

**Newsletter**  
Number 44, May-June 2020

# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Welcome from the Editor



Dear IIOA member,

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

This issue contains information about Latest ESR articles, Highlights in Journals, chapter books, and databases.

You can also find Call for Conferences and a SHAI0 announcement about the Permanent Workshop on Input-Output Analysis .

I hope you enjoy it! Any feedback, comments or suggestions are greatly appreciated. I also welcome contributions to future issues.

### ***Vinicius de Almeida Vale***

*IIOA Newsletter* Editor

Federal University of Parana, Brazil

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

Personal E-mail: [vinicius.a.vale@gmail.com](mailto:vinicius.a.vale@gmail.com)

Would you like to contribute to the IIOA  
newsletter?

Contact us [newsletter@iioa.org](mailto:newsletter@iioa.org)

## In this issue

- **Welcome from the Editor.....1**
- **Published papers and books  
in IOA and related methods.....2**
  - **Latest *ESR* articles.....2**
  - **Highlights in journals.....9**
  - **Highlights in Books.....14**
- **Databases.....16**
- **Events.....17**
  - **Next workshop.....17**
  - **Next conferences.....17**



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Published papers and books in IOA and related methods

### Latest ESR articles

**[Economic Systems Research](#)**  
**[Journal of the IIOA](#)**  
**[Volume 32, Issue 2, 2020](#)**



**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*, 32(2): 173-191.**

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.

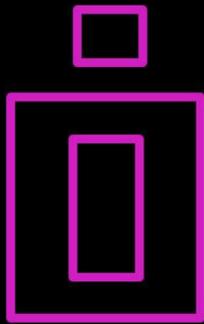
**Rodrigues, J.F.D., Yuan, R. and Xiang, H. [The expectations of and covariances between carbon footprints](#). *Economic Systems Research*, 32(2): 192-201.**

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

approximations of multipliers perform better than those of EESC, and approximations of expectations perform better than those of covariances.

**Fullemann, Y., Moreau, V., Vielle, M, and Vuille, F. [Hire fast, fire slow: the employment benefits of energy transitions](#). *Economic Systems Research*, 32(2): 202-220.**

The transition towards decarbonized and efficient energy systems has broad socio-economic implications. We estimate the potential impacts on employment from efforts in energy efficiency in industry, transport and buildings as well as substituting local renewable energy sources for fossil fuels. Both energy supply and demand are accounted for. We use a hybrid approach that combines national energy transition scenarios with input-output tables, adjusted for new energy and non-energy activities. We conclude that the transition has a net positive impact on employment as illustrated by the case of Switzerland. The local and decentralized nature of energy efficiency and renewables retains a greater share of value-added domestically than does a supply chain of fossil fuels. Moreover, we find that more jobs are created in demand-side activities, such as building renovation, than in renewable energy generation. Positive impacts on jobs from spillover effects in all non-energy activities are also found.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**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*, 32(2): 221-238.

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.

**Nakamoto, Y.** [Spatial structural decomposition analysis with a focus on product lifetime.](#) *Economic Systems Research*, 32(2): 239-261.

This study estimates the carbon footprint associated with global final demand for automobiles and petroleum of the U.S.A., Germany, and Japan, which accounted for 31% of the global stock of passenger cars in 2009, during 1995 to 2009. I develop a comprehensive new method to more clearly illuminate the structural change in automobiles' global final demand. Based on the results, I discuss how a circular strategy with a focus on vehicle lifetime extension contributes to the automobile carbon footprint in each country. While the environmental burden from automobile manufacturing has decreased globally, the Leontief production structure countered carbon reduction and completely canceled out the effects of technological changes to reduce emission intensities. The results showed that suppressing demand for new cars through lifetime extensions greatly reduced the carbon footprint, in a similar or even greater way than that from changes in industrial technology.

**Mardones, C. and Lipski, M.** [A carbon tax on agriculture? A CGE analysis for Chile.](#) *Economic Systems Research*, 32(2): 262-277.

This paper evaluates the implementation of a tax on CO<sub>2</sub> equivalent (CO<sub>2</sub>eq) emissions produced by the agricultural sector. Computable general equilibrium (CGE) simulations consider tax rates ranging from \$5 to \$131 USD/ton CO<sub>2</sub>eq with sensitivity analyses. We find that a tax applied only to agricultural emissions makes agriculture less competitive and, thus, reduces its production. Real GDP falls from 0.00–0.01% to 0.12–0.40% as a result, and total emissions decline from 0.07–0.10% to 1.79–2.25%. The tax is slightly regressive. We conclude that the tax on just agriculture does not substantially reduce emissions. Indeed, we find it is more efficient to apply the tax across the board, while subsidizing the forestry.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Cazcarro, I., Duarte, R., Chóliz, J. S. and Sarasa, C.** [Water and production reallocation in the Spanish agri-food system.](#) *Economic Systems Research*, 32(2): 278-299.

Multiregional input-output (MRIO) and computable general equilibrium (CGE) models have greatly facilitated approaches to environmental and economic problems in recent years. This paper examines regional reallocation criteria intended to reduce water constraints in the Spanish economy. Our goal is to assess the impact of alternative allocation scenarios for regional production on the country's agriculture and agri-food industries, and the associated effects on water resources along the whole length of food supply chains, which display significant asymmetries between regions caused by imbalances in the availability of water resources. We design a CGE model using an MRIO database for Spain. Our scenarios are based on increases in the production of water-intensive crops in regions with more abundant water resources and the development of more sustainable food supply chains between farms and the agri-food industry. Our findings point to a series of policy options that could be applied to ensure successful outcomes in both directions.

## [Economic Systems Research](#)

[Journal of the IIOA](#)

[Latest articles \(up to 26-May.\)](#)

**Gabela, J. G. F.** [On the accuracy of gravity-RAS approaches used for inter-regional trade estimation: evidence using the 2005 inter-regional input-output table of Japan.](#) *Economic Systems Research*.

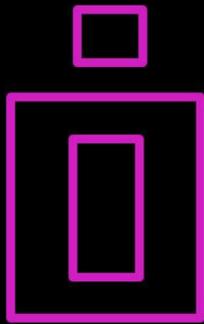
In contrast to international trade, it is still difficult to find regional trade statistics within a nation. Given that the gravity model continues to be very popular, we test two gravity-RAS approaches used for interregional trade estimation: a standard one and an extended version, which additionally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



disaggregation levels. Results from an experiment based on a random number generator show how RAS influences results.

**Moya-Martínez, P., Bermejo, F. and del Pozo-Rubio, R.** [Hard times for long-term care systems? Spillover effects on the Spanish economy.](#) *Economic Systems Research*.

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



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Haddad, E. A., Mengoub, F. E. and Vale, V. A.** [Water content in trade: a regional analysis for Morocco](#). *Economic Systems Research*.

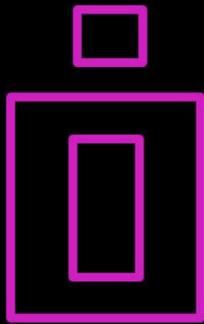
This paper aims at evaluating the virtual water content in trade in an intra-country perspective and discussing potential tradeoffs between the use of natural resources and value added creation. We develop a trade-based index that reveals the relative water use intensities associated with specific interregional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

**Allan, G. J., Connolly, K. and McIntyre, S. G.** [Developing an electricity satellite account \(ELSA\): an application to Scotland, UK](#). *Economic Systems Research*.

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

**Giammetti, R.** [Tariffs, domestic import substitution and trade diversion in input-output production networks: an exercise on Brexit](#). *Economic Systems Research*.

In this paper we employ the World Input-Output Database to develop a multi-sector inter-country model that allows us to identify the channels through which the trade effects of Brexit would propagate. The inclusion of global value chains and indirect Brexit effects in the model leads to estimates that diverge with the results of the main literature. Indeed, we found that Brexit could be risky and costly not only for the UK but also for many EU countries. Furthermore, we develop a second model and present the first empirical analysis on the consequences of domestic import substitution and trade diversion policies in Input-Output schemes. We found that allowing sectors and countries to partly substitute foreign products, leads to significantly lower losses for both macro-regions: the UK and EU27 would lose, at worst, the 0.28 and 0.5 percent of value-added, respectively.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Reyes, F. A.** [On growth regimes, structural change and input coefficients.](#) *Economic Systems Research.*

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

**Steenge, A. E. and Reyes, R. C.** [Return of the capital coefficients matrix.](#) *Economic Systems Research.*

A core ingredient of post-disaster input-output recovery models is the reconstruction of lost production capacity. Therefore, one would expect a set of models endowed with capital coefficients matrices to be available for analysis. However, this is not the case, possibly due to earlier negative experiences with such models. Nevertheless, in this paper, we aim to show that there is a class of problems that can be addressed successfully with a dynamic input-output model with a fully functioning capital coefficients matrix. We put forward that if reconstruction is tightly planned, investment and therewith gross output essentially become pre-determined. This also means that traditional final demand becomes an endogenous residual, with the model being transformed into a distribution and allocation model. We begin with a reordering of variables and equations as proposed in Leontief's dynamic inverse, and then move on directly to the newly proposed model. Suggestions for further work are given.

**Miroudot, S. and Ye, M.** [Decomposing value added in gross exports.](#) *Economic Systems Research.*

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



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Severini, F., Pretaroli, R., Socci, C., Zotti, J. and Infantino, G.** [The suggested structure of final demand shock for sectoral labour digital skills](#). *Economic Systems Research*.

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

**Cai, J. and Leung, P.** [A note on linkage between gross value added and final use at the industry level](#). *Economic Systems Research*.

Gross value added (GVA) is a common indicator of an industry/sector's economic performance. While an economy's total GVA is always equal to its total final use, an individual industry/sector's GVA is usually not equal to its final use. Yet an accounting identity between an industry/sector's GVA and the final use of multiple industries/sectors can be established by a gross value added-final use (GVA-FU) matrix. This paper derives the GVA-FU matrix in the Leontief demand-driven model and its equivalence in the Ghosh supply-driven model and interprets the matrix from different perspectives. The GVA-FU matrix can help policymakers and practitioners better understand an industry/sector's percentage of gross domestic product (GDP) – the underlying measure behind the United Nations Sustainable Development Goals (SDGs) Indicator 14.7.1 – from the demand-side perspective and facilitate its proper use for policy and planning. The GVA-FU matrix can become a standard component of the input-output apparatus for multiple applications.

**Attary, N., Cutler, H., Shields, M. and van de Lindt, J. W.** [The economic effects of financial relief delays following a natural disaster](#). *Economic Systems Research*.

In the U.S. the economic damages of natural disasters have increased substantially over time. While private insurance payouts tend to arrive relatively quickly, federal recovery monies are often allocated unevenly, with some communities waiting years to receive previously designated funds. We examine the costliness of delay by linking an economic model of the Joplin, Missouri economy to a civil engineering model that replicates the damage from a tornado that devastated the community in 2011. Building damage estimates from the natural hazard and engineering models are translated into capital stock losses, which subsequently impact the local economy through lost output. We examine several different recovery paths, with a focus on differences in the timing of recovery assistance. Our results show that delaying financial assistance can have important, irretrievable adverse outcomes in the short run.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Ferreira, J. P., Lahr, M., Ramos, P. and Castro, E.** [Accounting for global migrant remittances flows](#). *Economic Systems Research*.

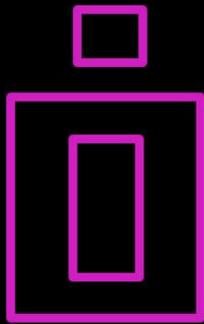
Migrant remittances are important to some countries. According to the World Bank, they comprise more than 30% of the GDP of Kyrgyzstan, Tonga, Tajikistan, Haiti and Nepal. Compared to official development aid or foreign direct investment, remittances have lately become a prime income stream for less-developed 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 be paid to the veracity of remittance estimates.

**Tsionas, M. G.** [Bayesian input-output table update using a benchmark LASSO prior](#). *Economic Systems Research*.

We propose updating a multiplier matrix subject to final demand and total output constraints, where the prior multiplier matrix is weighted against a LASSO prior. We update elements of the Leontief inverse, from which we can derive posterior densities of the entries in input-output tables. As the parameter estimates required by far exceed the available observations, many zero entries deliver a sparse tabulation. We address that problem with a new statistical model wherein we adopt a LASSO prior. We develop novel numerical techniques and perform a detailed Monte Carlo study to examine the performance of the new approach under different configurations of the input-output table. The new techniques are applied to a  $196 \times 196$  U.S. input-output table for 2012.

**Tiziano, D., Tuninetti, T., Laio, F. and Ridolfi, L.** [Tools for reconstructing the bilateral trade network: a critical assessment](#). *Economic Systems Research*.

This study critically assesses the performances of the Gravity Model (GM) and of the RAS algorithm for the bilateral flow intensity estimations and link prediction. The main novelty is the application of these methodologies to reconstruct the network topology with a minimum amount of information. Moreover, we implement a multi-layer analysis to provide a comprehensive and robust framework, by testing several food commodities, over the period 1986–2013. The main outcomes suggest that the RAS algorithm outperforms the Gravity Model in the estimations of the bilateral trade flows, importantly guaranteeing the balance constraints (i.e. global import equals global export), while GM generates lower relative errors, but it underestimates total global flows. Both RAS and GM can be applied to accurately recover the network architecture. The implications of our study encompass a wide range of applications: systemic-risk assessment, creation of new databases, and scenario analyses to support policy decisions.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Miroudot, S. and Ye, M.** [Multinational production in value-added terms](#). *Economic Systems Research*.

Micro-level evidence has emphasised that firms that produce across countries are responsible for a large share of international exchanges of goods, services, capital and knowledge. At the aggregate level, quantitative studies that look at multinational production generally rely on the concept of sales of foreign affiliates, which is a gross concept that includes the value of intermediate inputs. In the case of trade, the literature has recently shifted to a value-added approach that can distinguish in exports the contribution of the different economies supplying inputs. In this paper, we propose a framework that decomposes value-added in domestic sales in order to trace its origin and remove any double-counting. We find that an intercountry input-output table split on ownership can yield an analysis of activities of foreign affiliates of multinational firms in value-added terms.

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

Submit an article

## Highlights in journals

**Solís, A. F., Avelino, A. F. T. and Carrascal-Incera, A.** (2020) [The evolution of household-induced value chains and their environmental implications](#). *Ecological Economics*.

The growing fragmentation of production processes and expansion of international trade in the last decades have increased the scope and complexity of value-added chains worldwide causing a rearrangement of sectoral linkages intra- and inter-regionally. In terms of economic spillovers, this implies that a dollar entering a particular economy nowadays follows a different path than a decade before, permeating in longer interregional feedback loops and creating additional multiplier effects outside its region of origin. However, it also implies that the environmental burden that such this dollar generates has changed in scale and spatial distribution. In this paper, we explore the evolution of these "paths" over the period 1997–2008 and highlight the main drivers of observed structural changes that contribute to the surge or decline of the spatial distribution of economic spillovers and greenhouse gases emissions. We specifically study the effects of an increase in income in the United States, the country with the largest trade volume in the world. We introduce an extended version of the Temporal Leontief Inverse (TLI) framework that allows tracing the evolutionary path of the American households'

multiplier in a quasi-dynamic fashion, isolating the contribution of expenditure patterns, income, trade and foreign structural change to the temporal evolution. We find similar growing multiplier effects inside and outside the US due to services and manufacturing respectively, but a declining local environmental burden due to changes in interindustry relations inside the US with declining manufacturing and a reduced emission intensity. We also highlight the fragmentation process with declining foreign intraregional spillovers and increasing trade spillovers.

**Haddad, E., Cotarelli, N., Simonato, T. C., Vale, V. A. and Visentin, J. C.** (2020) [The Grand Tour: Keynes and Goodwin go to Greece](#). *Journal of Economic Structures*.

The impact of the crisis in the Greek economy was not uniform among the regions, threatening socioeconomic cohesion. In this paper, we explore the concept of the income multiplier in a multi-regional input-output setting, in the context of the Greek recession, showing empirical evidence for the increasing magnitude of the multiplier during the recession period. The main results reveal a complex system of interregional relations on some of whose structural characteristics the cyclical reaction paths of the regions depends. In this case, the use of fiscal instruments to stimulate local activity in the regions may bring about important implications for regional inequality in Greece.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Rueda-Cantuche, J. M., Revesz, R., Amores, A. F., Velázquez, A., Mraz, M., Ferrari, E., Mainar-Causapé, A. J., Montinari, L. and Saveyn, B.** (2020) [Improving the European input-output database for global trade analysis](#). *Journal of Economic Structures*.

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

**Wang, H., Wang, G., Qi, J., Schandl, H., Li, Y., Feng, C., Yang, X., Wang, Y., Wang, X. and Liang, S.** (2020) [Scarcity-weighted fossil fuel footprint of China at the provincial level](#). *Applied Energy*.

Supply risks and shortages of fossil fuels are major challenges to the sustainable development of countries. In response to this challenge, the 12th main goal of the Sustainable Development Goals emphasizes the importance of sustainable consumption and production patterns for resource (including fossil fuels) sustainability. However, for China, the world's largest energy consumer, the availability and criticality of fossil fuels to economic development have not been studied at sub-national scales. Understanding these can help fossil fuel management and the implementation of policies in different regions. This study is the first to analyse the scarcity-weighted fossil fuel footprint in China at the provincial level for 2012 using an environmentally extended multi-regional input-output model and a newly proposed scarcity evaluation indicator. Using scarcity-weighted indicators allows us to identify supply insecurities that are not revealed when focusing on fossil fuel extraction. The scarcity-weighted fossil fuel indicators identify new critical regions such as Hunan and Hubei. We also find that interprovincial export is a major driver of fossil fuel depletion in less-developed regions (e.g., 83% for Shanxi). This study can help regions in China identify fossil fuel supply risks from the viewpoint of their

natural capital endowment and resource depletion in relation to final demand. More importantly, the research findings provide a valuable reference for policymakers when reassessing sustainability not only for fossil fuels but also for other natural resources at multiple scales within and beyond China.

**Lin, C., Qi, J., Liang, S., Feng, C., Wiedmann, T. O., Liao, Y., Yang, X., Li, Y., Mi, Z. and Yang, Z.** (2020) [Saving less in China facilitates global CO2 mitigation](#). *Nature Communications*.

Transforming China's economic growth pattern from investment-driven to consumption-driven can significantly change global CO2 emissions. This study is the first to analyse the impacts of changes in China's saving rates on global CO2 emissions both theoretically and empirically. Here, we show that the increase in the saving rates of Chinese regions has led to increments of global industrial CO2 emissions by 189 million tonnes (Mt) during 2007–2012. A 15-percentage-point decrease in the saving rate of China can lower global CO2 emissions by 186 Mt, or 0.7% of global industrial CO2 emissions. Greener consumption in China can lead to a further 14% reduction in global industrial CO2 emissions. In particular, decreasing the saving rate of Shandong has the most massive potential for global CO2 reductions, while that of Inner Mongolia has adverse effects. Removing economic frictions to allow the production system to fit China's increased consumption can facilitate global CO2 mitigation.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**López, L. A., Arce, G. and Jiang, X.** (2020) [Mapping China's flows of emissions in the world's carbon footprint: A network approach of production layers](#). *Energy Economics*.

We propose a combination of a structural path analysis (SPA) with the complex network analysis to capture the existence of different sector or industry clusters in the transmission of carbon emissions from China to the rest of world's economy through imports. We used OECD-ICIO input-output framework and identified different types of communities as boosts and suppliers of carbon emissions by type of industry, type of final demand, and the different stages of production.

We have found that some worldwide industries, such as consumption of textiles and wholesale and retail trade, could reduce the emissions generated in China by collaborating with their direct suppliers since they receive a large part of their emissions from the first and second stage of production. However, it is not so easy for other consumption industries, such as food, computers, motor vehicles and most of the service industries, which are more diffuse ones, and incorporate most of their carbon emissions from China from furthest stages of production (3 to 9). In terms of economic policy, this imply that if these industries (or firms) that supply the final demand of the world economy want to reduce

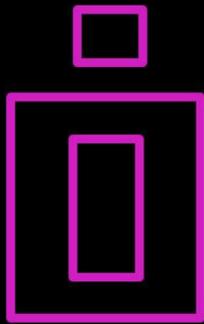
a significant part of their emissions generated in China, it should be through establishing collaboration agreements with the suppliers in China that are in the remote stages of the production process, which entails higher transaction costs.

**Chaves, L. S. M., Fry, J., Malik, A., Geschke, A., Sallum, M. A. M. and Lenzen, L.** (2020) [Global consumption and international trade in deforestation-associated commodities could influence malaria risk](#). *Nature Communications*.

Deforestation can increase the transmission of malaria. Here, we build upon the existing link between malaria risk and deforestation by investigating how the global demand for commodities that increase deforestation can also increase malaria risk. We use a database of trade relationships to link the consumption of deforestation-implicated commodities in developed countries to estimates of country-level malaria risk in developing countries. We estimate that about 20% of the malaria risk in deforestation hotspots is driven by the international trade of deforestation-implicated export commodities, such as timber, wood products, tobacco, cocoa, coffee and cotton. By linking malaria risk to final consumers of commodities, we contribute information to support demand-side policy measures to complement existing malaria control interventions, with co-benefits for reducing deforestation and forest disturbance.

**Monsalve, F., Ortiz, M., Cadarso, M., Gilles, E., Zafrilla, J. and López, L.** (2020) [Nesting a city input-output table in a multiregional framework: a case example with the city of Bogota](#). *Journal of Economic Structures*.

In parallel with the increasing availability of multiregional input-output (MRIO) tables, there has been a growing concern on IO modelling at lower levels of spatial disaggregation, to reflect the particular features of cities better. The urbanization process is one of the salient characteristics of the current stage of globalization, so it is imperative to know more about their global economic, social and environmental impacts. MRIO initiatives are defined at the country level, which means that we are potentially losing some key information about cities and their economic structures. In this paper, we fill this gap by putting together the IOT for the city of Bogota (Colombia) into the well-known OECD's ICIO database. After describing the structure of both IOTs, we document the harmonization and nesting procedures in a step by step approach, focusing on the main challenges and assumptions that we have to make. Additionally, a case study has been carried out to weight the level of integration of Bogota in global value chains. The analysis proves the low level of global integration: the bulk of the valued-added generated in Bogota due to the city's exports comes from the economy of the rest of the country and presents a significant deficit in its value-added balance. Apart, we hope it could shed some light to conduct similar adaptations for other cities.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Banacloche, S., Cadarso, M. A., Monsalve, F. and Lechon, Y.** (2020) [Assessment of the sustainability of Mexico green investments in the road to Paris](#). *Energy Policy*.

To meet the Paris Agreement, Mexico is committed to reduce unconditionally 25% of its greenhouse gases emissions for the year 2030. Since the strategy to achieve the mitigation goals needs an increase in renewable energy sources, Mexico's national climate change policy package has already been launched, including the deployment of 13.5 GW of wind, 1 of biomass, 0.7 of geothermal, 1.75 of hydropower and 10.4 of solar energy in the period 2018–2030. However, these green investments planned are below the scenario proposed by IRENA compatible with the Paris Agreement. This paper assesses Mexico's green investments for the period 2018–2030 in terms of value added, employment, materials, land use, water and CO<sub>2</sub>eq emissions in a multi-regional input-output framework and compare the results with the IRENA proposal. These green investments are expected to account for nearly an increase of 1% both of GDP and employment in Mexico and an expected mitigation of around 63 Mt CO<sub>2</sub>eq, once the new facilities are fully deployed. Nevertheless, the deployment and operation and maintenance phases will increase the emissions (0.82%), the water and material footprint (0.19 and 0.9%, respectively) and the land use (0.19%) with a substantial share of the positive and negative effects leaked outside.

**Cai, M. and Vandyck, T.** (2020) [Bridging between economy-wide activity and household-level consumption data: Matrices for European countries](#). *Data in Brief*.

This dataset represents bridging matrices between two different data classification systems: consumption by purpose (COICOP) and products by activity (CPA). While the former classification is used in household budget and expenditure surveys, the latter represents the industry sector dimension that is typically adopted in national accounts and input-output tables. We collect input data from Eurostat on total household consumption for 35 COICOP and 63 CPA categories for the year 2015. Based on these data, we construct bridging or concordance tables for 30 European countries using recently developed matrix balancing techniques. The resulting tables enable data conversion between consumption- and production-based statistics, facilitating research that integrates macroeconomics, multi-sectoral international trade and heterogeneous agents in household-level expenditure micro-data. Although they are a necessary input in several types of research, they are often constructed on an ad hoc and region-specific basis and not shared publicly. As such, making this dataset available will be useful for computable general equilibrium and input-output models and for carbon footprint and life cycle analyses that incorporate rich consumption micro-data, for instance to shed light on distributional

aspects of climate and energy policies. Furthermore, by eliminating a barrier raised by differences in statistical classifications, this dataset may foster collaboration between different research teams and may facilitate soft-linking between complementary analytical tools used for policy support.

**Banacloche, S., Cadarso, M. A. and Monsalve, F.** (2020) [Implications of measuring value added in exports with a regional input-output table. A case of study in South America](#). *Structural Change and Economic Dynamics*.

Global value chains (GVC) describe the functioning of international trade today. A widely used way to measure GVC is the input-output analysis. However, many developing countries are not covered in the main multi-regional input-output (MRIO) databases, hindering the measurement of GVC in regions like South America. The purpose of this paper is to analyse the role of South America in GVC using a novel regional input-output table (RIOT). To this end, a novel adaptation of Koopman, Wang and Wei gross exports decomposition scheme, suitable for any RIOT, is created. The implications of using a RIOT are assessed. Besides, the results are complemented with those obtained using a MRIO table. It is confirmed the low insertion of South America in GVC and its upstream position as a provider of intermediate goods and services. Imported content in South American exports comes mostly from outside the region and only Uruguay is vertically integrated.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Li, M., Wiedmann, T. and Hadjikakou, M.** (2020) [Enabling Full Supply Chain Corporate Responsibility: Scope 3 Emissions Targets for Ambitious Climate Change Mitigation.](#) *Environmental Science & Technology.*

There is building consensus that nonstate actors have the potential to drive more ambitious action toward climate targets than governments, thus driving the necessary transition to ensure that humanity remains within a safe operating space. These bottom-up mitigation activities, however, require individual targets on both direct and indirect (upstream) greenhouse gas (GHG) emissions in order to reconcile trade-offs between global and local sustainability goals. Here we use a scenario-driven approach based on a global multiregional input-output (GMRIO) model to develop scope 3 emission reduction targets for individual economic sectors, comparable across countries and geographies. Under an ambitious carbon mitigation scenario for 2035 (that follows a trajectory of 1.75 °C total warming by 2100), global upstream scope 3 emission intensities need to be reduced by an additional 54% compared to a baseline scenario with reference technology. On a sectoral basis, this is equivalent to a 58–67% reduction in energy, transport, and materials, a 50–52% reduction in manufacturing, services, and buildings, and a 39% reduction in agriculture, forestry, and other land use. By aligning indirect

supply chain targets with ambitious carbon mitigation scenarios, our approach can be used by nonstate actors to set actionable scope 3 targets and to build climate-compatible business models.

**Cheng, M., Chen, G., Wiedmann, T., Hadjikakou, M., Xu, L. and Wang, Y.**(2020) [The sharing economy and sustainability – assessing Airbnb's direct, indirect and induced carbon footprint in Sydney.](#) *Journal of Sustainable Tourism.*

A peer-to-peer sharing approach for the accommodation sector such as Airbnb has been suggested as a more environmentally sustainable alternative to conventional forms of accommodation services. This study evaluates the carbon footprint of Airbnb hosts in Sydney. The Airbnb platform and its hosts together generate direct and indirect carbon footprints in the range of 7.27 to 9.39 kg CO<sub>2</sub>e per room and night. The extra income of Airbnb hosts leads to additional, induced carbon footprints. By modelling four different scenarios, the induced carbon footprint of Airbnb hosts range from 3.84 to 602 kg CO<sub>2</sub>e/room-night. Findings challenge the prevalent notion provided by many previous studies that the sharing economy helps to use under-utilized resources, thus decreasing environmental impacts. This study contributes to peer-to-peer accommodation literature and to the widening public debate on the environmental sustainability of the sharing economy.

**García-Alaminos, A., Monsalve, F., Zafrilla, J. and Cadarso, M.** (2020) [Unmasking social distant damage of developed regions' lifestyle: A decoupling analysis of the indecent labour footprint.](#) *PLoS ONE.*

A fair path to achieve a sustainable world would imply reducing the eventual negative effects linked to the production process while increasing economic output, which is referred to in the literature as impact decoupling. This article aims to assess whether global consumption chains are currently on the decoupling path or not, from a social point of view. Specifically, we address the working conditions which developed societies' lifestyle sparked at a distance in global factory countries, focusing on the most harmful consequences of an indecent work. Additionally, we determine the kind of decoupling observed through the new concept of social footprints' elasticities with respect to final demand for each region. We employ a Multi-Regional Input-Output model and an own elaboration database of social impacts concerning undignified working conditions. Results indicate that most countries achieved the goal of decoupling occupational injuries -both fatal and non-fatal- from production, while results for forced labour show a slower and sometimes uncertain process of decoupling. European Union and United States' footprints have been reduced overtime for the three impacts. However, more than half of these footprints are still generated by imports, mainly from developing regions.



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

**Rocchi, P. Rueda-Cantuche, J. M., Boyano, A. and Villanueva, A.** (2020) [Macroeconomic Effects of EU Energy Efficiency Regulations on Household Dishwashers, Washing Machines and Washer Dryers](#). *Energies*.

Testing the relationship between economic performance and energy consumption is of utmost importance in nearly all countries. Taking the European Union as scope, this paper analyses the impacts of energy efficiency legislation on a selection of household appliances. In particular, it analyses the employment and value added impacts of the stricter energy efficiency requirements for dishwashers, washing machines, and washer dryers. To do so, this paper combines a bottom-up stock model with a macro-econometric dynamic general equilibrium model (FIDELIO) to quantify the direct and indirect value added and employment impacts in the European Union. The analysis shows that stricter energy efficiency requirements on household dishwashers, washing machines, and washer dryers have a net negative macroeconomic impact on value added (roughly 0.01 % of the total European Union value added) and a slightly net positive impact on employment. In fact, the regulations cause a shift in the composition of the household consumption basket that seems to favor labor-intensive industries.

**Lahr, M. L., Ferreira, J. P. and Tobben, J, R.** (2020) [Intraregional Trade Shares for Goods-Producing Industries: RPC estimates using EU data](#). *Papers in Regional Science*.

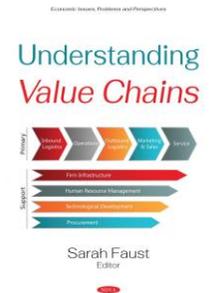
The lack of subnational trade data has dampened the development of reliable regional and multiregional models for regional policy development. So, most researchers and vendors of regional and interregional economic models continue to rely on location quotients, supply-demand pool techniques, or minor modifications of them, despite knowing that they under-estimate interregional trade. In this piece, we analyse the relative viability of estimates of intraregional trade—so called “regional purchase coefficients” (RPCs). We do so for manufacturing sectors in 28 EU countries using the World Input-Output Database. We introduce an RPC-estimating technique using a quasi-binomial regression approach for goods-producing industries; we apply standard supply/demand ratios as RPCs for service-based industries. We then apply the estimates to an aggregate EU input-output (I-O) table and measure how closely the results approximate the I-O tables (direct requirements matrices) for each of the 28 EU nations. We compare these findings to those obtained by other conventional approaches. We also evaluate their ability to replicate the country Leontief inverses and output multipliers. We find quasi-binomial regression approaches superior across the board.

## Highlights in Books

### [Understanding Value Chains](#)

**Sarah Faust** (Editor)

Nova Science  
Publishers (2020)



### Book-chapter:

What does value chain upgrading mean for (female) job opportunities in the EU?

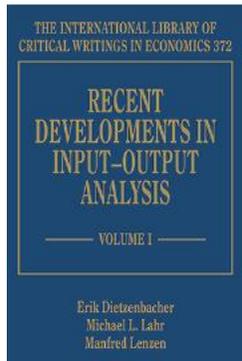
M<sup>a</sup> Victoria Román de Lara, Antonio F. Amores and José M. Rueda-Cantuche



**Newsletter**  
Number 44, May-June 2020

# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Recent Developments in Input-Output Analysis



The International Library of Critical Writings in Economics series

Edited by **Erik Dietzenbacher**, Professor of Interindustry Economics, University of Groningen, the Netherlands, **Michael L. Lahr**, Professor of Planning and Public Policy, Rutgers, The State University of New Jersey, US and **Manfred Lenzen**, Professor of Sustainability Research, University of Sydney, Australia

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.

'We were very pleased to learn of this ambitious new two-volume compendium of key contributions over the last twenty years or so to the field of input-output analysis, compiled by seasoned veteran input-output researchers Erik Dietzenbacher, Michael Lahr and Manfred Lenzen. The input-output field is experiencing a notable renaissance of methodological developments and applications, especially in conjunction with the growing collection of global data sets, to evaluate economic, environmental, and social policy issues. These recent developments are captured very effectively in the collection, which draws on a wide range of both traditional and newer, specialized journals with which some readers may be less familiar. The new compendium stands as an excellent resource on its own, and it will also serve as an especially useful companion to existing texts in the field.'

– Peter Blair, National Academies of Sciences, Engineering and Medicine, Washington DC, and Ronald E. Miller, University of Pennsylvania, US



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Database

### ICM Database - Integrated Carbon Metrics Embodied Carbon Life Cycle Inventory Database

University of New South Wales  
Wiedmann, Thomas ; Teh, Soo Huey ; Yu, Man

#### **Description**

The Integrated Carbon Metrics (ICM) Embodied Carbon Life Cycle Inventory (LCI) Database (ICM Database) provides Australian-specific Carbon Footprint Intensities for around 700 construction and building materials, as well as built environment-related products and processes, based on a hybrid life cycle assessment methodology. The ICM Database is an output of the Integrated Carbon Metrics project (number RP2007) supported by the CRC for Low Carbon Living (CRCLCL).

A copy of the ICM database can be downloaded by accessing the DOI below:

Wiedmann, T., Teh, S. H. and Yu, M. (2019) ICM Database – Integrated Carbon Metrics Embodied Carbon Life Cycle Inventory Database, University of New South Wales. [DOI](#)

### ECE Tool – Embodied Carbon Explorer Tool

An online tool to calculate the Scope 3 emissions of any project

Based on the top-down approach, the Embodied Carbon Explorer (ECE) online tool has been developed specifically to enable the rapid evaluation of (Scope 3) carbon emissions in a wide range of products and services (e.g. precinct, building, organisation, households, etc.) in Australia. It is well suited for a quick screening assessment before full, detailed assessments are undertaken.

What can the ECE do?

- It quantifies the total Scope 3 carbon emissions related to your project,
- It identifies main contributors to the total Scope 3 carbon emissions,
- It provides functionality suitable for evaluation under the Australian Climate Active Carbon Neutral Standard.

To use the ECE tool, please register for an account at: <https://ece.ielab-aus.info>

The ICM Database and ECE Tool were developed by the Sustainability Assessment Program (SAP) at UNSW Sydney, and is an output of the Integrated Carbon Metrics project (number RP2007) supported by the CRC for Low Carbon Living (CRCLCL).

### Social Indicators of Working Conditions Database

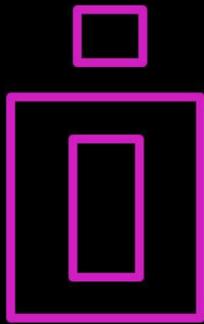
García Alaminos, Ángela (2019)

#### **Description**

This database compiles five indicators regarding working conditions: fatal occupational injuries, non-fatal occupational injuries, forced labour, part-time employment and temporary employment.

Each of the five indicators is provided for 44 regions according to WIOD Release 2016 regional structure and is disaggregated by economic activity according to the International Standard Industrial Classification of All Economic Activities (ISIC) Rev. 3. Therefore, this dataset is suitable to be introduced as a social satellite account in a multi-regional input-output model.

Data has been compiled from official sources as ILOSTAT, EUROSTAT or OECD Data among others. Data coming from different databases have been homogenized, and in some cases estimation has been required. Main sources are specified in the dataset. For further information about the generation process of the dataset, please contact the author at [angela.garcia@uclm.es](mailto:angela.garcia@uclm.es).



# INTERNATIONAL INPUT-OUTPUT ASSOCIATION

## Events

### Next workshop

#### Permanent Workshop on Input-Output Analysis

SHAIO ANNOUNCEMENT:

Due to the unprecedented situation caused by the COVID-19 pandemic, as well as the uncertainty about how the situation will evolve in the coming months, we have been forced to postpone the face-to-face edition of the SHAIO Permanent Workshop, which was to take place next September in León, Spain. The event, to which you are all invited will take place in September 2021 ([web](#)).

Besides, we inform you that the current year's [workshop](#) becomes online. We are designing a series of online talks and conferences to maintain the exchange of ideas and the spread of research that will take place throughout 2020.

Follow us on [Twitter](#) or [Facebook](#) to keep up to date with all the activities proposed.

We wish the best to the input-output community.

The SHAIO Council

Sociedad Hispanoamericana de Análisis  
Input-Output



## Next conferences

### 13<sup>th</sup> World Congress of the RSAI

June 2-5, 2020



**GTAP**  
Global Trade Analysis Project

**23<sup>rd</sup> ANNUAL CONFERENCE ON  
GLOBAL ECONOMIC ANALYSIS**  
"Global Economic Analysis Beyond 2020"  
June 17-19, 2020

**UPDATE**  
Due to the COVID-19 outbreak, this year's GTAP Conference will be held online.  
Visit the conference homepage for further details. <http://bit.ly/2020GTAPConference>

**PRESENTER DEADLINES\***

Final Papers	Presenter** Registration	Final Presentations
APRIL	APRIL	MAY
15	30	17

**NON-PRESENTER DEADLINE\***

Non-Presenter Registration
JUNE
7

\*\*Organized session organizers and chairs should also register by this date.  
\*All deadlines coincide with the Eastern Time Zone (US & Canada).

IIOA Newsletter Editor:

**Vinicius A. Vale** [newsletter@iioa.org](mailto:newsletter@iioa.org)  
Federal University of Parana, Brazil