Newsletter
Number 53, August 2022

INTERNATIONAL INPUT-OUTPUT ASSOCIATION

Welcome from the Editor

Dear **IIOA** member,

I am very pleased to release the latest issue of the *International Input-Output Association Newsletter*. Many thanks to all of you that have contributed by sending your inputs.

This issue contains the latest ESR articles, highlights in Journals and recent I-O books, and the announcements of some new events. You can also find a very interesting database, some teaching materials, and other news from the I-O world. The Social Accounting Corner brings this time conversations with Monica Serrano and Douglas Meade. It is another issue with plenty of interesting news that I hope you will enjoy.

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

Andre Carrascal Incera
IIOA Newsletter Editor
University of Oviedo, Spain
Newsletter E-mail: newsletter@iioa.org
Personal E-mail: carrascalandre@uniovi.es

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In this issue

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Events

IIOA events

Dear IIOA Members,

The IIOA announces a new Webinar! A key date for your diaries, the next IIOA Webinar will be held on **Thursday, 6th October 2022 at 6pm** Central European Time (CET).

It is with great pleasure to have **Prof. Manfred Lenzen** (Professor at University of Sydney and Fellow of the IIOA) as our speaker. Manfred's talk is titled, "Affluence, equity and degrowth in the context of climate change".

Please feel free to announce this webinar on social media, this is going to be a webinar open to non-members of the IIOA. Colleagues outside the IIOA can sign up for the webinar before Wednesday, October 5, 23:59 CET, using this form (feel free to forward this link to anyone who might be interested):

https://forms.gle/LDaz6u5MWfFkac1R6

Short Bio:
Manfred Lenzen is Professor of Sustainability Research with the ISA team in the School of Physics at the University of Sydney. He has a PhD in Physics and experience in renewable energy technologies, life-cycle assessment, and carbon footprinting. His current research interests focus on the link between environmental/resource impacts and international trade. He currently leads the development of cloud-based collaborative-research platforms for building large-scale global economic-environmental models that enable environmental impact analysis across global supply-chain networks.

Abstract:
In order to mitigate climate change, the majority of countries rely on increasingly speculative high energy-GDP decoupling, large-scale carbon dioxide removal and large-scale and high-speed renewable energy transformation. The magnitude of countries' greenhouse gas emissions is closely tied to their level of affluence. Similarly, 1.5 °C scenarios reported by the Intergovernmental Panel on Climate Change (IPCC) rely on combinations of controversial negative emissions and unprecedented technological change, while assuming continued growth in gross domestic product (GDP). Thus far, the integrated assessment modelling community and the IPCC have neglected to consider degrowth scenarios, where economic output declines due to stringent climate mitigation. Hence, the potential of degrowth to avoid reliance on negative emissions and speculative rates of technological change remains unexplored. This gap is significant, as the magnitude of countries' greenhouse gas emissions is closely tied to their level of affluence. Similarly, changes in emissions are largely driven by per-capita consumption. In unison, these findings point to lifestyle changes as needed to avoid dangerous levels of climate change. However, there are doubts regarding political feasibility and individual capability of such lifestyle changes, as the required mitigation trajectories become increasingly stringent.

We look forward to welcoming you!

Best regards,

Kuishuang Feng and Sanjiv Mahajan

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Events

2022 INFORUM World Conference

The INFORUM group of international partners will hold its World Conference this year virtually. This conference will be organized by the Inforum German, Italian and US teams. The conference will take place October 26 to 28, 2022.

Almost every year since 1993 (except 2020), Inforum has held an annual world conference. The aim of these conferences is to advance the work of empirical input-output modeling, analysis, and data development techniques through the presentation and publication of papers representing the work of INFORUM activities worldwide. Although the agenda overlaps somewhat with that of the International Input-Output Conference, it more specifically is dedicated to empirical work, especially in the areas of model building and data development. More information on the INFORUM conferences can be found at http://inforumweb.inforumecon.com/organization/conferences.html.

Key Deadlines:

Preliminary conference registration 15 September, 2022

Deadline for final paper submission 30 September 2022

Organizing Committee Contact Information:

If you are interested, please contact Frederik Parton (parton@gws-os.com) and Douglas Meade (meade@inforumecon.com), and we will send further information.

Teaching Materials

NEREUS
Núcleo de Economia Regional e Urbana da Universidade de São Paulo

Applied General Equilibrium Models I and II

Program

Instructor: Eduardo A. Haddad

The course goals are:

•To introduce students to the ideas and techniques of input-output analysis and computable general equilibrium modelling, and to equip them to start using operational models, adapting such models for their own simulations

•To equip students to start using different methods in multisectoral and multirregional analysis

•To develop skills that help analyzing development policies

•To introduce students to some of the commonly-used tool kits in regional science that help understanding and interpreting the complexity of the spatial structure of sub-national economies

More information at http://www.usp.br/nereus/?p=8794.

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Databases

Input-Output Analysis of the Ukraine War: A Tool for Assessing the Internal Territorial Impacts of the Conflict

Eduardo Amaral Haddad, Inácio F. Araújo, Ademir Rocha, Karina Sass

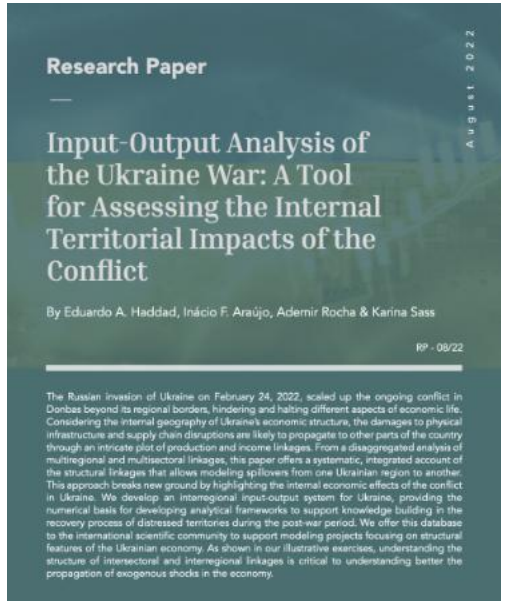
August 12, 2022

This is a joint effort involving the Policy Center for the New South (PCNS) in Morocco and the University of Sao Paulo Regional and Urban Economics Lab (NEREUS) in Brazil.

We developed an interregional input-output system for Ukraine, providing the numerical basis for developing analytical frameworks to support knowledge building in the recovery process of distressed territories during the post-war period. We offer this database to the international scientific community to support modeling projects focusing on structural features of the Ukrainian economy. Our illustrative exercises have shown that understanding the structure of intersectoral and interregional linkages is critical to understanding better the propagation of exogenous shocks in the economy.

This project was developed under the "Nereids Program" at USP, a scholarly solidarity outreach initiative that started five years ago to promote regional science and provide academic support to research institutions in peripheral areas in the developing world. The Nereids Program is based on three pillars: (i) education and training; (ii) research and capacity building; and (iii) knowledge exchange.

The paper and dataset can be accessed by clicking on the following link: https://www.policycenter.ma/publications/input-output-analysis-ukraine-war-tool-assessing-internal-territorial-impacts-conflict



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Economic Systems Research
Journal of the IIOA
Volume 34, Issue 3, 2022

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

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

Christian Lutz, Maximilian Banning, Lara Ahmann & Markus Flaute
Energy efficiency and rebound effects in German industry – evidence from macroeconometric modeling

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

Syeda Tasnia Hasan, Michael Oliver Wood & Simron Singh
Revealing embedded carbon emissions within the Comprehensive and Progressive Agreement for Trans-Pacific Partnership

The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), representing approximately USD 13.5 trillion of the global GDP, is one of the largest free-trade agreements in the world. This trade agreement considers many important issues yet fails to address climate change or carbon dioxide (CO2) emissions. CO2 emissions in trade are critical as all CPTPP parties have made significant carbon emissions reduction commitments of between 8-36% through the COP21- Paris Agreement. Herein lies a paradox. This study assesses the amount of embedded CO2 emissions in the CPTPP through an input-output analysis of consumption-based emissions in ten carbon-intensive sectors, under three scenarios. The results reveal that as trade between partners increases, so will CO2 emissions across those sectors. These findings are essential for policymakers who are striving to grow Partnerships (Sustainable Development Goal 17) while seeking to address Climate Action (Sustainable Development Goal 13), which appear to be conflicting goals.

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Jan Weinzettel

Aggregation error of the material footprint: the case of the EU

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

Makiko Tsukui, Chen Lin, Kaiyan Ji & Xiaoliang Lang

The true cost of trade among neighbors: the role of Japanese imports in waste generation in China

China's rapid economic development has caused considerable environmental problems in waste generation and treatment. One important reason for this is China's manufacturing exports to other countries such as Japan, a major trading partner. However, the contribution of such importing countries has not yet been fully explored. This study quantitatively examined how final demand in trade between China and Japan affects both countries' economies and waste generation. The results show that imports of final consumption goods from China to Japan induced enormous waste generation in China, while the wastes induced in Japan were negligible. Even if final demand exports from China to Japan are significantly economically beneficial to China, the cost to China from addressing the induced waste generation seems too much to make these exports worthwhile. To encourage constructive discussions, improvement of reliability and transparency of waste statistics in China that allows comparison with other countries would be significant.

Ning Chang & Chaohui Han

Regional CO2 emissions and cross-boundary mitigation potential in China

This paper presents a new framework for investigating regional CO2 emissions from the perspective of the domestic supply chain, with a combination of linkage analysis and structural decomposition analysis (SDA), which allows for a better understanding of spatial emission distributions and cross-boundary potential for CO2 mitigation. Based on the multi-regional input–output (MRIO) tables of 2007 and 2012, Chinese provinces (cities) are categorised into three groups according to linkage characteristics, among which, Group I is suggested to be given priority in formulating mitigation policies due to their stronger regional CO2 influence characteristics. Moreover, regions in Group I have been more affected by inter-regional trade than other groups with regard to their local CO2 emissions. Therefore, turning Group I into a low-carbon production pattern could help construct greener domestic supply chains. The results emphasise that regional analysis on CO2 emissions should go beyond the local factors, and that regional mitigation polices should consider the position and participation degree of different regions in domestic supply chains.

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Economic Systems Research
Journal of the IIOA
Latest articles (up to 2nd of Sept.)

Raúl Vázquez-López
Assessing employment benefits from trade: US-Mexico trade under NAFTA

Recent tendencies in the operation of Global Value Chains (GVC) have indicated an increasingly asymmetric distribution of benefits in terms of the participating countries and different layers of workers. This paper employs the World Input–Output Database to calculate the working hours and wages embodied in manufacturing exports between the US and Mexico, by country of origin and skill level, from 1995 to 2008. In purchasing power, the increase in total wages paid in the US, generated by the bilateral trade, was significantly higher than that of wages paid in Mexico, even though the additional number of hours worked in Mexico was seven times higher. For the US, the results ratify the loss of jobs after 2001, but with an upgrade of the skill structure. We conclude that the trend towards replacement of low-skilled labour by more capital-intensive systems occurs within GVC to the detriment of the incomes of low-skilled workers.

Vladimír Holý & Karel Šafr
Disaggregating input–output tables by the multidimensional RAS method: a case study of the Czech Republic

The RAS method is an iterative procedure that bi-proportionally scales an input–output table to be consistent with given row and column sums. It can be used to disaggregate an annual national table to more detailed tables, such as regional, quarterly, and domestic/imported tables. However, the regular two-dimensional RAS method does not ensure the consistency of the disaggregated tables with the original table. For this problem, we use the multidimensional RAS method, which besides input and output totals, also ensures regional, quarterly, and domestic/imported totals. Our analysis of Czech industries shows that the multidimensional RAS method increases the accuracy of table estimation as well as the accuracy of the Leontief inverse, the quarterly value added, and (to some degree) the regional Isard's model. We also rigorously demonstrate its relation to the cross-entropy model.

Anwar Shaikh, Luiza Nassif-Pires & José Alejandro Coronado
A new empirical contribution to an old theoretical puzzle: what input–output matrix properties tells us about equilibrium prices and quantities

Eigenvalues of input-output matrices have significant implications for the structures of equilibrium prices and quantities. According to the Bródy Conjecture (BC), all subdominant eigenvalues of matrix would approach zero as matrix size approached infinity. Thus, any given initial quantity or price vector would converge to the corresponding equilibrium one in a single step. This paper adds significant empirical evidence to this theoretical discussion. We create a database of 307 different sizes matrices ranging over 30 years. Contrary to BC, we find that: the coefficient of variation and the subdominant eigenvalue moduli rise with matrix size; there's a universal rank-size curve of eigenvalue moduli, but it is smooth and convex rather than L-shaped; the distribution of eigenvalue moduli is best fit by a Weibull probability distribution; the Weibull quantile function in turn yields a power law for eigenvalue moduli which is a better fit than a previously proposed exponential function.

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Highlights in journals

J. A. León, M. Ordaz, E. Haddad & I. F. Araújo
Risk caused by the propagation of earthquake losses through the economy
Nature Communications

The economy of a country is exposed to disruptions caused by natural and man-made disasters. Here we present a set of probabilistic risk indicators, the Average Annual Loss (AAL) and the Loss Exceedance Curve (LEC), regarding to production, employment, Gross Domestic Product (GDP), Gross Regional Product (GRP), export volume, inflation, tariff revenue, among others, due to earthquakes. All indicators are computed using a systematic probabilistic approach, which integrates the seismic risk assessment with spatial computable general equilibrium models, both robust and well-known frameworks used worldwide in their respective fields. Our approach considers the induced damage and frequency of occurrence of a vast collection of events that collectively describe the entire seismic hazard of a country, giving us a better and more complete understanding of the full consequence of earthquakes. We illustrate this approach with an example developed for Chile.

Mateo Ortiz, María-Ángeles Cadarso, Luis-Antonio López & Xuemei Jiang
The trade-off between the economic and environmental footprints of multinationals' foreign affiliates
Structural Change and Economic Dynamics

The side effects of the production activities of multinational enterprises (MNEs) are a constant source of controversy. It is claimed that MNEs stimulate employment and technological progress in the countries where they operate, but they are simultaneously accused of intensifying inequality and environmental damages, especially in developing countries. Using a multiregional input-output model, in this paper, we trace the CO2 emissions and value added attributable to the foreign affiliates of multinational enterprises (FMNEs) to quantify the trade-offs between the economic benefits and environmental impacts along their global supply chains. The results show that FMNEs in most countries induce greater contributions to CO2 emissions than to value added along their supply chains. This is mostly explained by the concentration of MNEs production in industries with a high CO2 burden (manufacturing sectors) and their relatively low participation in high-value added activities (services). The analysis also shows that FMNEs generally have higher carbon intensities than domestic-owned firms in the same sector, especially in OECD countries, which undermines the efforts made by those countries to reduce global emissions. FMNEs incorporate larger portions of imported emissions into their carbon footprint than domestic companies, so they more often take advantage of carbon leakages and are more vulnerable to a potential carbon border tax. Since developed countries own the affiliates producing 89% of FMNEs' global output, those countries should design policies to reduce the carbon footprints of their MNEs' foreign activities in both developed and developing countries.

Xuemei Jiang, Luis-Antonio López, María-Ángeles Cadarso & Mateo Ortiz
The emissions responsibility accounting of multinational enterprises for an efficient climate policy
Global Environmental Change

The achievement of global warming limits below 2 °C and 1.5 °C requires deeper involvement of nonstate and subnational actors. In this paper, we focus on multinational enterprises (MNEs) and propose a new technology-adjusted investment-based emission accounting (TIBA) system that considers the technology gap between parent companies and their foreign affiliates. Specifically, TIBA rewards the home regions that transfer clean technology to host regions through MNEs to reduce global emissions and penalizes home regions that expand with high emission intensities through MNEs to increase global emissions. Under the TIBA system, the economies with high outward foreign direct investment stocks are assigned significantly higher responsibilities of emissions than under the production-based accounting (PBA), such as the United States, major European economies, Japan, and Canada. However, the increases in responsibilities differ sharply, depending on their investing regions and industries, as well as the technology transfers. Moreover, our measurements suggest that ideal technology transfers under TIBA would reduce emissions by up to 3,762 Mt, accounting for ~16% of global Carbon Dioxide emissions from industrial processes involving fossil fuel combustion in 2016. This implies that there is room for improvement in low-carbon technology transfers through MNEs to combat global climate change. Thus, we argue that TIBA targets an efficient policy that highlights the role of MNEs.

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Luis Daniel Torres-González

The Characteristics of the Productive Structure Behind the Empirical Regularities in Production Prices Curves

Structural Change and Economic Dynamics

This paper contributes to the identification of the structural characteristics of the input-output accounts (IOA) behind the persistent simple behavior of relative production prices and capital intensities as an effect of changes in income distribution. These characteristics of the IOA are statistical in nature and refer to the strong proportionality between (i) the labor-coefficients vector and the Perron-Frobenius eigenvector of the input-coefficients matrix and (ii) the columns of this input matrix. Both statistical characteristics not only reduce the sources of nonlinearity in the price and capital intensity functions of the profit rate but also produce the statistical tendency of industry's capital intensities to cluster around central values with a limited variability irrespectively of the profit rate. The empirical results are based on the U.S. economy for the period 1977-2012.

Nan Liu, Jidong Kang, Tsan Sheng Ng & Bin Su

Cutting CO2 emissions through demand side regulation: Implications from multi-regional input–output linear programming model

Frontiers of Engineering Management

This study combines multi-regional input–output (MRIO) model with linear programming (LP) model to explore economic structure adjustment strategies for the reduction of carbon dioxide (CO2) emissions. A particular feature of this study is the identification of the optimal regulation sequence of final products in various regions to reduce CO2 emissions with the minimum loss in gross domestic product (GDP). By using China's MRIO tables 2017 with 28 regions and 42 economic sectors, results show that reduction in final demand leads to simultaneous reductions in GDP and CO2 emissions. Nevertheless, certain demand side regulation strategy can be adopted to lower CO2 emissions at the smallest loss of economic growth. Several key final products, such as metallurgy, nonmetal, metal, and chemical products, should first be regulated to reduce CO2 emissions at the minimum loss in GDP. Most of these key products concentrate in the coastal developed regions in China. The proposed MRIO–LP model considers the inter-relationship among various sectors and regions, and can aid policy makers in designing effective policy for industrial structure adjustment at the regional level to achieve the national environmental and economic targets.

Xue Yang, He Xu & Bin Su

Factor decomposition for global and national aggregate energy intensity change during 2000–2014

Energy

Intensity indicators are indispensable for monitoring global sustainability. Here aggregate energy intensity (AEI) was established to measure global sustainable energy resources utilization. Compared to traditional energy intensity, AEI integrates energy consumption and its concomitant economic gains. On this basis, temporal variation of global and regional AEI and its sectoral driving factors were examined. Results show that global AEI has declined by about 9% during 2000–2014. Electricity dominated (46%) global AEI composition and it pulled down global AEI with merely 1%, which was primarily brought by the falling share of electricity in global economy rather than electricity AEI decline. Regionally, AEI in most world areas (39/44) has declined, only five economies (Turkey, Brazil, Mexico, Indonesia, and India) held a rising AEI, which was motivated by their increased AEI and consumption proportion for carbon-intensive sectors. The marked rise in domestic energy intensity and import share were critical factors for the increased AEI of electricity, metal, and non-metal sectors in these regions. Policymaking targeted at adopting measures that reduce domestic energy intensity and consumption share for carbon-intensive sectors in economically backward regions was recommended for the purpose of mitigating global AEI.

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Nikolaos Apostolopoulos, Panagiotis Liargovas, Nikolaos Rodousakis & George Soklis
COVID-19 in US Economy: Structural Analysis and Policy Proposals
Sustainability

Based on an input–output framework, this paper analyses the intersectoral structure of the US economy and estimates the COVID-19 multiplier effects on this economy. For this purpose we employ a model of matrix multipliers—which, except for the technical conditions of production, also considers imports, income distribution, savings, and consumption patterns—using data from the input–output table of the US economy for the year 2015, i.e., the latest available data at the time of this research (a few months after the US presidential election). Furthermore, we detect the key commodities that are considered appropriate for implementing economic policies in the short term, i.e., for boosting growth and job creation, as well as the commodities that are suitable for long-term, structural policies. Our findings suggest that short-term policies for a direct recovery after COVID-19 should be based on public consumption expenditures and investments as well as through exports. It is also shown that there is a great variety of short-term and long-term policies that can be adjusted according to the challenges of the US economy. Finally, for reasons of completeness, we estimate the impact of the main plans of the American president's policy program, i.e., the "American Jobs Plan and the American Families Plan", and we show that both plans would cumulatively increase the US output by about USD 6.07 trillion over the next ten years, not only helping the US economy recover from the COVID-19 shock but also ensuring macroeconomic stability and social cohesion.

Zacharias Bragoudakis, Evangelia Kasimati, Christos Pierros, Nikolaos Rodousakis and George Soklis
Measuring Productivities for the 38 OECD Member Countries: An Input-Output Modelling Approach
Mathematics

Using a multisectoral model and the latest data from the OECD Input-Output Tables (IOTs-2021 ed.), this article estimates labour and capital productivities of the 38 OECD member countries. As measures of the productivity of labour, we consider the inverse of the vertically integrated labour coefficients, while Perron–Frobenius theorems are employed so as to measure capital productivity. In this respect, the productive technologies and the intersectoral relationships of each economy are taken into account. We further investigate the relationship between productivity, economic efficiency and living standards. Findings indicate that the impact of capital productivity on higher living standards depends on the evolutionary and institutional background of the economy at hand.

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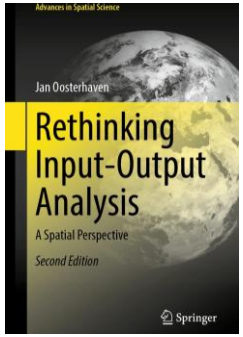
Recent I-O Books and related

Rethinking Input-Output Analysis, A Spatial Perspective, Second Edition, 2022



AUTHOR
Jan Oosterhaven, Fellow IIOA & RSAI
Officer Royal Order Orange-Nassau,
University of Groningen
ISBN 978-3-031-05086-2

This textbook helps students to understand the social, economic, and environmental importance of the mutual relations between industries in the same and in different regions and nations and demonstrates how to model these relations using regional, interregional, and international input-output (IO) models. It enables readers to extend these basic IO models with endogenous household expenditures, to employ supply-use tables (SUTs) that explicitly distinguish the products used and sold by industry, and to use social accounting matrices (SAMs) that detail the generation, redistribution and spending of income.

In addition to the standard demand-driven IO quantity model and its accompanying cost-push IO price model, the book also discusses the economic assumptions and usefulness of the supply-driven IO quantity model and its accompanying revenue-pull IO price model. The final chapters highlight three main applications of the IO model: (1) economic impact analysis of negative supply shocks as caused by, for example, natural disasters, (2) linkages, key sector, and cluster analysis, (3) structural decomposition analysis, especially of regional, interregional, and international growth, and demonstrate the strengths and weaknesses of these IO applications.

Written for graduate students of regional and spatial science as well as for economists and planners, this book provides a better understanding of the foundations, the power, the applicability and the limitations of input-output analysis. The second, completely revised edition expands on updating IO tables, modelling the disaster reconstruction phase, and includes an appendix on the necessary matrix algebra.

https://link.springer.com/book/10.1007/978-3-031-05087-9

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The Social Accounting Corner

Questions: 1) How did you learn about Input-Output for the first time? Can you remember your first thoughts? 2) Which was your first IIOA conference? Any memory that you want/can share? 3) Recommend the readers of the newsletter a paper that surprised or inspired you.

Mònica Serrano – Professor at the Economics Department, University of Barcelona (Spain)

1) My contact with input-output (IO) analysis was really by chance. Throughout all courses of the bachelor's degree in economics, I studied a large variety of economic models but not IO. During my Master thesis on household production and the interaction between market and nonmarket activities, I found a working paper by Duncan Ironmonger and Evelyn Sonius (1987) talking about "household production" and "input-output tables". That was the first that I read the words "input-output", and I Googled it immediately. An extensive list of references by Leontief dropped onto my screen, so I started reading a few. For me, it opened a door to a new way of thinking. A real challenge for an "economical-theoretical mind" modelled throughout a four-year degree. I am still astonished by the model's simplicity in explaining complex systems of interactions.

2) Like Satoshi Inomata, my first IIOA conference was Beijing in 2005. In that time, I was a PhD student, and it was my first international conference. I travelled alone, and the first day was a bit hard because I quickly found that I was walking within a crowd of great names. I was seeing so many faces of authors whose works I'd been reading.

I have a lively memory of Esteban Fernández-Vázquez, who kindly introduced me to some people in the IO community. This kind, simple action completely changed my initial impressions; from that moment on, the conference was more than just your ordinary academic conference.

I also remember my presentation; Let's just say, it was not good. I was a PhD student in a session largely composed of professionals in statistical offices. I got a many questions that I could not properly answer. But I must confess that I learnt a lot; in particular, it was clear that a dialogue exists between theory and applied science, between IO data producers and users. A pursuit that I try to maintain to this day.

3) This is not an easy question to answer. Much due thought suggests the list is long. Choosing only one is unfair to many others. But let's say it is the first paper from that original Googled list. I just re-read it again yesterday, and the rer-reading confirms by conviction. It is "Structure of the World Economy: Outline of a Simple Input-Output Formulation" by Wassily Leontief. It is his Nobel Memorial Lecture from December 11, 1973. It is simple, clear, and clever. Some of the topics covered remain hot even now. His reasoning and research strategy to solve the research questions posed remain novel to me today.

Next December 2023 it will be the 50th anniversary of the The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel awarded to Wassily Leontief "for the development of the input-output method and for its application to important economic problems". I suggest it is a good occasion for us all read it yet again, or for the first time if you've not yet the chance.

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The Social Accounting Corner

Questions: 1) How did you learn about Input-Output for the first time? Can you remember your first thoughts? 2) Which was your first IIOA conference? Any memory that you want/can share? 3) Recommend the readers of the newsletter a paper that surprised or inspired you.

Douglas Meade – Director of Research of Inforum – University of Maryland (USA)

1) Believe it or not, I had my first encounter with input-output in my junior year of high school. I had an exceptional math teacher, who introduced us to quite a lot of matrix algebra. At one point, I asked him if this stuff had any uses. "Thousands", he answered. He then proceeded to teach us a bit of economics, and the circular flow of the economy, how to solve a system of linear equations, and the Leontief inverse. He mentioned a lot of other uses in physics and engineering, but they didn't stick with me as much. A few years later, after I had earned my Bachelor's degree, I went to work at the Census Bureau, in the section that compiles manufacturing statistics. Again, I asked my boss, who used this data? He described many users, but in particular I was struck by the mention of the Bureau of Economic Analysis using the Census data to compile a large-scale input-output table for the U.S. I became more interested in this topic over the next few months. Since I was applying for PhD programs, he suggested I try the University of Maryland, and if I went there, to be sure and contact Clopper Almon. When I went to interview at UMD, I arranged a meeting with Dr. Almon. I found him very refreshing and a bit unusual, though mostly in a good way. I suppose destiny or random events conspired to throw us together, and I became a graduate student at Inforum, which he founded and used to run. Now I'm running Inforum, and still learn more about IO every day.

2) I remember it very clearly. The smell of orange blossoms in the mysterious and beautiful city of Sevilla, Spain, in 1993. There I met Wassily Leontief, Karen Polenske, Faye Duchin, Ann Carter, Geoff Hewings, Jochen Schumann, and many other of the stars in the IO sky. My paper was on using production functions to analyze labor productivity and employment in an IO framework. I'm still interested in this question! My fiancée Birgit accompanied me, and we spent another eventful week afterwards exploring Andalucia, and staying in the wonderful Paradors. That was in March, and 8 months later we got married. At the Sevilla conference, Birgit was tasked with taking minutes at a large dinner meeting of people from the IIOA that were particularly interested in what Inforum had to offer. That meeting formed the nucleus of an annual conference that we have held in 1993 (in Rennes) and every other year, except 2020. The 2021 conference was virtual, and the 2022 will be as well. I've been to many other IIOA conferences, and each stands out in its own way. The 1998 in New York was the last time I saw Dr. Leontief, who gave an impressive plenary session talk. I remember Macerata was very hot, and that Maurizio Ciaschini was a wonderful host. Atlantic City, in 2017, made me realize that other cities in the U.S. can seem just as exotic and foreign to me as Lisbon and Juiz de Fora. Now, I'm experiencing the special mixture of peoples that make Malaysia what it is, on the special island of Lankawi.

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The Social Accounting Corner

Questions: 1) How did you learn about Input-Output for the first time? Can you remember your first thoughts? 2) Which was your first IIOA conference? Any memory that you want/can share? 3) Recommend the readers of the newsletter a paper that surprised or inspired you.

3) What would life be without surprises and inspirations? I've been drawn to many topics in economics, and it's interesting how many of them touch on the interrelationships between industries, and how demand and price effects pass through the cascades. I guess I thought I had discovered Sraffa myself, since no one else was teaching or talking about his work when I was in graduate school, but then at Sevilla I saw a couple of papers by Heinz Kurz and his colleagues, and I was struck by how this presented a different, yet complementary approach to many of the topics touched upon by Leontief and his students. A few years earlier at George Mason University, I was also introduced (or should I say inculcated?) into the works of Ludwig von Mises, Friedrich Hayek, and the other "Austrians". I saw Hayek give a talk there when he was 88 years old, clear as a bell, and it was about the Hayekian Triangle, which related to how industries differed according to the "roundaboutness" of the capital structure used in their production, and why typical approaches to monetary policy therefore caused distortion in the capital markets. Another influential bunch of papers was by T.N. Mathur, whom I met while he was visiting the University of Maryland. I had borrowed a couple from him during his visit. I suppose he didn't want to carry the pile back to Wales, where he was teaching, and he donated the whole bunch to me! They later were published in an interesting book. He was one of the first I met who considered heterogeneity within an industry, and how this heterogeneity was responsible for much behavior that averages don't bring out.

A bit closer to home (we live on the same street) is the paper by Clopper Almon "Regression with Just the Facts". Never published, but in the archive of the 12th annual IO conference, it touches on some basics of the meanings of probability and how to use it, which is especially relevant today, as there are different approaches to the use of probability in economic modeling.

IIOA Newsletter Editor:
Andre Carrascal Incera newsletter@iioa.org
University of Oviedo, Spain