, and input-output tables (IOT) are product-by-product or industry-by-industry matrices. A 3D diagram illustrates the flow of goods and services between 'Domestic' and 'Foreign' sectors, showing 'Final Demand' and 'Final Use'.

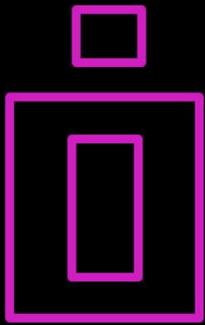
The infographic 'Supply & Use Tables Made Easy' provides a visual breakdown of the tables. It includes:
 

- 1. Domestic Supply Table:** Shows the output of goods and services by industry. Diagonal entries are primary output, and off-diagonal entries are secondary output.
- 2. Domestic Use Table:** Shows the purchase of goods and services by final users: Households and non-profit organizations (NPO), Government, and Rest of the world as exports.
- 3. Import Use Table:** Expands the imports row from the domestic use table to show goods and services imported for intermediate and final use.
- Value-added:** Shows compensation of employees, other taxes less subsidies on production, consumption of fixed capital, and operating surplus.

 A legend identifies symbols for Industry, Product (Goods and services), Household and government spending, Investment, Exports, and Value added.

STATISTICAL  
WORKING PAPERS





# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Events

### Next courses

#### Practical GE Modelling Course

September 9-13, 2019

Vienna, Austria

#### Outline

The [Centre of Policy Studies](#) (CoPS) offers an intensive one-week course introducing participants to computable general equilibrium (CGE) modelling with GEMPACK software. The course will be hosted by the [Austrian Institute of Economic Research](#) (WIFO).

The course focuses on a typical single-region applied general equilibrium model: the ORANI-G model of the Australian economy. Variants of the ORANI model of the Australian economy have been used extensively for policy analysis in Australia for more than two decades. ORANI-G, a generic version of ORANI, has been used to model the economies of more than 30 countries around the world.

The course aims to introduce participants to the ideas and techniques of CGE modelling, and to equip them to start using, adapting or constructing CGE models for their own simulations. By the end of the course, participants will have acquired thorough knowledge of:

- the theory underlying CGE models;
- the basic structure of a typical CGE model;
- the representation of applied GE models in the notation used in GEMPACK;
- the data requirements of a typical single-country CGE model;
- checking that the equations and data of a model are implemented correctly on the computer;
- formulating exogenous scenarios;
- computing simulations for policy analysis and interpreting and reporting results.

The course program consists of lectures integrated with a sequence of practical computer exercises using GEMPACK. This provides a strong emphasis on learning through analysis of stylized simulations including a rise in wages, an increase in government spending or a change in applied tariffs. The course will be taught by the world-leading CGE [modellers from the Centre of Policy Studies](#).

The course should appeal to

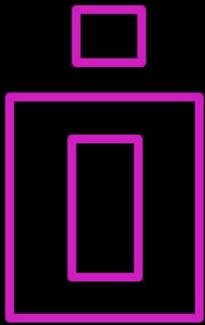
- those needing background to work with, or understand results from, a typical CGE model like ORANI-G;
- those wishing to use the theory of ORANI-G with GEMPACK for a model of a country other than Australia;
- those wanting to understand current policy issues in the context of a formal economy-wide system.

More information For more information please visit the Practical GE Modelling course page [here](#).

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 **VICTORIA  
UNIVERSITY**  
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# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Next conferences

### **International Conference on Input-Output Modelling of Green Growth** 28-29 August, 2019

Jakarta

Fiscal Policy Agency Ministry of Finance of Indonesia, in collaboration with Padjadjaran University, the Australia-Indonesia Institute, and the University of Sydney Australia, is planning a conference on "Input-output modelling of green growth" on 28-29 August 2019 in Jakarta. The goal of this conference is to promote research on sustainable development strategy and linked to the Sustainable Development Goals (SDGs) policies in particular.

#### **Conference topics:**

Research that applies input-output analysis for discussing key fiscal, economic, social, and environmental challenges on green growth, climate change, and sustainable energy policies.

#### **Important Dates:**

- Abstract Submission Open: 1 May 2019
- Abstract Submission Due: 30 June 2019
- Notification of Acceptance: 5 July 2019
- Early Bird Registration Open : 6 July 2019
- Early Bird Registration Due: 15 July 2019
- Full Paper Submission Due: 30 July 2019
- Paper Presenter Registration Due: 15 August 2019
- Conference Dates: 28-29 August 2019

#### **Contact Person:**

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Universitas  
Padjajaran



KEMENTERIAN KEUANGAN  
REPUBLIK INDONESIA

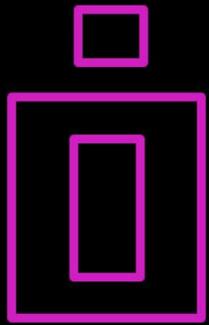


An Australian Government Initiative



THE UNIVERSITY OF  
SYDNEY

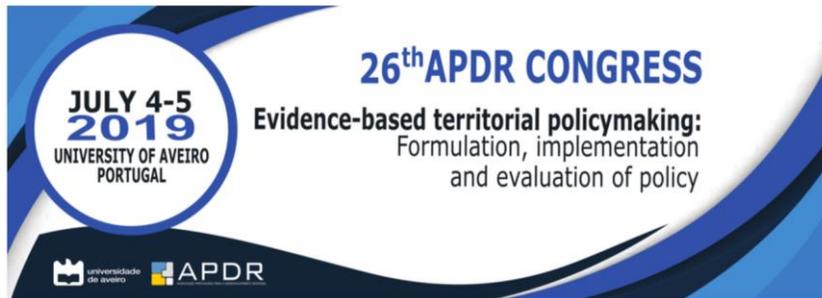




# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## **26th APDR Congress**

July 4-5, 2019



The 26th APDR Congress will be held at the University of Aveiro, which hosted its first edition in 1990. This congress will allow a debate on the needs and challenges of territorialising public policies and on the role of (big) data, information and technologies in planning and regional development.

Thus, the 26th APDR Congress emphasizes the interactions between three dimensions: i) data and information; ii) tools and models; iii) policies and instruments.



## **59th ERSA Congress**

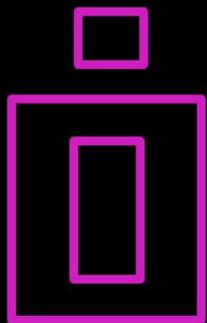
August 27-30, 2019



### **Key Dates**

- October 22nd 2018: Call for Special Sessions
- December 7th 2018: Deadline Special Sessions Proposals
- December 10th 2018: Open submission for abstracts (and papers)
- February 28th 2019: Deadline abstract (and paper) submission
- March 29th 2019: Notification of acceptance and registration opens
- May 13th 2019: Deadline registration at early bird fees
- June 10th 2019: Deadline registration
- Early July: Final programme





# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## 8th Conference on Input-Output Analysis (Hispanic-American Input-Output Society, SHAIO)

September 11-13, 2019

Santiago de Compostela, Spain

The Hispanic-American Input-Output Analysis Society ([SHAIO](#)) in collaboration with the [University of Santiago de Compostela](#), [AYeconomics](#) and the [GAME Group](#), will organize the 8th SHAIO Conference on Input-Output Analysis on September 11-13, 2019 in one of the most beautiful cities in Spain, Santiago de Compostela, Galicia.

We are very excited to have the opportunity of inviting all the Input-Output community to participate in the next 8th Hispanic-American Input-Output Conference, and we hope that the linkages established here remain strong in the years to come. Looking forward to seeing you all making the pilgrimage to Santiago de Compostela this 2019!

Keynotes speakers confirmed: [Ferran Sancho](#) (Autonomous University of Barcelona, Spain) and [Raquel Ortega-Argilés](#) (Chair in University of Birmingham, United Kingdom).



### Key Dates:

- Abstract and special sessions proposals submission deadline:** May 31, 2019
- Notification of acceptance of abstract and special sessions proposals:** June 10, 2019
- Full paper submission deadline:** July 22, 2019
- Registration for the Spanish School deadline:** July 22, 2019
- Submission Emilio Fontela Prize deadline:** July 22, 2019
- Early bird registration deadline:** July 26, 2019
- Regular registration deadline:** August 30, 2019
- Spanish School of IOA:** September 11, 2019
- Spanish Conference on IOA:** September 12-13, 2019

Scholarships for PhD Students Info: We are pleased announced that we will provide two scholarships for PhD students funded by Banco Mediolanum to participate at the Spanish School of Input-Output Analysis (ESAIIO) and the 8th Spanish Conference Input-Output Analysis (JAIO), which will take place in Santiago de Compostela between the 11th and 13th of September of the present year 2019. The grant covers the registration fee, accommodation for 3 days in University residence and 100 euros for transportation ([more info](#)).

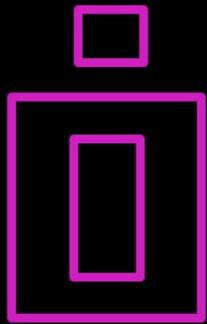


FACULDADE DE CIENCIAS ECONÓMICAS  
E EMPRESARIAIS



INSTITUTO GALEGO DE  
ESTADÍSTICA





**Newsletter**  
Number 40, May 2019

# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**66th NARSC**  
July 4-5, 2019

Pittsburgh, USA

Join us in Pittsburgh, Pennsylvania for the 66th Annual North American Meetings of the Regional Science Association International. The meetings will be held at the Omni William Penn Hotel in Pittsburgh from Wednesday November 13th to Saturday November 16th, 2019.

Paper sessions will be scheduled from Thursday morning through Saturday afternoon.

Details on the annual NARSC Graduate Student Paper Competitions are posted on [this page](#).

### Special Sessions – Call for Papers

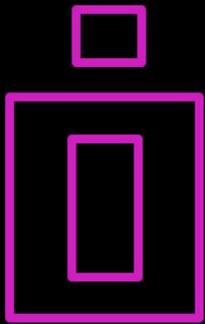
1. **31st Annual Regional/Rural Development** see [attached](#).
2. **Geocomputation** see [attached](#).
3. **REAL 30 YEARS** see [attached](#).
4. **The Opioid/Drug Crisis** see [attached](#).
5. **Technology, Globalization, and Regional Inequalities** see [attached](#).
6. **Transportation Accessibility, Spatial Processes, and Socioeconomic Impacts** see [attached](#).
7. **Residential Mobility and Location Choice** see [attached](#).
8. **Early Child Conditions and Development** see [attached](#).
9. **Regional Economic Effects of Disasters** see [attached](#).
10. **Agricultural Innovation, Productivity and Regional Economic Growth** see [attached](#).
11. **Demographic Transitions: Regions, Cities and Neighbourhoods** see [attached](#).

### Important dates:

Mid-April, 2019	Opening of Abstract/Session Submission Portal
July 1, 2019	Opening of Conference Registration
July 15, 2019	Deadline for Abstract/Session Submission
August 1, 2019	Notification of Paper Acceptance
August 15, 2019	Deadline for Submission to Student Paper Competitions
August 15, 2019	Advance Registration Deadline
September 7, 2019	Deadline for Abstract Earmarking (To Guarantee Placement on Program)
October 16, 2019	Preliminary Program
October 20, 2019	End of Discounted Hotel Rate
October 27, 2019	Manuscripts Must Be Sent to Discussants
November 13-16, 2019	Late Registration Fees Apply
	Conference in Pittsburgh



**RSAI**



**Newsletter**  
Number 40, May 2019

# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## **27th IIOA Conference**

June 30 - July 5, 2019



The Office for National Statistics in collaboration with the University of Strathclyde, Fraser of Allander Institute, Glasgow Convention Bureau and the Scottish Government will ensure that we make the 2019 IIOA Conference a truly memorable occasion.

We will deliver an inclusive, innovative, accessible, affordable and enjoyable conference for all delegates in a state of the art conference centre in Glasgow, which is one the UK's most vibrant, cultural and friendly cities located at the gateway to the magnificent Scottish Highlands.

The 2019 Conference will build on the successes of previous IIOA Conferences as well as provide a programme to inspire the next generation and encourage partnerships and collaborations in the field of Input-Output and the much wider field of economic statistics.

*Sanjiv*



Mr Sanjiv Mahajan  
Chair of Local Organisation Committee  
Office for National Statistics

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