Newsletter
Number 41, August-September 2019

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 Malaysia.

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

You can also find a Call for The 4th International Conference on Economic Structures (ICES 2020) and 60th ERSA Congress.

Furthermore, there is a piece to celebrate Real anniversary.

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
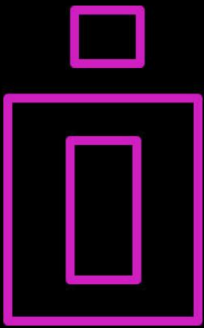Newsletter E-mail: newsletter@iioa.org
Personal E-mail: vinicius.a.vale@gmail.com

Would you like to contribute to the IIOA newsletter?
Contact us newsletter@iioa.org

In this issue

INTERNATIONAL
INPUT-OUTPUT ASSOCIATION

Recent IIOA Conference

27th International Input-Output Association Conference 2019
Glasgow, Scotland

30th June – 5th July 2019

"On behalf of the IIOA Council, a big thank you to all involved in making the 2019 IIOA Conference an all-round success – amazing feedback, fabulous organisation of the event, 'wow' factor venues and the Glasgow Conference will be remembered for a long time."

"It was a great honour, privilege and pleasure to hold this Conference in the UK for the first time, in the wonderful city of Glasgow."
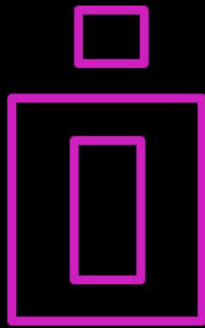
Sanjiv Mahajan
Chair of the Local Organising Committee,
Vice President of the IIOA

PEOPLE MAKE GLASGOW

IIOA
www.iioa.org

GLASGOW CONVENTION BUREAU

Office for National Statistics

UNIVERSITY of STRATHCLYDE
FRASER OF ALLANDER INSTITUTE

University of Strathclyde Glasgow

The Scottish Government

INTERNATIONAL
INPUT-OUTPUT ASSOCIATION

"You have contributed to IIOA Conference history"

1st time ever
IIOA Conference **Held in the UK**

Nearly 70% attendees registered
by the Early Bird Registration deadline, 1st May 2019

9 Parallel Sessions
90 minutes each with 304 presentations over four days

1st ever Conference Panel Session on:
"Sustainability, Input-Output and the Low (or zero) carbon transition"

£1,060 raised for environmental causes in Scotland

10 Development Programme presentations
Sessions held across five rooms

1st ever InspIO Keynote Session

248 people attended the Civic Reception

233 people attended the Conference Excursions

302 people attended the Conference Dinner

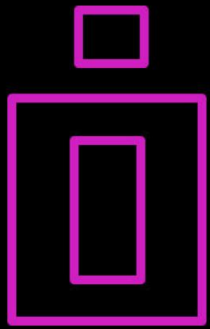No **meat** served during the whole conference (08:00-19:00 each day)

Many "Surprises and Prizes…"

Notable records and achievements

- 463 Abstracts submitted – 2nd highest after Lisbon (2014)
- 318 Papers presented – 2nd highest after Lisbon (2014)
- Only two no shows – lowest number and lowest percentage ever
- 354 Conference attendees (registered) – Highest ever
- 421 Conference attendees – Including Keynote Speakers, Panellists, Guests and Assistants, etc.
- 47 Countries represented – Highest ever
- Female participation nearly 34% – 3rd highest after Mexico City (2015) and Atlantic City (2017)
- Students participation nearly 28% – Highest ever
- 135 Payments as new members – Highest ever
- 107 People attended the International School of Input-Output Analysis – Highest ever
- 159 People attended the Young Researchers' Night – Highest ever
- Parallel sessions took place in up to 12 rooms – Highest ever

Check the updates on the
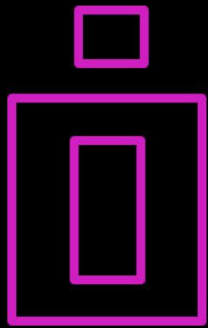
IIOA Glasgow Conference webpage

INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Check the updates on the IIOA Glasgow Conference webpage:

- Post Conference Review

- Post Conference Photos

- Post Conference Video

University of Strathclyde Glasgow

The Scottish Government

UNIVERSITY of STRATHCLYDE FRASER OF ALLANDER INSTITUTE

Office for National Statistics

GLASGOW CONVENTION BUREAU
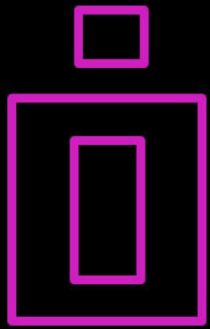
Leontief Prize 2019

Matteo Vincenzo Rocco achieved the MSc in Energy Engineering in 2011 and the PhD in Energy and Nuclear Science and Technology in 2015 at the Department of Energy of Politecnico di Milano, Italy. He is currently assistant professor in the same institution, and Senior Research Fellow in Fondazione Eni Enrico Mattei (FEEM). His research activities lie in the fields of Life Cycle Assessment and Industrial Ecology, with special focus on the development and application of energy modeling tools and environmentally extended input-output models. He is author of more than 30 peer-reviewed journal publications and one book in these research fields. He currently serves as member of the Academic Editorial Board of the Journal of Cleaner Production, and as reviewer for many international journals. He was awarded as the best young researcher by the Italian LCA association in 2016 and the Leontief Prize for the best conference paper of young authors presented at the International Input Output Association Conference in 2019. He got involved in several research projects for public and private institutions, and among others he is actively cooperating with the International Energy Agency (IEA) and as expert member in the International Electrochemical Committee (IEC).

Integrating Energy and Economy models based on the Dynamic Input-Output framework

Power sector is recognized as pivotal in meeting the long-term national environmental targets. For this reason, it is fundamental to develop methods and models able to comprehensively assess the economy-wide implications due to the implementation of new energy technologies or energy policies.

The scope of bottom-up energy models is usually limited to the national power sector, by determining its power output on an hourly basis with high technology disaggregation, or by planning optimal future capacity expansions. However, these models are unable to capture the linkages between the power sector and other sectors of the economy. On the other hand, top-down macroeconomic models provide a comprehensive picture of the economy, but they suffer from high space and time aggregation, being unable to represent the behavior of power technologies with high temporal detail. Several attempts to link bottom-up and top-down models can be found in the literature: despite this, a fully dynamic, integrated energy-economy model is still lacking.
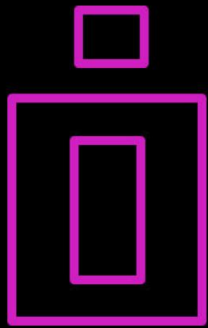
In this paper, Duchin's Rectangular Choice of Technology model (RCOT) is reformulated based on a Dynamic input-output framework: technical coefficients and final demand of electricity (per hour) and of other products (per year) are exogenously provided to the model, which endogenously returns the optimal power production broken down by energy technology and by economic sector on an hourly basis, in order to meet a set of given technical and economic constraints. The model is applied to Italy in 2011 as case study, based on data retrieved from Exiobase v.3, International Energy Agency and by the Italian electricity distribution authority.

Results of the case study reveal that the proposed approach may be suited for investigating several research issues by comprehensively considering the linkages among all the national productive sectors (e.g. technologies integration, economic policies, competition for natural resources, etc.).

Check the abstracts and papers on the IIOA Glasgow Conference webpage

INTERNATIONAL
INPUT-OUTPUT ASSOCIATION

Next IIOA Conference

INTERNATIONAL
INPUT-OUTPUT ASSOCIATION

UPM
UNIVERSITI PUTRA MALAYSIA
BERILMU BERBAKTI

28th International Input-Output Conference
and
10th Edition of the
International School of IO Analysis

Kuala Lumpur, Malaysia

5th - 10th JULY 2020

INTERNATIONAL INPUT-OUTPUT ASSOCIATION

It is a great pleasure to announce that Kuala Lumpur, Malaysia has been selected to host the 28th International Input-Output Conference and 10th Edition of the International School of Input-Output Analysis.

The 28th International Input-Output Conference and 10th Edition of the International School of Input-Output Analysis will be held from 5th – 10th of July 2020.

The IIOA Council Members unanimously agreed that Universiti Putra Malaysia (UPM) acts as the host institution.

Chair of Scientific Programme Committee:
Shigemi Kagawa, Kyushu University, Japan

Chair of Local Organizing Committee:
Mohd Yusof Saari, Universiti Putra Malaysia, Malaysia

PRACTICAL INFORMATION

The 28th International Input-Output Conference and 10th Edition of the International School of Input-Output Analysis will take place in Putrajaya, the Malaysia's third and latest Federal Territory.

Currency
The currency used in Malaysia is the Malaysian Ringgit (MYR).

Weather
Humid tropical weather with temperature ranging from 20^0 to 33^0 Celsius.

Clothing
Visitors are advised to dress appropriately for Malaysia's tropical rainforest climate. It is sunny in Kuala Lumpur most of the time, but the weather can get very hot especially between May and July. On some other months, there might be occasional showers and thunderstorms.
Regardless of the time you visit Malaysia, bringing along an umbrella with you is always a good idea.

More information coming soon!
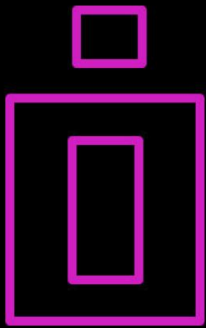
INTERNATIONAL INPUT-OUTPUT ASSOCIATION

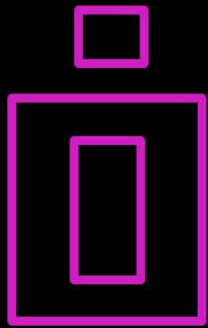## Call for Nominations for IIOA Fellows

Nomination of IIOA Fellows is open for new Fellows to be announced at the 28th IIOA conference scheduled to take place July 5-10, 2020 in Malaysia. IIOA members may nominate any members of the association according to the guidelines described below. For consideration during this year's nomination process, the current Secretary of the Fellows, Geoffrey Hewings, must receive all nomination materials (at hewings@illinois.edu) no later than **January 31, 2020**. Selection of up to two additional Fellows will be made by vote of the current Fellows.

Fellows of the IIOA are elected to honor them for their scientific contributions to the field of input-output analysis broadly defined. Members of the IIOA, not themselves Fellows, are invited to nominate other members. A nominee must have been a member of the IIOA for at least six years. Each nomination should include: name, current address, current email, current institution, brief curriculum vitae, list of up to ten key publications, and a description of the candidate's contribution to input-output analysis of no more than 100-200 words. Two additional IIOA members, excluding the nominee and the Fellows, must provide letters of support for each nomination. Nominations from previous years are not carried over; in this case re-nominations will be required.

All Fellows are eligible to vote on the nominees. Up to two new Fellows of the IIOA may be elected, and any newly elected Fellows will be installed as such during a plenary event at the conference. Fellows may call themselves Fellows of the IIOA and have the right to free membership in the IIOA. Fellows have the obligation to further promote the development and to advocate suitable application of input-output analysis, broadly defined.

Thank you for your active participation.

Geoffrey Hewings (hewings@illinois.edu)

Published papers and books in IOA and related methods

Latest ESR articles

Economic Systems Research

Journal of the IIOA

Volume 31, Issue 3, 2019

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, 31(3): 285-304.*

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 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.
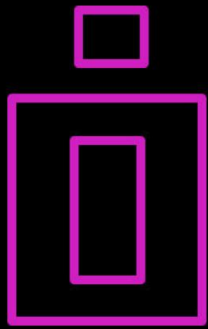
Wei, D., Chen, Z., and Rose, A. Estimating economic impacts of the US-South Korea free trade agreement. *Economic Systems Research, 31(3): 305-323.*

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.

Gurgul, H. and Lach, L. Tracing VARDI coefficients: a proposal. *Economic Systems Research, 31(3): 324-344.*

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.

Schumacher, D. The integration of international financial markets: an attempt to quantify contagion in an input–output-type analysis. *Economic Systems Research, 31(3): 345-360.*

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.

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, 31(3): 361-381.*

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.

Cai M. and Rueda-Cantuche, J. M. Bridging macroeconomic data between statistical classifications: the count-seed RAS approach. *Economic Systems Research, 31(3): 382-403.*

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.
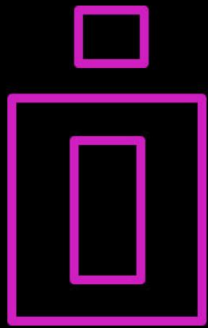
Mary, S., Phimister, E., Robert, D. and Santini, F. A Monte Carlo filtering application for systematic sensitivity analysis of computable general equilibrium results. *Economic Systems Research, 31(3): 404-422.*
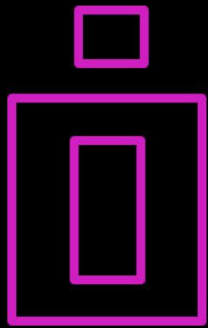
Parameter uncertainty has fuelled criticisms on the robustness of results from computable general equilibrium models. This has led to the development of alternative sensitivity analysis approaches. Researchers have used Monte Carlo analysis for systematic sensitivity analysis because of its flexibility. 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-Cantuche, J. M., Olmedo, E. and Beutel, J. Projecting supply and use tables: new variants and fair. *Economic Systems Research, 31(3): 423-444.*

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.

Steenge, A., Bouwmeester, M. and Incera, A. C. Rents, resources, and multiple technologies; Ricardian mechanisms in input-output modelling. *Economic Systems Research, 31(3): 445-466.*

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.

Economic Systems Research

Journal of the IIOA

Latest articles (up to 16-Sep.)

Ferreira, J.P., Lahr, M., Ramos, P. and Castro, E. Accounting for global migrant remittances flows. *Economic Systems Research.*
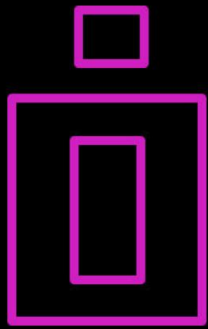
Migrant remittances are important to some countries. According to the World Bank, they comprise more than 30% of the GDP of Kyrgyzstan, Tonga, Tajikistan, Haiti and Nepal. Compared to official development aid or foreign direct investment, remittances have lately become a prime income stream for less-developed nations. In this paper, we analyze the net spillover and feedback effects from the consumer demand generated in migrants' home countries. We use World Bank estimates of remittances and the World Input-Output Database (WIOD) for the investigation with so-called 'hypothetical insertion' as the tool of choice. We find that even some developed nations, like the US, likely benefit from remittances (the largest global path for remittances is that from the US to Mexico), but that not all do (e.g. Canada does not). We stop short of making strong policy recommendations. Instead, we suggest that more attention is paid to the veracity of remittance estimates.

Rueda-Cantuche, J. M., Amores, A. F. and Remond-Tiedrez, I. Can supply, use and input–output tables be converted to a different classification with aggregate information?. *Economic Systems Research.*

Every change in the product and/or industry classifications and/or methodology of supply, use and input–output tables makes any medium- to long-term policy analysis impossible unless appropriate conversions are provided by national statistical institutes using more detailed data. However, can these tables be reasonably converted to a different classification of industries and products using aggregate information? We develop a conversion method that allows changes in classification that are independent of the number of industries and products. In addition, we provide evidence about its empirical performance compared with projection methods. We find projection methods perform better than conversion methods, at least when using aggregate information. Nonetheless, unlike conversion methods, projection methods generally require supply, use and input–output tables in the new classification that might not always be available. In their absence, we recommend using more detailed and sophisticated data.

Rodrigues, J.F.D., Yuan, R. and Xiang, H. The expectations of and covariances between carbon footprints. *Economic Systems Research.*

Carbon footprints and other environmentally extended input–output indicators are obtained as aggregations of emissions embodied in supply chains (EESCs), which express the emissions occurring in a specific production activity to satisfy a given volume of final demand. Here we derive theoretical approximations of the expectations of and covariances between EESCs, as a function of the expectations of and covariances between source data (technical coefficients, emission coefficients and final demand volumes) through a Taylor expansion. We report an empirical test of those approximations, using a sample of 5 global multi-regional input–output models in the year 2007, of which we extract 22 single-region input–output systems with 17 sectors. We find that approximations of multipliers perform better than those of EESC, and approximations of expectations perform better than those of covariances.

Vercalsteren, A., Christis, M., Geerken, T. and Van der Linden, A. Policy needs (to be) covered by static environmentally extended input–output analyses. *Economic Systems Research.*
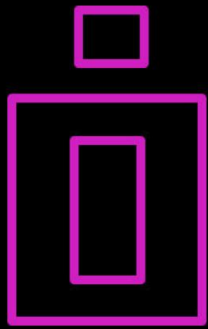
There exists little evidence in the literature of the extent to which static environmentally extended multiregion input–output (EE-MRIO) studies actually contribute to political decision-making and policy formulation. This paper provides an overview of the reported applications of EE-MRIO analysis in an environmental context, either initiated by questions from policy makers or demonstrated by researchers. The applications are structured according to their scope and scale, the coverage of the DPSIR environmental policy framework (driving forces/ pressures/ state/ impact/ response), and the type of application (problem analysis/agenda setting, ex ante and ex post/monitoring). Results from interviews with policy makers (Belgium) show both their interest in IO-modelling and specific needs they have to make it more useful in their own context. The more experimental EE-IO models serve well for the early policy phase of problem analysis and agenda setting. Also, their use can prove the importance of strengthening international collaboration to develop internationally recognized EE-IO models.

Ito, K., Deseatnicov, I. and Fukao, K. Japan's participation in global value chains: splitting the IO table into production for export and domestic sale. *Economic Systems Research.*

This paper examines Japan's participation in global value chains (GVCs). To this end, we use plant-level data for Japan to split output in each industry in Japan's manufacturing sector into output for export or domestic sale and create an extended multi-country input–output table (MIOT). We then compute trade in value added (TiVA) indicators to examine the participation of Japanese manufacturing plants in GVCs. Our estimates suggest that Japan's forward participation in GVCs is lower than suggested by estimates computed from a traditional MIOT. We infer that this result is due to high cross-border production fragmentation as well as the large presence of Japanese multinational companies in global manufacturing and the high volume of intra-firm trade in Japan's manufacturing sector. We conclude that considering firm heterogeneity in production for export and domestic sale in MIOTs provides a more accurate understanding of global production fragmentation.

Ahmed, I., Socci, C. Severini, F., Pretaroli, R. and Al Mahdi, H. K. Unconventional monetary policy and real estate sector: a financial dynamic computable general equilibrium model for Italy. *Economic Systems Research.*

This study investigates the effects of an expansionary monetary policy on the Italian economy and, in particular, on real estate (RE) as a commodity. RE is a key sector for the Italian economy. It has strong interactions with the other sectors, especially with the financial markets. Therefore, we develop a financial dynamic computable general equilibrium model to analyze the response of RE sector to a shock on money supply. The parameters of the model are calibrated on the financial social accounting matrix for Italy that identifies the economic and financial flows in the economic system in a well-defined time period. Our findings confirm that the policy has a positive impact on real economy and on the RE output, value added and pricing.

Manresa, A. and Sancho, F. A follow-up note on the plausibility of the Leontief and Ghosh closed models. *Economic Systems Research.*
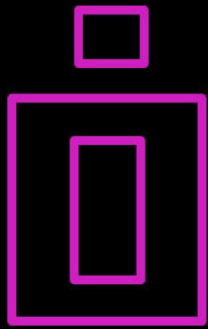
Herein we consider Leontief and Ghosh models that partly endogenize both part of final demand and part of value-added. We use Osterhaven's [(2012) Adding Supply-driven Consumption Makes the Ghosh Model Even More Implausible. Economic Systems Research, 24, 101–111] numerical three-sector example to show that anomalies of the sort he finds for a Ghosh closed model can also be found in the closed version of a Leontief model. By assuming, as Oosterhaven did, that aggregate exogenous resources are fixed, we obtain mirror results to his in a Ghosh setting, albeit in the more-traditional Leontief instance. Such numerical anomalies for the three-sector case turn out to be generic to both partially closed models for any 2×2 input–output model. A proof for the general n×n case remains to be uncovered.

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.

Dávila-Fernández, M. J. and Punzo, L. F. Financialisation as structural change: measuring the financial content of things. *Economic Systems Research.*

In this article, we present a multi-sectoral treatment of financialisation based on input–output analysis. Our main innovation introduces financialisation as an increase in financial content per unit of output produced. In this way, we may investigate changes in relative importance of financial activities, taking into account direct and indirect interactions among sectors. Although methods focusing on the disaggregation of input–output tables have been largely explored in past decades, they have received limited attention in the literature on financialisation. We aim to refocus on multi-sectoral issues by offering a simple structure of analysis to assess the interconnections between the real and financial sides of the economy. Using a 15 and 14-sector level of aggregation, we study the experiences of the United States and Brazil for the period 1947–2015 and 1995–2011, respectively.

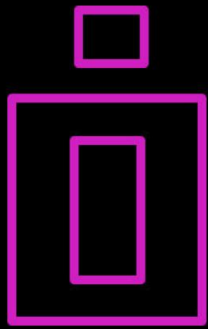**Lenzen, M.** Aggregating input–output systems with minimum error. *Economic Systems Research.*

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 CO2 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.

Dávila-Fernández, M.J. and Punzo, L.F. Financialisation as structural change: measuring the financial content of things. *Economic Systems Research.*

In this article, we present a multi-sectoral treatment of financialisation based on input–output analysis. Our main innovation introduces financialisation as an increase in financial content per unit of output produced. In this way, we may investigate changes in relative importance of financial activities, taking into account direct and indirect interactions among sectors. Although methods focusing on the disaggregation of input–output tables have been largely explored in past decades, they have received limited attention in the literature on financialisation. We aim to refocus on multi-sectoral issues by offering a simple structure of analysis to assess the interconnections between the real and financial sides of the economy. Using a 15 and 14-sector level of aggregation, we study the experiences of the United States and Brazil for the period 1947–2015 and 1995–2011, respectively.

Manresa, A. and Sancho, F. A follow-up note on the plausibility of the Leontief and Ghosh closed models. *Economic Systems Research.*

Herein we consider Leontief and Ghosh models that partly endogenize both part of final demand and part of value-added. We use Osterhaven's [(2012) Adding Supply-driven Consumption Makes the Ghosh Model Even More Implausible. Economic Systems Research, 24, 101–111] numerical three-sector example to show that anomalies of the sort he finds for a Ghosh closed model can also be found in the closed version of a Leontief model. By assuming, as Oosterhaven did, that aggregate exogenous resources are fixed, we obtain mirror results to his in a Ghosh setting, albeit in the more-traditional Leontief instance. Such numerical anomalies for the three-sector case turn out to be generic to both partially closed models for any 2×2 input–output model. A proof for the general n×n case remains to be uncovered.

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.
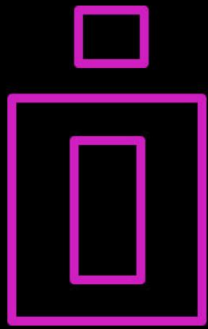
INTERNATIONAL INPUT-OUTPUT ASSOCIATION

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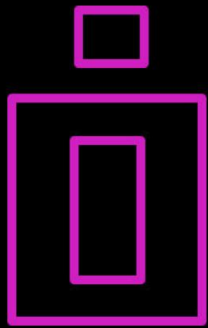
Duarte, R., Sarasa, C. and Serrano, M. Structural change and female participation in recent economic growth: a multisectoral analysis for the Spanish economy. *Economic Systems Research.*

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 multisectorial 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.

Zhang, N. and Zhao, X. Measuring global flow of funds: focus on China, Japan, and the United States. *Economic Systems Research.*
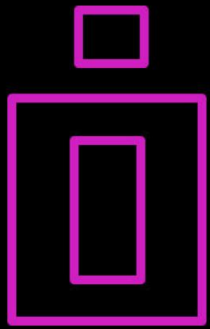
This paper aims to establish a new statistical framework for measuring global flow of funds (GFF) based on its inherent mechanisms. It advances a previous theoretical discussion and develops a practical operational statistical matrix. Based on theoretical and practical possibilities the paper gets existing 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.

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.

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.
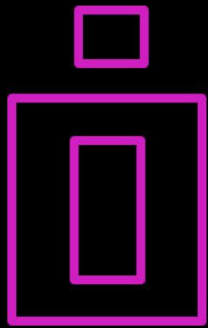
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Highlights in journals

Okamoto, N. (2019) Spatial and institutional urbanisation in China. *Asia-Pacific Journal of Regional Science.*

This paper sheds new light on the characteristics of urbanisation in China, which commenced as a comprehensive social–economic plan in 2014, from the perspective of 'spatial urbanisation' and 'institutional urbanisation'. The paper argues that urbanisation in China comprises not merely 'spatial urbanisation', i.e., the concentration of population in certain areas as has been commonly observed in developed countries, but also 'institutional urbanisation' in which the institutional barrier has remained in situ to prevent migrants from becoming urban citizens and to suspend true urbanisation. To obtain clear picture of two kinds of urbanisation, the paper conducted the simulation analysis using input–output model. This econometric analysis indicates that 'spatial urbanisation' will boost the manufacturing sector, leading to economic growth, while 'institutional urbanisation' will cause a structural change towards a service-based economy, which could result in the so-called 'middle-income trap' being avoided. Nevertheless, the advancement of 'institutional urbanisation' is extremely costly rather than 'spatial urbanisation'.

Liu, X., Du, H., Zhang, Z., Crittenden, J.C., Lahr, M.L., Moreno-Cruz, J., Guan, D., Mi, J. and Zuo, J. (2019) Can virtual water trade save water resources?. *Water Research.*

At times, certain areas of China suffering from water shortages. While China's government is spurring innovation and infrastructure to help head off such problems, it may be that some water conservation could help as well. It is well-known that water is embodied in traded goods - so called "virtual water trade" (VWT). In China, it seems that many water-poor areas are perversely engaged in VWT. Further, China is engaging in the global trend of fragmentation in production, even as an interregional phenomenon. Perhaps something could be learned about conserving or reducing VWT, if we knew where and how it is practiced. Given some proximate causes, perhaps viable policies could be formulated. To this end, we employ China's multiregional input-output tables straddling two periods to trace the trade of a given region's three types of goods: local final goods, local intermediate goods, and goods that shipped to other regions and countries. We find that goods traded interregionally in China in 2012 embodied 30.4% of all water used 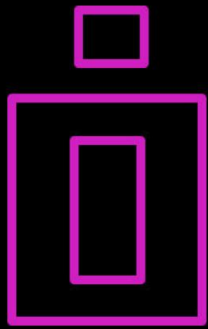nationwide. Nationwide, water use increased substantially over 2007-2012 due to greater shipment volumes of water-intensive products. In fact, as suspected, the rise in value chain-related trade became a major contributing factor. Coastal areas tended to be net receivers of VWT from interior provinces, although reasons differed, e.g. Shanghai received more to fulfill final demand (67.8% of net inflow) and Zhejiang for value-chain related trade (40.2% of net inflow). In sum, the variety of our findings reveals an urgent need to consider trade types and water scarcity when developing water resource allocation and conservation policies.

Sancho, F. (2019) An Armington–Leontief model. *Journal of Economic Structures.*

We develop a novel linear equilibrium model with an Armington flavor. We provide (1) proof of the solvability of the model and of the existence and non-negativity of the equilibrium solution and of the newly derived multiplier matrix; we also show (2) that the standard Leontief multiplier matrix arises as a special case of this new model and (3) that this model allows the computation of multiplier effects with no external output bias, which is particularly relevant for applied economic analysis.

Yang, L. and Lahr, M.L. (2019) The Drivers of China's Regional Carbon Emission Change—A Structural Decomposition Analysis from1997 to 2007. *Sustainability*

Using three official multiregional input–output tables and carbon emission data, we decompose the change in carbon emission for eight regions of China between 1997 and 2007. We do so according to the following seven partial effects: (i) Changes in energy end-use structure, (ii) effect of energy intensity, (iii) the added value's share of gross output, (iv) changes in sub-industry structure, (v) changes in the substitution of import for intermediate inputs, and changes in (vi) structure and (vii) level of final demand. We find energy intensity contributes most to CO_2 abatement throughout China, while other factors vary widely across the different regions. We suggest that governments consider regional disparity and CO_2 flows when formulating policies; structural change with an eye toward energy-savings and general efficiency improvements, like better insulated buildings, are among measures we deem effective.

Papadakis, S. and Markaki, M. An in depth economic restructuring framework by using particle swarm optimization. *Journal of Cleaner Production.*

The aim of this paper is the development of an integrated framework, based on environmental input-output analysis, for optimizing the economic structure of an economy. The restructuring process is approached as a constraint optimization problem where the optimized variables are the elements of the matrix of domestic technical coefficients. A method for determining the optimal level of the productive linkages of an economy in order to maximize its output with the minimal greenhouse gas emissions the possible is suggested. The proposed methodology is able to join both environmental and economic policy targets, in the form of predefined constraints. The objective function, which is going to be minimized, expresses the greenhouse gas emissions (GHG) intensity or GHG emissions per unit of output. A particle swarm algorithm is employed for the solution of the optimization problem. An illustrative application to the Greek economy was carried out. The experimental results revealed that if the Greek economy will apply policies for boosting the sectors of high and medium-high R&D intensity, then the greenhouse gas emission per unit of gross domestic product of

Greece would be reduced. Furthermore, the promotion of high and medium-high R&D intensity sectors is connected with an important improvement of the production linkages to a wide range of sectors, highlighting the important spillover effect of the suggested restructuring process.
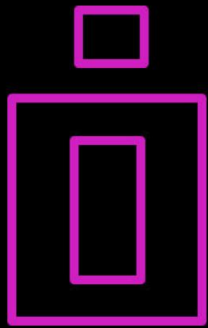
Zafrilla, J.E. et al. Triple bottom line analysis of the Spanish solar photovoltaic sector: A footprint assessment. *Renewable and Sustainable Energy Reviews.*

Sustainable development, in its wider sense, i.e., economic, social and environmental, has emerged as one of the key challenges for humankind in the 21st century. Solar photovoltaic (PV) emerges as a key technology to meet not only the climate targets but also those related to social progress and economic growth. This paper's main objective is to capture the momentum and potentialities of the Spanish Solar PV sector using a Triple Bottom Line (TBL) analysis from a broad economic, social and environmental footprint perspective in an MRIO context in 2016.

Regarding the economic impact, we find that the Spanish Solar PV sector accounts for 0.19% and 0.31% of GDP in direct and in total terms, respectively; besides, 60% of indirect GDP is created within Spanish economy and 40% is

generated abroad, while 86% of induced GDP is generated within domestic economy. By activity, PV manufactures is the only one to generate most of its indirect GDP abroad (68%). In social terms, Solar PV activities are responsible for 5904 direct jobs and 18,377 in total in Spain in 2016, and the most important activity is energy production and distribution (50.2% of total generated employment). In environmental terms, the footprint of the whole Solar PV industry accounts for only 734 ktCO2, which helps to avoid a great volume of direct emissions in electricity generation, with more than 69% generated beyond Spain's borders.

With regard to the potentialities of the Spanish Solar PV sector, and given the forecasted growing deployment of Solar PV in Spain by 2030 and 2050, this industry is set to be one of the leading sectors of the Spanish sustainability transition in the near future. Current policy requires the fast deployment of Solar PV throughout the country to ensure more sustainability-friendly economic, social and environmental development.

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_2 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_2 emissions and reveal significant impacts across the three provinces. Machinery and light manufacturing have shown rapid growth, and their CO_2 emissions related to CO_2 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_2 and existing improvements in production structure are far from sufficient. Construction is one of the largest and fastest growing emitters, yet improvements in CO_2 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_2 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 CO2 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 CO2 emissions for this case are noted to be 16% higher than those estimated for 2012. CO2 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.
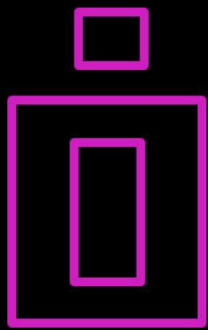
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The international fragmentation of current production processes has led to an explosion of trade in intermediate products, indirectly impacting jobs, income, resources, energy, and emissions. Much of what is consumed is produced via global value chains contributing to climate change via carbon dioxide emissions. The editors analyse the complex interdependent international production structures and their links to social inequality and the environment, which has led to a demand for international input–output tables. Including an original introduction the new volumes comprehensively present research that has advanced the state of the art in input–output analysis over the past two decades.

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ECONOMICS

### Developments in Input-Output Analysis

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Rooted in a long tradition, input-output analysis has evolved into a powerful method and tool for addressing the big questions of the 21st century. Globalisation has led to a tightly woven web of industrial and commercial connections, linking producers and consumers in every corner of world. This has resulted in accelerated global economic growth but also to environmental burden shifting between countries. To address the question how human wellbeing can be increased for a growing world population without compromising vital life support systems requires a detailed understanding of the interactions between economy, society and natural environment. With new developments in global models and databases, input-output analysis is suited more than ever to unravel these linkages, reveal dependencies and inform corporate and political decision-making. The book series puts up the milestones of research, development and applications in input-output analysis along the way deeper into the century.

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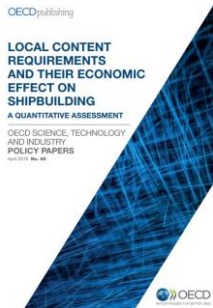
LOCAL CONTENT REQUIREMENTS AND THEIR ECONOMIC EFFECT ON SHIPBUILDING A QUANTITATIVE ASSESSMENT

Karin Gourdon and Joaquim J. M. Guilhoto

This study quantifies the significant economic gains that are expected to be revealed through the abolition or relaxation of local content based policies. The work analyses two specific local content policies affecting directly or indirectly the shipbuilding industry in two countries: Brazil's local content requirement as part of national concession contracts in the oil and gas sector, and the long-standing US Jones Act obliging intra-US seaborne trade to be conducted on US built and US flagged vessels. The paper's static simulation exploits OECD's latest Trade-in-Value-Added (TiVA) data – a rich database on Inter-Country Input-Output relationships.

The database has been disaggregated to the level of the shipbuilding industry, enabling an assessment of the effect of the two selected policies on inter-industry trade. The simulation results suggest large economic benefits for both countries in the long-term despite initial losses in the target industry. The study was authored by Karin Gourdon from the Structural Policy Division (SPD) at the OECD Directorate for Science, Technology and Innovation (STI). The simulation was conducted by Joaquim J. M. Guilhoto (OECD/STI). Ali Alsamawi, Joaquim J. M. Guilhoto and Norihiko Yamano (OECD/STI) created the database at a very detailed industry-level, which was essential for a simulation at the level of the shipbuilding industry. Laurent Daniel (OECD/STI) and Nick Johnstone (OECD/STI) contributed with essential insights and suggestions, and supervised the project. The paper has also benefitted from helpful suggestions and feedback from Sarah Box and Dirk Pilat (OECD/STI). Christian Steidl (OECD/STI) provided research support at the initial stages of the project.
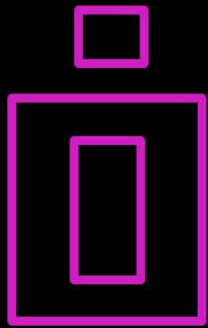
**Measuring bilateral trade in terms of value added**

Arto, I., Dietzenbacher, E. and Rueda-Cantuche, J. M.
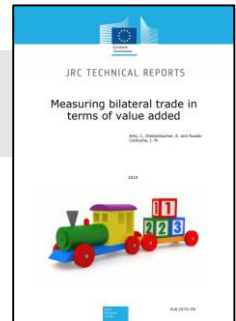
The increase in the fragmentation of production across countries and the subsequent growth in the trade of intermediate products have raised concerns about the suitability of conventional trade statistics to understand the economic consequences of trade. Several authors have attempted to disentangle value added content of trade. This technical report proposes a novel framework that enables to: (1) fully decompose the factor content of bilateral trade measured at the border; and (2) account for the role of the different countries and industries participating in the global value chain. Furthermore, because of the country and industry detail of this approach, it provides a new extension of the standard value added to exports ratio, and also reconcile the "sink-based" and "source-based" methods commonly used to report the value added in trade
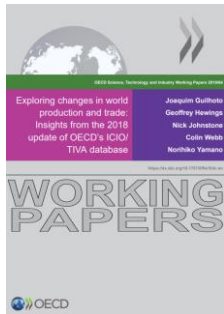
Exploring changes in world production and trade: Insights from the 2018 update of OECD's ICIO/ TIVA database

Joaquim Guilhoto, Geoffrey Hewings, Nick Johnstone, Colin Webb and Norihiko Yamano
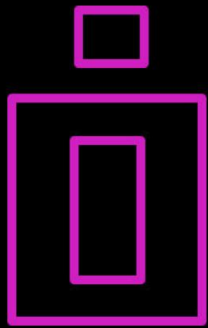
This paper explores changes in the structure of trade in value added drawing on the newly released 2018 update to the ICIO/TiVA database that covers 64 countries (plus an aggregate "Rest of World), and 36 industries. Exploring the data over the period from 2005 to 2015, selected aspects of world-wide changes in international production systems were uncovered with subsequent attention to four key sectors that are heavily integrated in the world trading system: Textiles & Apparel; Chemicals; ICT and Electronics; and, Motor Vehicles. And finally providing some insights into the employment and environmental impacts of trade.

There is considerable heterogeneity in recent developments, with some countries experiencing declines in their integration in global value chains (such as France, Germany and Korea), while others experienced growth (such as Australia and Norway) and still other countries (such as the Russia Federation) have experienced a more cyclical pattern of growth and decline followed by modest growth. At the regional level, overall the sourcing of trade changed very little (intra-versus inter-regional), with the notable exception of East and Southeast Asia where it is striking the role played by the Chinese economy in the regional and global trade. In Europe and North America, the changes in intra-regional trade were very small.

Attention is also directed to the increasing role of services in manufacturing exports; for all countries, this share has increased over the period from 2005 to 2015 with most countries recording values between 25% and 40%. In addition, non-resident expenditures (primarily from tourism) recorded some important changes. For over half the countries, the contributions account for less than 5% of total exports but for some countries, such as Greece, the share exceeds 20%.

The paper also explores aspects of changes in labor demand and the contributions to greenhouse gas emissions, areas in which the application of the ICIO/TiVA database is particularly enlightening. Many countries that have already been actively participating in GVCs are increasingly looking to "upgrade" their GVC activities to higher value added stages of production, and to accomplish this skilled labor plays a key role. The distinction between accounting for pollution at the source of production or the source of final consumption has occupied a prominent role in the academic literature, with concerns that efforts to mitigate GHGs in one set of countries resulting in counterbalancing emissions from other countries through imports

World Input-Output Database Environmental Accounts

Corsatea, T.D.; Lindner, S.; Arto, I.; Román, M.V.; Rueda-Cantuche, J.M.; Velázquez Afonso, A.; Amores, A.F.; Neuwahl, F

This report describes the approach adopted for the update of the World Input-Output Database (WIOD) environmental accounts for the period 2000-2016. In constructing the WIOD-based energy and emission accounts we follow closely the methodology developed by Genty et al. (2012), with some adjustments due to changes in system boundaries, which are further detailed. This report illustrates the data adjustment steps required to reconcile energy and economic data which stem, for example, from different accounting principles. Special care has been taken to address problems related to time series breaks in order to achieve a smooth transition between the years 2009 and 2010 at the intersection between the original and new WIOD releases. Results for EU countries are compared with other

data sources such as the previous WIOD time series, the Physical Energy Flows Accounts (PEFA) and the National Accounts Matrices with Environmental Extensions (NAMEA) showing a satisfactory goodness of fit, with some exceptions. A final comparison of the inter-temporal structure across periods is proposed in order to identify possible reasons of changes in the patterns of gross energy use.

New database to monitor national energy use and CO_2 emissions

WIOD Environmental Accounts (2019)

The tables below provide the environmental accounts consistent with the World Input Output Database Release 2016, including gross energy use, emission relevant energy use and CO2 emissions by 64 sectors and by households, for 12 energy commodities. The database covers 28 EU countries and 13 other major countries in the world for the period 2000 to 2016.

Description of the variables:

Energy use, Gross
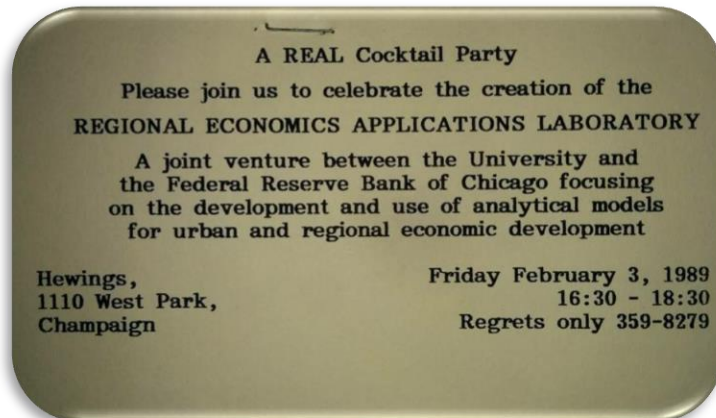
Energy use, Emission Relevant
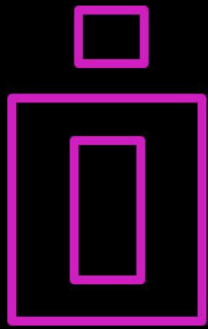
CO2 Emissions
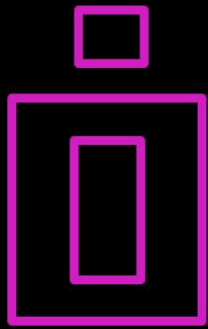
Please join us to celebrate...

REAL is celebrating **30 years**! In the next pages you will find some stories and photos to celebrate these 30 years of success.

As a past visiting scholar, I thank Hewings and Prof. Sandy Dall'erba for the opportunity, experience and learning.

Please enjoy….

Vinicius Vale - Brazil

A REAL Cocktail Party
Please join us to celebrate the creation of the
REGIONAL ECONOMICS APPLICATIONS LABORATORY
A joint venture between the University and
the Federal Reserve Bank of Chicago focusing
on the development and use of analytical models
for urban and regional economic development

Hewings,   Friday February 3, 1989
1110 West Park,   16:30 - 18:30
Champaign   Regrets only 359-8279

R | E | A | L
THE UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

September 1, 2001: first time in the U.S., first time at REAL. Although I contacted him out of the blue, I finally found a U.S. institution and Professor who would supervise my PhD work; and 9 months later here I was at REAL. My two biggest surprises were how approachable Geoff was and how international the group was (both still are). To put my points in perspective, French professors are traditionally distant with their students, and French universities seldom have non-European students.

Fast forward a few years. Geoff asked me to take over REAL in 2015 after he retired. Two main accomplishment happened since then: (1) securing a new space for REAL as the former set of rooms in Mathew Hall became unavailable and (2) securing a new institutional affiliation for myself, the Dept. of Agricultural and Consumer Economics (ACE). Additional efforts aim at involving other ACE faculty in mentoring REAL students and sensitizing UIUC administrators and funding agencies to the Laboratory's research accomplishments and prospects.

REAL is now composed of 12 UIUC students and around 15 international visiting-scholars who work on various regional science topics and techniques. They too are typically surprised by the peculiarity of the lab and need to be further enlightened about our activities and purpose.

See you all at NARSC for further events celebrating REAL's 30 years!

Sandy Dall'erba – USA

Past visiting scholar (2001-2003), past post-doctoral student (2005-2006) and current Director of REAL (2015-on)
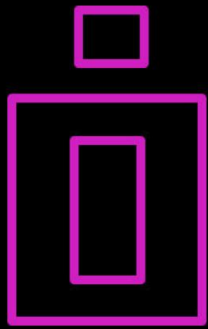
REAL was unknown to me when I started studying at the University of Illinois in 1991. Now, 28 years later I can say that REAL and Geoffrey Hewings, its founder and director, have changed the way I carry out my work as a researcher and a teacher. For once I was introduced to input-output analysis and regional (input-output) modeling, they have been part of my research and consulting portfolio ever since. Moreover, the way I approach younger researcher nowadays is guided by what I call the "Geoffrey Hewings spirit": A very positive attitude together with a strong will of providing support whenever needed. Most important, however, is the fact that I became part of a global family of researchers (some call if mafia…) open to share ideas and collaborate, all connected to each other by a spirit of friendship and trust. While science and research is often characterized by fierce competition and jealousy, "You'll never walk alone" (© Liverpool FC) is the slogan guiding the REAL family. By pure luck I found REAL so many years ago. Now I cannot imagine how life would be without it. Happy Birthday to the greatest family of all!

Oliver Fritz - Austria

The day Geoffrey JD Hewings became a "keyword"

It is now 30 years to the day since Philip Israilevich and Geoffrey JD Hewings started a cooperative venture between the Federal Reserve Bank in Chicago and UIUC. Since then, REAL has become one of the leading research centers in regional science worldwide. It is fair to say that the Brazilian branch of Geoffrey JD Hewings' genealogy is heavily rooted in the perennial influence of Professor Werner Baer in the shaping of economics graduate studies in Brazil. The partnership between the two scholars has been fundamental to the maintenance of a regular flow of Brazilian visitors to REAL. Over the years, Hewings' academic sons and daughters have developed their careers, some of them in academia back in Brazil. As they became advisers to their own Ph.D. students in their home institutions, stronger ties with REAL started to be created. Through a special program sponsored by the Brazilian government, the so-called Sandwich Scholarship Program, Ph.D. students from Brazil would spend one year at REAL working on their doctoral dissertations. Since 2000, REAL has welcomed around 20 such "Sandwich" scholars from Brazil, who have already successfully defended their dissertations with Geoffrey JD Hewings as their co-adviser. The Brazilian REAL Network is an interesting case study that reflects this pattern of evolving collaboration networks in regional science in scientifically emerging economies. The expansion of the REAL scientific collaboration network in Brazil emerges as a relevant mechanism for both a qualitative leap in national scientific production in regional science and for the dissemination of knowledge in peripheral regions of the country. Conducted under the leadership of Geoffrey JD Hewings, it has been fundamental to develop regional science in Brazil. Five years ago, when REAL celebrated its 25th anniversary, I had the opportunity to document this transnational experience related to the Lab's experience involving Brazilian scholars in a journal article published at the International Regional Science Review. "Geoffrey JD Hewings" as a keyword of that piece reveals, in my view, his outstanding academic trajectory and his major influence in the Brazilian academia throughout the years.

Eduardo Haddad - Brazil

Haddad, E. A., Mena-Chalco, J. P., & Sidone, O. J. G. (2017). Scholarly Collaboration in Regional Science in Developing Countries: The Case of the Brazilian REAL Network. *International Regional Science Review*, *40*(5), 500–529. https://doi.org/10.1177/0160017615614898
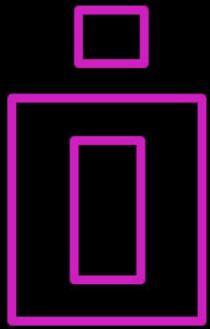
REAL is now 30! But before REAL there was the friendship between two outstanding persons and professionals, who were behind its creation. Geoffrey Hewings and Philip Israilevich in 1989 drummed up effort to create REAL—a joint venture between the University of Illinois and the Federal Reserve Bank of Chicago; it had offices in both Urbana and Chicago. We also should not forget Michael Sonis, who, like a magician, had a mathematical model to solve any problem. This fantastic trio, under the lead of Hewings, worked hard to make the REAL community what it is today. It shows that excellent research can be done in collaboration and with an open mind, i.e., you may not be the best among your colleagues, but you become your best when collaborating with them! Geoff, with his mind and arms open to the World, made REAL a center of research and a model to be followed everywhere! I am proud to be part of this process, as I had the privilege to be able to have Hewings as my Ph.D. advisor before REAL, in 1984, and to also to work with Sonis on various papers. But to me it was most important to have Geoff as a raw model that I use to guide my professional life!!!

Well done, GEOFF!!! Happy Birthday, REAL!!!

Joaquim Guilhoto – Brazil - France
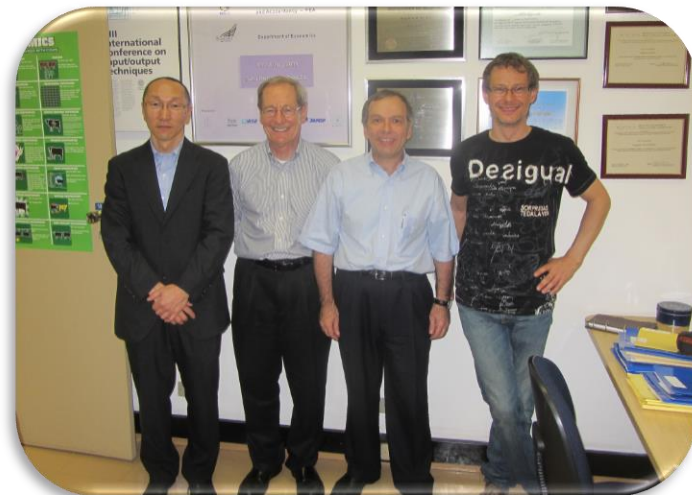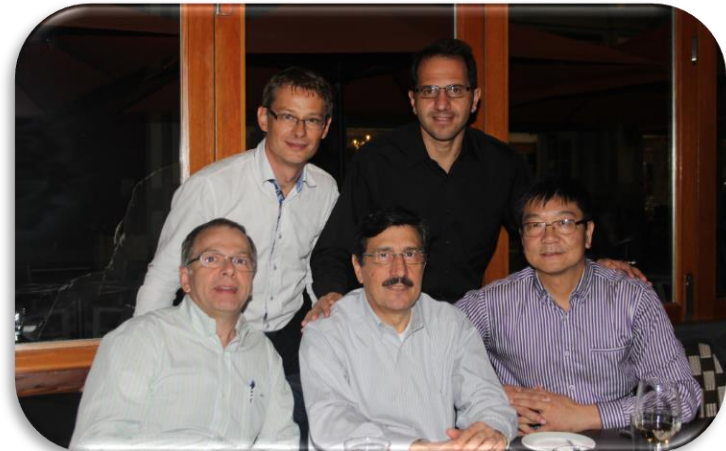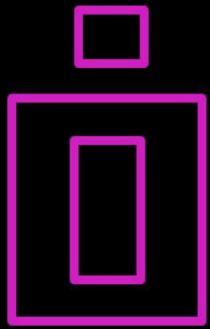
INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Almost since its inception, the Regional Economics Applications Laboratory (REAL) has served as an enormously successful focal point to foster, promote and perpetuate Input-Output Analysis (IOA). If you pass by Mumford Hall at the University of Illinois at Urbana-Champaign, you will surely find someone studying the blue Bible of IOA by Miller and Blair.

Under the professional and kind leadership of Geoffrey J. D. Hewings during 27 years, and of Sandy Dall'erba since 2016, REAL has hosted an outstanding number of international researchers (to some of us, even for more than three times!) working on a different range of topics involving Input-Output techniques: integration of input-output and econometric models, structural decomposition analysis, Miyazawa multipliers, methods of updating input-output tables or multiregional IOA.

Now that it is turning 30 years, REAL can be proud of saying that it has created a vast network of researchers in the field at the worldwide level: from China to Brazil, passing through Mexico, UK, South Korea and Spain.

Gathered in a collaborative and supportive learning environment centered around the interchange of ideas while making lasting friendships, studying input-output at REAL becomes a wonderful experience that change both your personal and your professional life forever.

Now, I can't think of input-output without (very happily!) thinking of REAL.
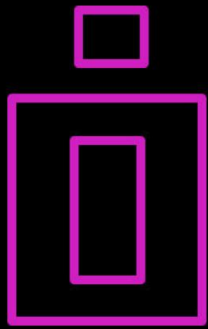
Happy Birthday!

Alberto Franco - Spain
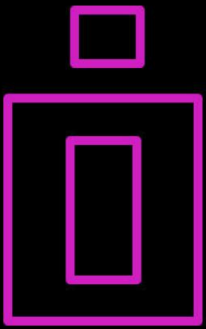
INTERNATIONAL
INPUT-OUTPUT ASSOCIATION

I arrived to REAL in 1991, looking for regional economics knowledge as part of my Ph.D. program in economics. There, I found not only econ but mainly I learned how to work in group, being part of a team, promote regional economics and later regional science, a model of how to research and bring people around spatial problems that can be studied from many discipline and each one with something to add to its comprehension.

Geoff Hewings was the leader that develop this lab, that more than a lab was like a huge family that to nowadays does not stop growing, every REAL guy that I met I feel like a relative, as a matter of fact, I call to some of them, especially older ones, old bro!!!

In addition, I keep sending my best student to UIUC and all of them become part of the REAL mafia and they had gotten not only the degree but also the knowledge and networking that REAL and Geoff provide.

Today, there are two REAL children in Chile, the IDEAR (Institute for Applied Regional Economics) in Antofagasta and the Center for Regional Economics and Policy (CEPR) in the Universidad Adolfo Ibáñez in Viña del Mar, both researching and promoting the regional science development in the country and in Latin America following Geoff´s way to create links and promote research.

Patricio Aroca - Chile

I spent one year in REAL (2013.8-2014.8), which was an important period during my Ph.D. study. I met Geoffrey Hewings in 2010, when I presented a IO study in English for the first time. He gave me very helpful comments and introduced REAL to me. Three years later, I had the chance to spend one year in REAL and learned IO model and CGE model with Geoffrey Hewings.

Geoffrey encourages students to build research network, starting by encouraging everyone in the REAL to talk with each other in English, even making two Chinese guys talk to each other in English! Every year I met lots of new mafia at the international IO conference. We may not have studied together, but we knew we were all influenced by the spirt of REAL. After my Ph.D. studies, I got a job at a university, and IO modelling remains my major field of study. I now teach my students how to use IO, just as REAL and Geoffrey Hewings taught me. The REAL spirt spreads around the world.

Thanks Geoffrey Hewings for connecting mafias from different countries together. Happy birthday to REAL. Happy birthday to the mafia.
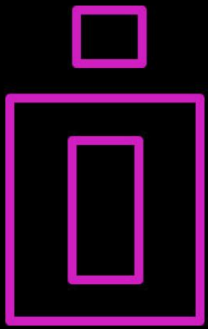
Zengkai Zhan - China
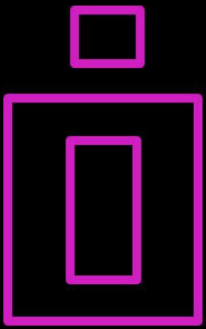
INTERNATIONAL INPUT-OUTPUT ASSOCIATION

INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Well done GEOFF!!!

Happy Birthday REAL!!!

R | E | A | L
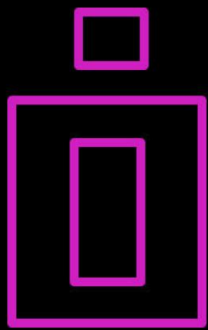
THE UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Events

Next conferences

The 4th International Conference on Economic Structures (ICES 2020)
March 27- 29, 2020

Organizers: Pan-Pacific Association of Input Output Studies(PAPAIOS)

Co-organized by Graduate School of Management, Kyoto University

The Pan Pacific Association of Input-Output Studies (PAPAIOS) welcomes your participation and contribution to the ICES 2020, co-organized by Graduate School of Management, Kyoto University. The session welcomes theoretical and empirical contributions that apply to a wide range of formal analytical instruments and statistical techniques to explore the structural interdependencies among various activities immanent in the economy, especially related to input-output analysis.

Important dates:

Abstract submission open: 1 August, 2019

Abstract submission deadline: 29 November, 2019

Acceptance notification: 15, December, 2019

Full paper/Summary submission open: 16, December, 2019

Registration open: 20 January, 2020

Full paper/Summary submission deadline: 28 February, 2020

Registration deadline: 12 March 2020

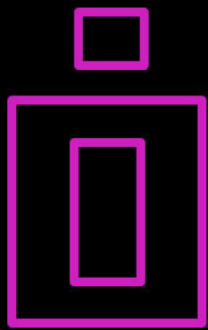**Abstract Submission Deadline:**

29 November 2020

Organizers

Chief of the General Organizing Committee:

Kiyoshi FUJIKAWA (President of PAPAIOS), Nagoya University, Japan

Chief of the Local Organizing Committee:

Kwangmoon KIM, Kyoto University, Japan

Chair of the Scientific Program Committee:

Takashi YAGI (Vice President of PAPAIOS), Meiji University, Japan

Further information will be announced in the following website:

http://www.gakkai.ne.jp/papaios/en/conference.html

INTERNATIONAL INPUT-OUTPUT ASSOCIATION

28th IIOA Conference
July 5-10, 2019

60th ERSA Congress
August 26-29, 2020

Key Dates

2019
October 21st Call for Special Sessions
December 9th Deadline Special Sessions Proposals
December 11th Open submission for abstracts (and papers)

2020
March 2nd Deadline abstract (and paper) submission
March 30th Notification of acceptance and registration opens
May 18th Deadline registration at early bird fees
June 15th Deadline registration for being included in the programme
Early July Final Programme