Newsletter

International Input-Output Association (IIOA)

Number 6; May, 2009

Jiemin Guo (OECD)

Bent Thage (Statistics Denmark)

Editorial

IO Tables and SNA as an integrate part of statistical and analytical tools

Dear IIOA member,

While Wassily Leontief pioneered the input-output system in the 1930s, the development of national accounts system took place at the same time or soon after. In response to the lack of information to cope with the economic problems of the Great Depression, Simon Kuznets was asked by the US Department of Commerce to develop a set of national economic accounts for the United States, which subsequently evolved as the National Income and Product Accounts (NIPAs.) But it was Richard Stone, who developed the national accounts framework for the UK in the 1940s, under the request of Organisation for European Economic Cooperation (OEEC, which became OECD in 1961) design A Standardized System of National Accounts (1952), then chaired and directed the first System of National Accounts in 1953 published by the United Nations.

The 1953 SNA did not include IOTs,. Stone considered this one of its major limitations: hence, much of his subsequent work concentrated on expansions of this aspect of the system afterwards. In 1954 he wrote the article "Input-Output and the Social Accounts," which outlined the future inclusion of input-output analysis and extended the development of the "social accounting matrix." Stone's goal of the extension of national accounting was fulfilled in 1968, when the SNA underwent its first substantial revision. Serving as chairman of the Expert Group, Stone wrote the first four chapters of 1968 SNA, which introduced I-O, along with flow-of-funds accounts, and national and sector balance sheets to the System.

The introduction of I-O by the 1968 SNA had two important aspects. Firstly the concepts and the actual figures of the I-O tables were now assumed to be completely consistent with the time series of the national accounts, allowing for a more efficient analytical use of both types of data. Secondly techniques in compiling the data were set in the framework of separate supply and use tables, which were viewed as an efficient way of compiling a consistent set of national account, in both current and constant prices.

The integration of I-O in the overall system of national accounts is an important feature of the 1993 SNA. It includes an integrated set of supply and use tables (SUT), as well as symmetric input-output tables. Its role in the System is primarily related to the goods and services accounts and to the shortened sequence of accounts for industries. The SUT (I-O) construction serves two purposes, those statistical and analytical. They also provide a framework for checking the consistency of statistics obtained from different sources. This integration of not only concepts, but also compilation techniques, was gradually implemented in still more countries during the following decades. So when the 1993 SNA came out, the clear recommendation was to follow this integrated approach, and the advantages in the form of an efficient use of all available information when compiling the current price values, and a consistent framework for the constant price estimates were underlined.

In 2003 the Statistical Commission of the UN initiated an update of the 1993 SNA (to the 2008 SNA). There are two volumes for the 2008 SNA, which is scheduled to be released in the summer of 2009, one year later than originally plan.

A list of 44 substantive issues for updating was identified. Input-output as such was not on the list, even though some suggested changes affected the measurement of items entering the tables. The most important of the issues affecting IOTs is a change in the treatment of goods sent abroad for processing.

The decision was to treat these flows net instead of gross, which was the earlier treatment, gives principle priority vis-à-vis the physical flows so as to facilitate consistency with the balance of payments manual (BPM5). Discussions are still underway with regard to whether this change in principle may be ignored to some extent when compiling the I-O tables, where the actual shipments of goods are usually perceived as important.

In SNA 2008, the input-output part was completely rewritten. It was, in fact, split into two separate chapters (Chapter 14 in volume 1 and chapter 28 in volume 2). The first drafts of both chapter 14 and of 28 attracted many critical comments concerning the scope and specific contents: many pointed out critical errors and misunderstandings. Unfortunately, only a few comments were accounted for and even then in a limited manner in subsequent drafts. This unsatisfactory result prompted a direct comment on the UN web site also from the IIOA that reads as follows:

"The International Input-Output Association (IIOA) takes a major interest in the way the input-output framework is presented in the 2008 SNA. Our membership include both producers and users of input-output tables and will in many respects have the text of the SNA as their main reference when it comes to understanding the essentials of compiling and using input-output tables. It is therefore important that the 2008 SNA gives a coherent, consistent and user friendly exposition of the input-output framework and at the same time represents the state-of-the-art as it has developed since the 1993 SNA. It is therefore with some concern that that substantial comments were taken into account in the redrafting. We trust that the necessary time and effort will be taken to redraft the chapter, and we would be ready to assist in any way possible."

Thus the SNA 2008 effectively downgrades the input-output framework and no longer provides a coherent introduction to our field—for neither compilers nor users. What is in place instead is an unbalanced text that with many problematic statements and some numerical examples that often do not support a basic understanding of the connection between I-O tables and their analytical uses. On the other hand most basic principles with regard to I-O as an integrated part of the system of national accounts and to the importance of maintaining consistency between the I-O tables and the broader set of national accounts are upheld.

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Remembering Wassily Leontief in Russia

LEONTIEF CONFERENCE: CHALLENGES AND TRADITIONS

On 27-28 February 2009, more than 150 leading scholars and politicians gathered in Saint Petersburg for the VIII Leontief Annual Conference to pay the tribute to the memory of the great scientist and the founder of the Leontief Centre (www.leontief.ru).

It has been ten years since the first Leontief Commemorative Conference was convened by the Leontief Centre with the purpose of combining the tribute with a discussion of the most urgent issues of economic and social reform for Russia. The Carnegie Moscow Centre subsequently supported this idea and, through a joint effort, the first Conference was held in February 2000 in St. Petersburg. It was devoted to Wassily Leontief and examined outcomes from a decade of Russian economic reforms. The Conference resonated so well that the organizers felt obliged to turn it into an annual event.

This year the VIII Leontief Conference was dedicated to the 10th anniversary of his death. It opened on February 26 with the traditional ceremony of laying flowers to the memorial plaque on the facade of the Leontief family home on 43, Zhdanovskaya Street. The home was officially memorialized in 2006 and since has become a focal point of Wassily Leontief Centenary Celebration Programme in Russia.

The key theme of the VIII Leontief Conference was Economics and Law and the two day program included:

- 3 plenary sessions, during which a wide range of issues was discussed—from the role of law in the social-economic transformation of Russia to an economic perspective of a legal norms interpretation and definition of the legal and illegal constituents of modern economic systems
- presentation of «Wassily Leontief. Selected works» in three volumes
- Award Ceremony of the Laureates 2008 with the International Leontief Medal "For Contribution to Economic Reforms".

WASSILY LEONTIEF'S SELECTED WORKS

The presentation of the three-volume edition "Wassily Leontief. Selected works" was made on the second day of the Conference by chief editor Alexander Granberg, a well-regarded academician and a member of Presidium of the Russian Academy of Sciences. It contains a selection of the most significant works of Wassily Leontief and covers the wide range of problems that were the core of his research interest for the full 60 years of his intensive academic career. In his speech Alexander Granberg reviewed the life and achievements of the world famous scientist who was a recognized expert in economic analysis, a trusted advisor to governments of many states, and an honorary member of the Russian Academy of Sciences.

Volume I : Common Economic Problems of Cross-Sectoral Analysis combines most famous works in input-output theory and methodology, and general problems of economy, written in different time periods. Volume I includes a synopsis of the book "Input-Output Economics", selected chapters from two other Leontief books published in the USSR (*Studies in the Structure of the American Economy*, 1958 and *Essays in Economics*, 1990), and one of his last articles on the possibilities of applying input-output analysis to the knowledge economy.

Volume II : Special Studies based on the Input-Output Methodology presents three main areas of Wassily Leontief's research based on the Leontief Method: long-term forecasting of the world economic system development; economics of military spending; and the impact of automation on employment. Wassily Leonief's global model built for the world economy forecasting includes 2,625 equations describing the economy of 15 world regions united by trade and financial flows. Part two of the Volume is devoted to the analysis of the impact of military spending on the economy of world regions using input-output analysis. Part three of the Volume studies the impacts of automation in various sectors with the emphasis on dynamics and employment structure.

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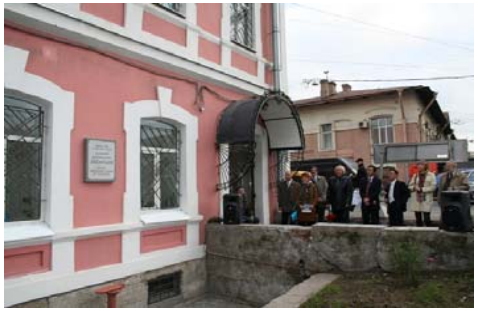
Volume III: Selected Articles brings together articles on various topics. This Volume consists of 29 articles written from 1925 to 1990, which are grouped into five thematic sections. Most of them were published earlier in collections "Essays in Economics" (Moscow, 1990) and "Selected articles" (St Petersburg, 1999). Due to the limited size of the volume a number of interesting articles could not be included but will be published later.



INTERNATIONAL LEONTIEF MEDAL

The Ceremony of Rewarding Laureates 2008 with the International Leontief Medal "For Contribution to Economic Reforms" became the highlight of the Conference. The International Leontief Medal for "Contribution to Economic Reforms" was established to commemorate Wassily Leontief's centenary in February 2005 by the Public Awarding Committee founded by the Leontief Centre.

The medal is given to outstanding Russian and International scholars and specialists who contribute personally to the development of economic science, creation of effective institutions of market economy and conditions for sustainable economic growth.

During the Conference an exhibition was opened of the Leontief Medal Laureates in different years, including Former Prime Minister Yegor Gaidar, Director of Institute for the Economy in Transition; Alexey Kudrin, Minister of Finance of the Russian Federation; Eugeny Yasin ,State University - Higher School of Economics, Academic Supervisor; Boris Firsov, Honored Rector of the European University in St Petersburg.

Among international Laureates are **Robert M. Solow**, Honored Professor of Massachusetts Institute of Technology, Nobel Prize winner; **Lawrence Klein**, Honored Professor of Benjamin Franklin University of Pennsylvania, Nobel Prize winner; **Shuntaro Shishido**, Director of Research Institute of Japan - US and World Modeling and Analysis; **Thijs ten Raa**, Associate Professor of Tilburg University, the Netherlands, member of the Council of the International Input-Output Association.

The 2008 Leontief Medal winners are: **Leszek Balcerowicz**, Professor at the Warsaw School of Economics; **Jeffrey David Sachs**, Director of the Earth Institute at Columbia University; **Vladimir Mau**, Rector of the Academy of National Economy under the RF Government; **Dmitry Travin**, Academic Supervisor of the Centre for Modernization Studies of the European University at St Petersburg; and **Alexander Granberg**, Member of Presidium of the Russian Academy of Sciences; Chairman of the Council for the Study of Productive Resources (SOPS).

The Medal Award Ceremony was opened by **Irina Karelina**, Leontief Centre Director-General. Greetings to participants of the Ceremony were sent by Nobel Prize winner **Robert Solow**, the 2006 International Leontief Medal Laureate, and **Jan Oosterhaven**, President of International Input-Output Association – the main international partner in the Leontief Centre's commemorative efforts.

Paul Vandoren, Deputy Head of Delegation of the European Commission to Russia and **Masaaki Kuboniwa**, Professor of the Institute of Economic Research Hitotsubashi University, the 2004 Leontief Medal Laureate, warmly welcomed the winners and Ceremony participants.

Award ceremony was followed by the Laureate Lectures:

Beyond the Crisis: Key Issues of Socio-economic Development of Russia delivered by **Vladimir Mau**, focused on the causes of the crisis, macroeconomic policy mistakes of the United States, Russia's economic policy errors, and the path forward.

The Ten Commandments of Reformers by **Dmitry Travin**, covered key reform issues and the tough mission of leaders who are charged with implementing the reform.

Wassily Leontief Scientific Heritage and Challenges of the Modern Economy by **Alexander Granberg**, connected theoretical problems raised by Wassily Leontief with Russia's current task of identifying proper ways to optimize development in a multiregional setting.

By a well-established tradition the Leontief Medal winners of this year are photographed with the winners of the past years. This year it was done on the Ambassador helipad with a beautiful panoramic view on the roofs of St. Petersburg.

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WASSILY LEONTIEF WEB PORTAL

The next Awarding Ceremony of Leontief Medal 2009 will take place in St Petersburg in February 2010 in the framework of IX Annual Leontief Conference. For information about the Conference and Medal Award Ceremony, please visit our Leontief page www.wassily.leontief.net

Wassily Leontief's Web page (www.wassily.leontief.net) is the first attempt to implement a large Internet initiative on creation Wassily Leontief's virtual museum and full electronic collection of his works.

Today the portal presents Wassily Leontief's biography, scientific activities and heritage, based on the information and materials of Leontief Centre, historical archives of S.A. Kalyadina, materials of D.V. Mityurin, deputy editor of "Confidential materials of XX century" newspaper, documentary film about Wassily Leontief by the State Television and Radio Channel Culture (author A. Bederov, producer A. Kapkov), as well as information about our commemorative initiatives and how we remembering Wassily Leontief in Russia these last ten years.

Elena Belova
ICSER Leontief Centre

Conferences

XXXIV Simposio de la Asociación Española de Economía (SAEe)
Valencia 10/12 December 2009
VNIVERSITAT DE VALÈNCIA

The University of Valencia is pleased to host the XXXIV Symposium of the Spanish Economic Association (SAEe) to be held in Valencia, Spain, on **10-12 December 2009**.

Authors are invited to submit theoretical and applied papers in all areas of economics for presentation at the Symposium. Submissions should be for contributed sessions.

Submissions must consist of a single PDF file with a maximum size of 2 MB, uploaded at: WebMeets.com/SAEe/2009.

More information at:
http://www.spaneconrev.org/simposio/index.htm

Abstract deadline: June 14, 2009

20th Annual Conference of Pan-Pacific Association of Input-Output Studies

PAPAIOS

Sun-refre Hakodate
2-14 Omori-chou, Hakodate-shi, Hokkaido

October 31-Nov. 1, 2009
(Deadline: June 28, 2009)

The Pan Pacific Association of Input-Output Studies invites your participation and contribution to the 20th Annual Conference . The Annual Conference of this year focuses on the following sub-themes. All contributions that address the following sub-themes are especially welcomed:

- Environment and Energy
- International Economy
- Telecommunication and Information Technology
- Productivity
- Computable General Equilibrium Model
- Regional Input-Output Analysis
- Theory of Input-Output Techniques
- SNA and SAM
- Diverse

More info at: PAPAIOS Conference

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III World Conference of Spatial Econometrics

AQR IREA

The 3rd World Conference of the Spatial Econometrics Association has the objective to bring together economists, econometricians and regional scientists to discuss the present achievements and future challenges and opportunities.

The conference will be held on **8-10th July 2009** at the Faculty of Economics and Business, University of Barcelona.

We are pleased to announce that, after a peer review process, a special issue of Economic Modelling will be published with a selection of the best papers presented at the conference.

Submission of papers please send to sea09@ub.edu

More information at: http://www.ub.es/sea2009.com/

Abstract deadline: June 1, 2009

SEA SPATIAL ECONOMETRICS ASSOCIATION

56th Annual North American Meetings of the Regional Science Association International

San Francisco, California, US
18-21 November 2009

Abstract deadline: August 1, 2009

The North American Regional Science Council (NARSC) is one of three international regional science organizations that, together, promote the exchange of knowledge, theory, and analysis of cities and regions across the globe.

NARSC represents the interests of regional scientists in North America, while the European Regional Science Association (ERSA), and the Pacific Regional Science Conference Organization (PRSCO) service the needs of regional scientists throughout Europe and the Pacific Rim. All three super-regional associations fall within the organizational structure of the Regional Science Association International (RSAI) which coordinates the activities of regional scientists globally.

Our annual conference is structured around a number of thematically-focused sessions during which regional scientists present their work. The typical format involves four consecutive 20-minute scholarly presentations, followed by comments and critique offered by the appointed discussant, and questions and answers from the audience. The conference also incorporates discussion panels on timely topics of Regional Science.

All paper presenters are expected to have a manuscript (even in draft form) available to share with the appointed discussant 2-3 weeks before the conference. An abstract must be submitted by the stated deadline for a presentation to be accepted, but a manuscript is not necessary at this time. All conference participants agree to serve as discussants of a conference paper, if appointed to do so by the Conference Program Committee. Some participants will also be invited to serve as session chairs.

The North American Meetings of the RSAI offer a prime venue for several groups of scholars, including members of the Urban Economic Association and the Sloan Industry Studies Program.

More information at: http://www.narsc.org/newsite/

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In the next ESR issue

Economic Systems Research

Journal of the International Input-Output Association

Volume 21 ***Number 2*** ***June 2009***

Manfred Lenzen and Bart Los. Editors

Asao Ando & Bo Meng. *The Transport Sector and Regional Price Differentials: A Spatial CGE Model for Chinese Provinces*

With regression formulas replaced by equilibrium conditions, a spatial CGE (Computable General Equilibrium) model can substantially reduce data requirements. Detailed regional analyses are thus possible in countries where only limited regional statistics are available. Though regional price differentials play important roles in multi-regional settings, transport does not receive much attention in existing models. This paper formulates a spatial CGE model that explicitly considers the transport sector and FOB/CIF prices. After describing the model, performance of our model is evaluated by comparing the benchmark equilibrium for China with a survey-based interregional table for 1987. The structure of Chinese economies is summarized using information obtained from the benchmark equilibrium computation. This includes regional and sectoral production distributions and price differentials. The equilibrium for 1997 facilitates discussion of changes in regional economic structures that China has experienced in the last decade.

Andrea Bonfiglio. *On the Parameterization of Techniques for Representing Regional Economic Structures*

This paper is concerned with two parameterized methods of regionalising input-output coefficients: the Flegg et al. Location Quotient (FLQ) and its augmented version (AFLQ). For applying the two techniques, a parameter has to be estimated. In this regard, the paper faces two matters that are still open in the literature: the existence of a range of δ that can be used in different regions and the estimation of the most appropriate value of δ. For this aim, a Monte Carlo simulation has been carried out in order to generate "true" multiregional I-O tables randomly. From the simulation, analyses based on probability distributions and regression were also carried out. Finally, these simulation results have been compared to those of an empirical case. Results confirm that there is effectively a range of values of δ within which the best δ is more likely to fall. For the FLQ, this range is centred around 0.3 with an associated probability of 33% (if the width of the range is set at 0.1), whereas, for the AFLQ, the relevant range is between 0.3 and 0.4 with a probability by 38%. Finally, this paper provided a way to estimate the best δ for a given region, without knowing the relevant and detailed economic structure at sectoral level.

Sandro Montresor & Giuseppe Vittucci Marzetti. *Applying Social Network Analysis to Input-Output Based Innovation Matrices: An Illustrative Application to Six OECD Technological Systems for the Middle '90s*

The paper discusses, illustrates and possibly contributes to overcome two methodological problems which emerge in applying Social Network Analysis (SNA) to the study of IO-based innovation flows matrices. The first one has to do with the scale-effects these matrices suffer from. The second one refers to the need of dichotomising the matrices. Through an illustrative application to 6 OECD countries in the mid-'90s, the paper shows that, as for the former problem, different relativization procedures can be and have been used, which either tend to alter the actual meaning of standard SNA indicators, or do not properly take into account the actual composition of countries' final demands. As for the latter problem, the paper shows that the choice of discrete cut-offs is extremely sensitive, as comparative results actually change along the continuum of matrix values. In order to overcome the scale problem, a new relativisation procedure is put forward, which measures innovation flows embodied in a unit value basket of final demand and thus properly retains all the information provided by the original matrix of inter-sectoral embodied innovation flows. In addressing the problem of dichotomisation, the paper suggests as a second best to work with density distributions which can make the choice of discrete cut-off values less arbitrary.

Amarendra Sahoo & Thijs ten Raa. *The Relative Performance of Formal and Informal Sectors in India*

We evaluate the relative performance of formal and informal sectors in India by looking into their productivity differences. Recognizing the inter-sectoral linkages in the economy, the competitive general equilibrium prices are computed; these signal the productivities. Our model synthesizes frontier analysis with the general equilibrium approach to generate shadow prices. The formal activities are found to be more productive than the informal. However, the informal services sector is as efficient as the formal one. There would be an overall productivity gain of 22 percent to the economy if factors were allocated to productive activities. The shadow prices from the model indicate that the formal capital and informal capital are scarce factors, while it has been the opposite for formal (regular) and informal (casual) labour. Formal labour is more productive than its informal counterpart; formal capital and informal capital are equally productive.

Paul de Boer. *Multiplicative Decomposition and Index Number Theory: An Empirical Application of the Sato-Vartia Decomposition*

In de Boer (2008), additive decompositions of aggregate changes in a variable into its factors were considered. We proposed to use the "ideal" Montgomery decomposition, developed in index number theory as an alternative to the commonly used methods in structural decomposition analysis and applied it to the example analyzed by Dietzenbacher and Los (1998) (D&L). In this paper we consider multiplicative decompositions and show that the method proposed by D&L of taking the geometric average of all elementary decompositions is "ideal". However, it requires the computation of an ever increasing number of decompositions when the number of factors increases. As an alternative, we propose to use the Sato-Vartia decomposition which is "ideal" as well, but requires the computation of only one decomposition. Application to the example of D&L reveals that the two methods yield results that are very close to each other.

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Highlights in journals

S. Kagawa, Y. Oshita, K. Nansai & S. Suh, "How Has Dematerialization Contributed to Reducing Oil Price Pressure?: A Qualitative Input-Output Analysis for the Japanese Economy during 1990-2000", *Environmental Science and Technology*, 43(2) 2009, pp. 245-252.

The evolution of crude oil use structure and its impacts on commodity prices are examined for Japanese economy between 1990 and 2000. We found that the out-degree of the production network, indicating the extent of the pressure on prices of downstream industries in response to higher crude oil prices, decreased in several sectors between 1990 and 2000.

The results by sector showed that the decrease was greatest in the chemical product- and iron and steel manufacturing sectors, which both indirectly use crude oil. The decrease in out-degree is considered to have been caused by improved efficiency in the production of oil-related products and increase in energy savings by the manufacturing facilities in these sectors. In addition, many of the sectors having a high out-degree engage in intermediate product production.

Conversely, the in-degree, which represents the extent of being pressured by other sectors with increased crude oil prices, also decreased during the period between 1990 and 2000. From the result of the in-degree, this study found that dematerialization and weight reduction of final products such as "cellular phones" and "personal computers" had a marked effect on decreasing in-degree.

More importantly, for the top-ranked sectors with the high out-degree and in-degree, such as "aliphatic intermediates", "chemical fertilizers", "plastic products", "hot rolled steel", "yarn and fabric dyeing and finishing", the results suggest that the pressure due to rising crude oil prices can be more effectively eased by implementing measures targeted at upstream products and sectors, while current policy measures to alleviate oil-price induced inflation are mainly targeted at downstream products such as gasoline.

S. A. Low & A. M. Isserman, "Ethanol and the local economy: Industry trends, location factors, economic impacts, and risks" *Economic Development Quarterly*, 23(1), 2009, pp. 71-88.

Ethanol has been embraced enthusiastically as a solution to many problems, including national energy security, global warming, air pollution, farm incomes, and local economic development. The industry has boomed in the United States: There were 54 ethanol plants in 2000, 134 by the end of 2007, 171 in mid-September 2008. Estimates of the industry's effects on local economies vary wildly, chiefly because of assumptions regarding the corn industry. This article presents an overview of the industry, its location, and the public policy umbrella that supports its growth. It analyzes what happens to the local economy when a county adds an ethanol plant, demonstrates what must be done to modify input-output models to capture those effects, and applies the approach to proposed plants in four counties. An ethanol plant provides the enticing benefits of a manufacturing plant with 35 to 40 jobs, but several characteristics and uncertainties of the industry merit a careful look when making local economic development decisions.

K. Mukhopadhyay, "Air pollution and income distribution in India", *Asia-Pacific Development Journal* 15(1) 2008, pp 35-64.

Concern over the environmental effects of fossil fuels in India has been growing as domestic consumption levels increase. Along with industry, households are major consumers of commercial energy and, consequently, major contributors to the total energy use in India. Emission levels in the country are gradually increasing. The present study estimates emissions related to fossil fuel combustion in India and also identifies the factors responsible for changes in those emissions during the 1980s and 1990s. Results show that the factor relating to changes in final demand, which reflect increased economic growth, had the greatest influence on emission levels. The study disaggregates households into three income groups, examining the contribution each makes to fossil-fuel-based pollution in India with respect to the various factors identified. Analysis indicates that higher- and middle-income groups generated more pollution due to excessive and inefficient consumption of commercial energy. The paper concludes with a discussion of policy implications.

D. Guan, K. Hubacek, C. L. Weber, G. Peters & D. M. Reiner, "The drivers of Chinese CO2 emissions from 1980 to 2030", *Global Environmental Change*, 2008, 18, pp. 626-634.

China's energy consumption doubled within the first 25 years of economic reforms initiated at the end of the 1970s, and doubled again in the past 5 years. It has resulted of a three fold CO_2 emissions increase since early of 1980s. China's heavy reliance on coal will make it the largest emitter of CO_2 in the world. By combining structural decomposition and input–output analysis we seek to assess the driving forces of China's CO_2 emissions from 1980 to 2030. In our reference scenario, production-related CO_2 emissions will increase another three times by 2030. Household consumption, capital investment and growth in exports will largely drive the increase in CO_2 emissions. Efficiency gains will be partially offset the projected increases in consumption, but our scenarios show that this will not be sufficient if China's consumption patterns converge to current US levels. Relying on efficiency improvements alone will not stabilize China's future emissions. Our scenarios show that even extremely optimistic assumptions of widespread installation of carbon dioxide capture and storage will only slow the increase in CO_2 emissions.

R. Mínguez, J. Oosterhaven & F. Escobedo, "Cell-corrected RAS method (CRAS) for updating or regionalizing an input–output matrix", *Journal of Regional Science*, 2009, Vol. 49 No. 2, pp. 329-348.

The RAS method is used to update or regionalize a single matrix such that it conforms to new row and column totals. Nowadays a multitude of IO tables is easily available by internet. This paper presents a correction of the RAS method (CRAS) that uses cell variation distributions calculated from multiple matrices of different periods or different regions. After the solution of the regular RAS, an additional optimization problem is solved that produces the most likely cell-corrections to the regular RAS solution. In this article CRAS is tested on a time series of IOTs for the Netherlands for 1968–1986. It shows that - in situations of structural change - applying CRAS improves the regular RAS estimate.

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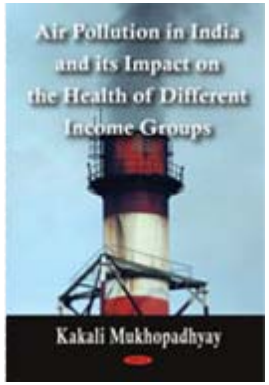
Highlights in books

AIR POLLUTION IN INDIA AND ITS IMPACT ON THE HEALTH OF DIFFERENT INCOME GROUPS Kakaly Mukhopadhyay, Nova Science Publishers, New York, 2008. Link to the editorial site: Air pollution in India



This book reviews the status of air pollution and its impact on the health of different income groups in one of the developing countries, India. The study estimates the total emissions of CO2, SO2 and NOX in India during 1983-84 to 2003-4 using Input-Output Structural Decomposition Analysis. It explores the contribution made by different income groups on the emissions in India. To assess the health impacts of air pollution on different income groups the book also conducts a micro study for a metro city, Calcutta. The micro analysis evaluates the extent of deterioration in air quality, identifies the factors responsible for deterioration, and finally makes an assessment of the impacts of deteriorated air quality on human health of different income groups.

One of the biggest tasks at present, the book concludes, is to tackle the generation of emission by the higher income groups along with the improvements of the health scene of the economy. It calls for proper policy for the mitigation of air pollution from the experience of other countries.

WASTE INPUT-OUTPUT ANALYSIS. Concepts and applications to industrial ecology. Shinichiro Nakamura & Yasushi Kondo, Springer, 2009. Link to the editorial site: Waste input-output analysis

The increasing use of input-output analysis (IOA) in Industrial Ecology (IE) for life-cycle assessment (LCA), material flow analysis (MFA), and life-cycle costing (LCC) calls for a self-contained publication on IOA that can meet the needs of practitioners without compromising on basic concepts and latest developments.

"Waste Input-Output Analysis" addresses these needs. The standard IOA has the weakness that it does not consider the physical flows of waste and the activity of waste management. To cope with this problem, the authors have developed the Waste Input-Output model (WIO) which addresses these issues explicitly.

The major aim of this book is to make WIO accessible to the students and practitioners of IE. "Waste Input-Output Analysis" is unique in its coverage of both the basics of IOA and its application to IE with special emphasis on issues of waste management. No pre-knowledge is required on IOA.

Keywords:
- industrial ecology
- input-output analysis
- life cycle assessment
- recycling of waste
- waste management

INNOVATION SYSTEM FRONTIERS. Cluster Networks and Global Value. Brian Wixted, Springer, 2009. Link to the editorial site: Innovation System Frontiers

Based on the literature that economic input-output (intermediate components) flows are closely related to innovation building relationships, the book uses inter-country input-output modelling to better understand systems of innovation systems that cross national borders. It demonstrates that production in three R&D intensive industries are highly internationalised.

The analysis is developed to reveal the structure of cross border networks of innovation systems in motor vehicle, aerospace and ICT / electronics production and how these have changed across the period 1970 to 2000.

Recent economic transformations in the world economy are progressing in two divergent directions – international production fragmentation and industrial agglomeration. Based on extensive data analysis and using models of interdependencies between key economies, this book analyses innovation systems that cross national borders. It is shown that technological complexity is an important factor in the formation of highly specific production networks, and why, for a number of production systems, fragmentation and clustering are two sides of the same coin. By outlining the picture of a world economy structured around networks of clusters and joined together through systems of linkages of components, people and knowledge flows, the author helps to promote a better understanding of recent economic transformations.

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Input-Output software

PyIO
Python Module for Input-Output Analysis

The **Regional Economics Applications Laboratory** (REAL) focuses on the development and use of analytical models for urban and regional forecasting and economic development.

REAL's mission is to provide timely, high quality analytical economic information for a variety of uses such as public policy decision making by public sector agencies and for strategic marketing in the private sector. REAL's capabilities revolve around comprehensive state and metropolitan models that integrate econometric and input-output analysis to provide for both impact and forecasting analyses.

While REAL's primary focus has been on the economies of the U.S. Midwest, REAL has collaborated in the development of models for several regions on the east coast. In addition, two models have been constructed for states in Brazil and a third is under construction. A model for the Jakarta Metropolitan region is also under construction.

REAL draws its staff from cooperating institutions and advanced graduate students in the fields of economics, geography, urban and regional planning, computer science and mathematics. Many of the projects the students work on then become the basis for thesis and dissertations.

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A number of years ago, the Regional Economics Applications Laboratory began the development of an input-output toolbox. Over a dozen methods of analysis are currently available (PyIO) and plans are now being made to:

(1) increase the number of methods and

(2) provide a Windows interface with the less-than-user-friendly Python software.

One of the first of the new additions will be the conversion of the Fortran code from Dinwiddy and Teal's introduction to CGE modelling (now out of print); this provides a very nice entrée to CGE modelling building on the familiar notions of the circular flow of income in an economy to considerations of inter-industry linkages, external trade and a government sector.

The current PyIO methods and future additions will be open source; we would be pleased to hear from scholars and practitioners interested in making suggestions about additions to the toolbox or modifications to the existing methods.

We would also welcome contributions of code for additional methods. Please contact Geoffrey Hewings (hewings@illinois.edu).

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