

Dear IIOA member,

This year through to the next not only am I your IIOA Vice President, but I also am the President of PAPAIOS (Pan-Pacific Association of Input-Output Studies), the Secretariat office of which is located at Toyo's Keio University (see the website: <http://www.sanken.keio.ac.jp/papaios/index-jp.html>). With the immeasurable leadership of Professor Leontief, this Tokyo-based association was founded in April 1989, just one-year after the birth of the IIOA. Just as it was for the IIOA, the Eighth Conference held in Sapporo, Japan, in 1986 was a vital stimulus in the formation of PAPAIOS.

Currently, PAPAIOS has a member count of 356 (about a hundred smaller than IIOA). Of these members 318 are regular individual members, 26 are student members, and 8 are corporate/institutional members. It differs from the IIOA, whose members are quite globalised, in that almost all PAPAIOS members reside in Japan (Japanese and students from abroad). Indeed, the officially only four of PAPAIOS's members are foreign national (Offhand, I do not know the names of these four.) Moreover, the four foreign members merely subscribe to our English journal called JAIOA (Journal of Applied Input-Output Analysis), which was named by Professor Leontief. PAPAIOS also differs from IIOA in that its member count has stagnated lately, perhaps even showing a decline as its members age. Reluctantly I must confess that PAPAIOS remains a strictly national academic association despite its original objective to encourage the advancement of knowledge in input-output analysis through intense communication among economists, scientists and technocrats across the entire Pan-Pacific region. That is, like the IIOA, PAPAIOS also recognized that input-output analysis was a vital international communications portal shared by academia, governmental statistical offices, policymakers, and industrial practitioners. But its attempts to extend its borders

Editorial Pan-Pacific Association of Input- Output Studies

beyond the islands of Japan has not met the dreams of its founders.

With this in mind, Tohoku University's Professor Inamura, his student Dr. Kagawa, and I decided to hold an intermediate Input-Output meeting in Sendai in 2005 co-hosted with IIOA. We deemed it a success since it clearly established stronger communications between IIOA and PAPAIOS. Of course, others may have deemed it successful for other reasons.

Since the collegiality of the Sendai meetings remains engraved the memory of participants, it is an ideal time to forge a stronger linkages between the two associations. I have had informal conversations with Jan Oosterhaven, current President of IIOA, on how this can be achieved. In our private talks, he suggested the possibility that the two associations bilaterally offer the other group's members discounted membership. I thought it a solid start. Of course, to become a reality this idea needs to be discussed and agreed upon by the members of both associations. Moreover, each group probably needs to know what sort of discount in membership fee will apply to its member who opt to join the other group before making such a decision.

A bilateral membership system can benefit both associations: (1) it will dramatically increase membership in both associations, (2) members in each of the associations will have ready access to information on conferences hosted by the other organization, and (3) manuscript submissions to *ESR* and *JAIOA* undoubtedly would increase, leading to quality improvements in both. Additionally, we may expect further positive effects from closer collaboration of the two associations, for example, increasing joint membership globally via the resulting intensified global network of professionals across Europe, the US and Asia.

This joint association concept needs some more thinking, but I am now placing it before members of both associations. Perhaps the time is ripe for other national input-output associations like those in China and Spain to join us. Finally, I would like to remind all of you the existence of the Leontief Library at Chuo University, Tokyo. The books, articles, databases, memos that he wrote and collected are there and await your viewing and investigation. For details, please see: <http://leontief.tamacc.chuo-u.ac.jp/>.

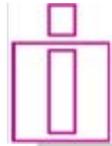
Norihisa Sakurai,
Vice President of IIOA

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News inside !!!

The Working Papers
Series in Input-
Output Economics of
the IIOA is launched
at: [WPIOX](http://www.wpiox.org)



Erik
Dietzenbacher



Bent
Thage

New Working Papers in Input- Output Economics

Under the auspices of the IIOA, we have recently launched the Working Papers in Input-Output Economics (WPIOX) series. It can be accessed at [WPIOX](#)

WPIOX aims at disseminating research output amongst those interested in input-output economics, both academicians and practitioners. It is common practice that the results of ongoing research are documented in the form of working or discussion papers, typically with the author's own institution (university departments, research institutes, or governmental organizations, for example). Such documents may be conference papers, research reports, preliminary versions of what later become journal articles, or databases. Too often, the existence of such working papers is not (or insufficiently) known by colleagues in the field. To enhance the exchange of ideas and knowledge in input-output economics, collecting working papers in a central electronic "archive" allows for a wide availability and easy accessibility through internet.

The archive contains working papers in input-output economics as defined in its broadest sense. That is, studies that use data collections that are in the format of (or are somehow related to) input-output tables and/or employ input-output type of techniques as tools of analysis. The archive presents for each paper the abstract and keywords, which can be read directly, and the full text, which is in pdf-format.

The archive catalogues working papers in various ways. The papers are filed according to 15 pre-specified topics and according to the year of submission. Within each catalogue, the papers are ordered alphabetically by author and by date of submission. In addition there are separate catalogues for new submissions, working papers that have been published later as an article in a journal or as a contribution to an edited volume, and there is an overall catalogue. Finally, there is a search engine that allows to search the archive on the basis of the name of an author, of a word in the title, and of a keyword. Using the "screen text" option it is possible to search for a name or a word in any of the available papers.

The 15 pre-specified topics are: History of I-O analysis; Methods and mathematics; Structural change; Impact analysis; Energy studies; Environmental studies; Construction of I-O tables; Social accounting matrices; CGE models and econometrics; Dynamic I-O models; R&D, technology and growth; (Inter-)Regional studies; Trade analysis; Transitional economies; and Miscellaneous topics.

Authors are invited to submit any paper in input-output economics, whatever:

- the theoretical background (e.g. classical, neo-classical, Walrasian, Keynesian, Ricardian, Marxian, Sraffian)
- the topic (e.g. growth, welfare, interdependence, disequilibrium, prices)
- the policy issue (e.g. income distribution, employment, investments, migration, energy consumption, environment)
- the analytical framework (e.g. static, comparative static, dynamic, structural, spatial, open versus closed)
- the unit and level of analysis (e.g. enterprises, industries, metropolitan areas, regions versus nations, groups of countries, the world)
- the object of analysis (e.g. goods and services, materials in physical quantities, prices, innovations, patented inventions, citations, information, people)
- the technical focus (e.g. economic theory, applied mathematics, data collection and compilation of input-output tables, including sources, concepts, conventions).

Authors who would like to contribute to the WPIOX archive, should send an e-mail message to Erik Dietzenbacher (h.w.a.dietzenbacher@rug.nl) or Bent Thage (bth@dst.dk).

They should use as subject the phrase "WPIOX-submission" and indicate in their message up to three of the fifteen topics under which they would like to have their paper filed. An abstract of up to 150 words should be included in the body of the e-mail message. The full text of the paper should be attached to the e-mail message, preferably in so-called pdf-format.

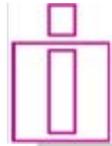
If a paper is a working or discussion paper with an institution (university department, research institute, or governmental organization, for example), the series title and the number (e.g. "SOM Research Memorandum 99C12, University of Groningen") should be clearly mentioned. The users of the archive may cite papers by using either the original series title and number or by using the each paper has received (i.e. WPIOX **.***).

Upon receipt, a paper will be briefly reviewed by us, in order to see whether the paper fits within the scope of the archive as outlined above. Papers are not peer-reviewed and inclusion in the archive does not depend therefore on its perceived quality, unlike a publication in a journal. It should also be emphasized that submission of a paper to the archive neither prevents authors from submitting it to a journal, nor that it automatically implies a submission to the IIOA's official journal Economic Systems Research.

Once a month, we will update the archive and include the newly accepted working papers. Each paper is assigned a code (WPIOX **.***), which does not prevent anyone from using the original department's working paper series code when citing the paper. Authors are allowed to submit revised versions of their paper. In that case, the same rules should be obeyed as if sending a new paper, but the WPIOX-code we originally assigned to the paper should be clearly indicated. The revision will be stored under the same code, i.e. it will replace the earlier version. Finally, we will remove the full text of an archived working paper upon receipt of a message which states that the paper (with code) has been published as an article in a journal or contribution to an edited volume.

We look forward to receiving your submissions!

Erik Dietzenbacher and Bent Thage



Nobel Prize in Economics 2008

Paul Krugman

Princeton University, NJ, USA

"for his analysis of trade patterns and location of economic activity"



(...) (he) "has stressed the importance of **input-output linkages** among firms as an alternative explanation for agglomeration tendencies. Such linkages may be crucial for understanding the location of economic activities in situations of low labour mobility as is the case, for example, among many European countries. Input-output linkages were first analyzed by Krugman and Venables (1995) and Venables (1996). The main idea here is that the entry of new firms in a region increases the market for upstream suppliers (backward linkages as opposed to the forward linkages that stimulate the migration of workers). When upstream suppliers can produce at lower costs, the costs of downstream producers fall as well, due to increasing returns to scale. A cumulative agglomeration process could then be driven by the interaction between upstream and downstream firms. If labour mobility is low and the supply of labour is inelastic, then concentration of production must lead to rising wages. This has two opposite effects: higher household income leads to an increase in demand, whereas higher wages decrease firm profits and make relocation to the periphery more attractive. As a result, the set of possible equilibrium is quite rich."

More information at: [Laureate P. Krugman 2008](#)

Call for nominations for IIOA Fellows

The nomination and election of "Fellows of the IIOA" are regulated by the **bylaws** accepted at the Sendai 2006 July Council meeting of the IIOA and establishes:

1. Aim.

The aim of electing Fellows of the IIOA is to honor appropriate members of the IIOA for their scientific contributions to the field of input-output analysis, broadly defined.

2. Number.

During each International Input-Output Conference the maximum number of members to be elected as new Fellows of the IIOA is equal to three. The overall maximum number of Fellows is twenty.

3. Secretary.

Each election round, one of the newly elected Fellows will be appointed as Secretary and will be responsible for the organization of the next election.

4. Nomination.

In the calendar year preceding the next International Input-Output Conference members of the IIOA will be invited by the Secretary to nominate other members for election before December 31. Each candidate must have been a member of the IIOA for at least six years. Each nomination will include: name, current address, current email, current institution, brief curriculum vitae, list of maximally ten key-publications, and a description of the candidate's contribution to input-output analysis of 100-200 words.

5. Election. All Fellows will be invited to deliver their votes on the election of the new Fellows. The Secretary will inform the elected Fellows, the President of the IIOA, the Chair of the scientific committee and the Chair of the local organizing committee of the next International Input-Output Conference of their election, at least one month before the next conference.

6. Installation.

The new Fellows of the IIOA will be installed as such during one of the plenary sessions or the official dinner of this next conference.

7. Rights.

The Fellows have the right to call themselves "Fellow of the IIOA" and have the right to free memberships in the IIOA.

8. Transition.

At the International Input-Output Conference in Istanbul 2007 the first cohort of IIOA Fellows will be installed, consisting of Anne P. Carter, Andras Bródy and Karen R. Polenske (1st Secretary).

The IIOA Council has established that IIOA Fellows will be selected based upon their important contributions to the field of Input-Output economics.



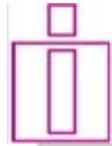
In Istanbul in 2007, the following life-time Fellows were announced Andrew Bródy, Anne P. Carter, and Karen R. Polenske.

We now call for nominations for three additional Fellows. Any current members may nominate any member of the association by

1. Providing name, current address, email, and institution of person being nominated.
2. Sending a short 100-200 word statement supporting the nomination.
3. Enclosing a CV for the person nominated.
4. Enclosing a list of maximally ten key publications for the person nominated.
5. Providing two references.

In addition, the person nominated must have been a member of the IIOA for at least six years. See the attached by-laws for complete details. For full consideration during the current nomination process, the nomination must be received by Karen R. Polenske (krp@mit.edu) no later than **Wednesday, December 31, 2008**.

(Cont. next page)



I will confer with the other two Fellows concerning the nominations, and we will then select the next three Fellows who will join the original three. An announcement will be made at the 17th International Input-Output Conference in São Paulo, Brazil, July 11-17, 2009.

Karen R. Polenske
Secretary of Nominations Committee
IIOA Fellows

Conferences

5th International Conference on Industrial Ecology / 2009 ISIE Conference

Transition Toward
Sustainability
21-24 June 2009
Lisbon, Portugal



**Abstract submission deadline
December 12, 2008**

The International Society for Industrial Ecology, ISIE, promotes Industrial Ecology (IE) as a way of finding innovative solutions to complicated environmental problems and facilitates communication among scientists, engineers, policymakers, managers and advocates who are interested in how environmental concerns and economic activities can be better integrated. The mission of the ISIE is to promote the use of industrial ecology in research, education, policy, community development, and industrial practices.

The field of Industrial Ecology has adopted and developed rigorous tools for assessing the environmental impacts of products, processes, industrial sectors and economies at local, regional and global scales. These include methods of life cycle assessment, material and energy flow analysis, applied thermodynamics, risk assessment, input-output analysis, and resource economics. These methods serve: in the design of green products and processes, e.g., green buildings, eco-industrial parks; in assessing technological change, dematerialization and de-carbonization; and in developing policy to encourage product stewardship and environmental protection.

The ISIE, has a worldwide membership of about 500 leading scientists and engineers broadly concerned with the technical foundations of sustainable development. The membership, from academia, industry and government, has expertise in the technological development and societal progression towards industrial systems that are compatible with the functioning of natural ecosystems, e.g., efficient use of energy, material recycling and non-polluting. Many members of the society are advisors to national governments on matters of environmental technology and policy.

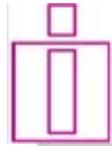
More information at: <http://isie2009.com/>



Call for Papers: Special IARIW-SAIM Conference on "Measuring the Informal Economy in Developing Countries" Kathmandu, Nepal, September 24-26, 2009

The International Association for Research in Income and Wealth (IARIW) and the South Asian Institute of Management (SAIM) are organizing a conference on measuring the informal economy in developing countries to be held in Kathmandu, Nepal September 24-26, 2009. The term 'informal economy' is defined as the wide range of economic activities contributing to the well-being of households that are not counted in any conventional official data collection process and thus not the subject of regular policy interest or of government support (though sometimes intervention). An objective of the conference is to move the sector coverage and policy agenda on from the original ILO understanding of the issues related to the informal economy.

Abstracts of proposals should not exceed 300 words. The Conference Program Committee consisting of Derek Blades (chairman), Andrew Sharpe (IARIW), Bishnu Pant (SAIM) and Francisco Ferreira (World Bank) will consider all submissions. Abstracts should be sent as e-mail attachments to derekblades@wanadoo.fr by **March 31, 2009**. A decision regarding acceptance will given by mid-April. Final papers should be in the hands of session organizers and chairpersons for distribution to discussants by August 31, 2009 to allow them sufficient time for review and to prepare their comments. Additional information on the conference, including the provisional program outline, is posted at www.iariw.org/conference2009.



8th International Conference of the European Society for Ecological Economics



29 June 2009 – 02 July 2009

Transformation, innovation and adaptation for sustainability: integrating natural and social sciences

This conference offers the opportunity to engage into a critical evaluation of the present and future research agenda of Ecological Economics. Global environmental problems have risen to the top of the international political agenda and there is growing demand for analyses that help understanding inter-coupled social, technological and environmental systems and formulating urgent policy actions. The relevant systems are typically open, dynamic and often indeterminate in their behaviour. This introduces challenges concerning the quality of knowledge and the tools and methods suitable for understanding system changes. These problems are further compounded where governance interventions are framed differently under contending social values and interests and shaped by the exercise of cultural, political and economic power. More information at: <http://www.esee2009.si/>

Abstract deadline: November 30, 2008 !!



10-12 June 2009
Santiago
(Chile)

Twelfth Annual Conference "Trade Integration and Sustainable Development: Looking for an Inclusive World"

The goal of the conference is to promote the exchange of ideas among economists conducting quantitative analysis of global economic issues. Particular emphasis will be placed on applied general equilibrium methods, data, and application. Related theoretical and applied work is also welcome.

A global network of individuals and institutions conducting economy-wide analysis of trade, resource, and environmental policy issues has emerged. Thousands of these researchers now use a common data base supplied by the Global Trade Analysis Project (GTAP). The project is coordinated by the Center for Global Trade Analysis at Purdue University with the support of a consortium of national and international agencies. Participants are given an opportunity to present their work, interact with other professionals in the field, and learn about the most recent developments in global economic analysis.

The themes of the Twelfth Annual Conference are:

- * Trade for an inclusive world: Multilateral and Bilateral Agreements
- * Terms of trade shocks and food crisis
- * Climate Change, Energy and Environment
- * Poverty, Income Distribution and Development, towards the Millennium Development Goals
- Geography of trade: Sub-national assessments

More information at: GTAP Conferences 2009

Abstract deadline: January 15, 2009



17th International Input-Output Conference

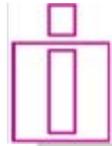
The International Input-Output Association (IIOA) is a scientific non-profit membership organisation founded in 1988. Its objective is the advancement of knowledge in the field of input-output analysis, including improvements in basic data, theoretical insights and modelling, and applications, both traditional and novel, of input-output techniques.

The IIOA grew out of an informal world-wide network of economists, government officials, engineers and managers with interests in input-output analysis.

If you are not a member of the IIOA, we would like to invite you to learn more about the IIOA by navigating through our homepage and/or by contacting one of our officers or Council members.

More information at: www.usp.br/econ/io2009

Abstract deadline: January 31, 2009



In the next ESR issue

Economic Systems Research

Journal of the International Input-Output Association

Volume 20

Number 4

December 2008

Erik Dietzenbacher. Editor

Önder Nomaler & Bart Verspagen. *Knowledge Flows, Patent Citations and the Impact of Science on Technology*

Technological innovation depends on knowledge developed by scientific research. The number of citations made in patents to the scientific literature has been suggested as an indicator of this process of transfer of knowledge from science to technology. We provide an intersectoral insight into this indicator, by breaking down patent citations into a sector-to-sector matrix of knowledge flows. We then propose a method to analyze this matrix and construct various indicators of science intensity of sectors, and the pervasiveness of knowledge flows. Our results indicate that the traditional measure of the number of citations to science literature per patent captures important aspects intersectoral knowledge flows, but that other aspects are not captured. In particular, we show that high science intensity implies that sectors are net suppliers of knowledge in the economic sector, but that science intensity does not say much about pervasiveness of either knowledge use or knowledge supply by sectors. We argue that these results are related to the specific and specialized nature of knowledge.

Esteban Fernández-Vázquez, Bart Los & Carmen Ramos-Carvajal. *Using Additional Information in Structural Decomposition Analysis: the Path Based Approach*

Structural decomposition analysis (SDA) is a well-known methodology to assess the relative importance of effects that together constitute the actual change in a variable of interest. A widely recognized problem of SDA is that the results often depend strongly on the specific decomposition formula chosen, while numerous formulae are equivalent

from a theoretical point of view. This “non-uniqueness” problem is often solved rather pragmatically, by reporting an average over (a subset of) all possible formulae. In this paper, we propose an approach that uses maximum entropy econometrics techniques to select a specific decomposition formula if additional information on one or more (but not all) determinants is available. We illustrate the method empirically by investigating the sources of change in real labor costs by industry in Spain, 1980-1994.

Jan Oosterhaven, Dirk Stelder & Satoshi Inomata. *Estimating International Interindustry Linkages: Non-Survey Simulations of the Asian-Pacific Economy*

This paper evaluates a recently published semi-survey international input-output table for nine East-Asian countries and the USA with four non-survey estimation alternatives. A new generalized RAS procedure is used with stepwise increasing information from both import and export statistics as optimisation constraints on the four non-survey tables. The results show that the estimated table improves when increasing information from both sources is used, despite the well known inconsistencies between import and export data in trade statistics. It is concluded that the new procedure can be useful as a critical analysis of newly published (semi-)survey international tables and/or as an early updating tool during the construction process.

Utz-Peter Reich. *Additivity of Deflated Input-Output Tables in National Accounts*

Input-output tables deflated by chained prices indices are not additive over product rows. The paper discusses the reasons and suggests a remedy. The new method proposed is based on a distinction, in concept, between “real value”, on the one hand, and variation in “volume”, on the other. The first corrects for the monetary variation of the unit of account resulting from inflation, while the latter isolates the variation of one product price relative to the other products, caused by the forces of supply and demand on each individual commodity market. An example of the resulting growth analysis is compiled for the Dutch economy between years 1990 and 2000.

Guang-Zhen Sun. *The First Two Eigenvalues of Large Random Matrices and Brody's Hypothesis*

Bródy (1997) notices that for large random Leontief matrices, namely non-negative square matrices with all entries i.i.d., the ratio between the subdominant eigenvalue (in modulus) and the dominant eigenvalue declines generically to zero at a speed of the square root of the size of the matrix as the matrix size goes to infinity. Since then, several studies have been published in this journal in attempting to rigorously verify Bródy's conjecture. This short article, drawing upon some theorems obtained in recent years in the literature on empirical spectral distribution of random matrices, offers a short proof of Bródy's conjecture, and discusses briefly some related issues.

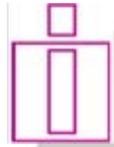
BOOK REVIEW

Arup Mitra. Barbara Harriss-White & Anushree Sinha (Eds). *Trade Liberalization and India's Informal Economy*

Title-page, Volume Contents and Author index, Vol. 20

Change of editorial address from 2009 !!

The ESR Editorial Office has changed location. Editorial Correspondence should be addressed to the Editorial Office Manager, Centre for Integrated Sustainability Analysis, A28 - School of Physics, The University of Sydney NSW 2006, Australia. Tel: +61 (0)2 9036 9365. Fax: +61 (0)2 9351 7726. Email: esr@physics.usyd.edu.au



Highlights in journals

M. Sonis & G. J. D. Hewings, "On the Sraffa-Leontief model", *Review of Regional Studies*, 37(1) 2007, pp. 39-63.

In this paper we consider the matrix forms of the Sraffa-Leontief income distribution model introduced by Steenge (1995, 1997). We will explore the equivalence between these matrix forms and the set of simpler models, including the Sraffian condition of linear relations between the rate of profits r and wage rate w^* . Further, we will evaluate the condition that the price vector p and the commodities vector x are the left-hand and the right-hand eigenvectors of the matrix A of direct inputs and that these vectors are the fixed points of the Sraffian standard commodities-standard prices matrix. We will then explore links between the Sraffa-Leontief system and the multiplier product matrix (MPM) for the matrix A to consider new insights generated through visualization with the help of an artificial economic landscape. Furthermore, the connections between MPM and the Sraffian standard commodities-standard prices matrix and their minimal information properties are proven.

D. W. Hughes & M. Shields, "Revisiting Tourism Regional Economic Impact: Accounting for Secondary Household Employment", *Review of Regional Studies*, 37(2) 2007, pp. 186-206

Many argue that tourism development is beneficial for local economies, partly because of spillover effects. Others hold that tourism jobs are lower paying, often seasonal, and can generate a host of social ills with earned income concentrated in low-income households. A Social Accounting Matrix (SAM) of a Pennsylvania region is used to test the impacts of tourism businesses supported by the Progress Fund, a regional Community Development Financial Institution, on household income distribution by incorporating secondary and primary employment based income. Analysis indicates that tourism-oriented activity has relatively large contributions to lower and upper as opposed to middle income households.

M. Lenzen, "Double-counting in life cycle calculations". *Journal of Industrial Ecology*, vol. 12 issue 4, 2008, pp.583-599.

Many popular frameworks apply life cycle calculations to examine environmental burdens occurring throughout the life cycle of products and services that are either purchased by final consumers or demanded as inputs by producers. Accounting for the full supply chain of producer

items can lead to double-counting effects when results of separate studies are added up and referenced or compared to totals. If, for instance, energy life cycle inventories were prepared for all consumer and producer items in an economy and added up, the resulting total amount of energy would be greater than national energy consumption. Although this double-counting is inconsequential if analyses are appraised in isolation without reference to national totals, it leads to serious errors when large interconnected systems are analyzed or when results are placed into wider (e.g., regional, national, or global) contexts. The article lists a number of prominent policy and decision-making frameworks that make use of life cycle techniques, where this double-counting error is highly undesirable. It proposes a solution to the double-counting problem in which supply chains in the product life cycle are split and burdens shared between the supplying and demanding sides of every transaction in the economy.

G. Peters, "Efficient algorithms for Life Cycle Assessment, Input-Output Analysis, and Monte-Carlo Analysis" *International Journal of Life Cycle Assessment*, 12(6), 2007, pp. 373-380.

As Life Cycle Assessment (LCA) and Input-Output Analysis (IOA) systems increase in size, computation times and memory usage can increase rapidly. The use of efficient methods of solution allows the use of a wide range of analysis techniques. Some techniques, such as Monte-Carlo Analysis, may be limited if computational times are too slow. In this article, I describe algorithms that substantially reduce computation times and memory usage for solving LCA and IOA systems and performing Monte-Carlo analysis. The algorithms are based on well-established iterative methods of solving linear systems and exploit the power series expansion of the Leontief inverse. The algorithms are further enhanced by using sparse matrix algebra. The algorithms presented in this article reduce computational time and memory usage by orders of magnitude, while still retaining a high degree of accuracy. For a 3225×3225 LCA system, the algorithm reduced computation time from 70s to 0.06s while retaining an accuracy of $10^{-3}\%$. Storage was reduced from 166 megabytes to 1.8 megabytes. The algorithm was used to perform a Monte-Carlo analysis on the same system with 1,000 samples in 90s. I also discuss various issues of power series convergence for general LCA and IOA systems and show that convergence will generally hold due to the mathematical structure of LCA and IOA systems. By exploiting the mathematical structure of LCA and IOA iterative techniques substantially reduced the computational times required for solving LCA and IOA systems and for performing Monte-Carlo simulations.

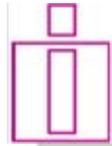
This allows more wide-spread implementation analysis techniques, such as Monte-Carlo analysis, in LCA and IOA. It is suggested that algorithms, such as the ones described in this article, should be implemented in LCA packages. Various checks can be used to verify that computational errors are kept to a minimum.

M. Llop & A. Manresa, "Analysis of Linear Multipliers in an Open Regional Economy", *Regional Studies*, 2007, Vol. 41 No. 4, pp. 421-428.

Since Round's pioneering contribution in 1985, the conventional approach for analysing the interdependences between economic systems involves multi-regional or multi-country models. The objective of the present paper is to provide a way of representing the linkages between an economy and foreign agents when data deficiencies prevent multi-regional models from being used. Specifically, it extends the model of linear multipliers so that it can represent the circular flow of income in an open economy. The paper also presents a decomposition of the global multipliers that makes it possible to identify the feedback effects associated with the foreign sector. With this decomposition, one can evaluate the real contribution of external relationships to income generation within the economy.

J. Zhang, B. Madsen & C. Jensen-Butler, "Regional Economic Impacts of Tourism: The Case of Denmark", *Regional Studies*, 2007, Vol. 41 No. 6, pp. 839-854.

The Danish interregional general equilibrium model LINE is presented together with its tourism submodel. The model is used to analyse the importance of tourism in regional economies and to decompose regional tourism multipliers. The difference between direct and derived effects is examined; and by using the model, the factors that determine the size of the direct effects and derived effects are identified. The analysis is applied to Danish regions which are divided into urban and rural regions. In general, the results show that tourism multipliers are larger in urban than in rural areas. Factors such as interregional trade, commuting and shopping leakage have to be taken into consideration when evaluating the derived effects. When the leakage is large, the tourism multiplier tends to be small. The paper also draws attention to the difference between absolute and relative impacts of tourism on the regional economy.



Dr. William H. Miernyk In memoriam



Dr. William H. Miernyk, of Morgantown, died on August 7, 2008, at age 90. He was born January 4, 1918, in Durango, Colo., to Elizabeth Sopko and Andrew Miernyk. He had a great love for both scholarship and family. As a young man Dr. Miernyk loved sports, and was a boxer, gymnast, and football player at Durango High School, Ft. Lewis College and the University of Colorado.

He and Mary Davis met growing up in Durango, where they married during World War II. He served as a sergeant in the U.S. Army and was stationed in the South Pacific Theater throughout the war. After the war, William and Mary, and their growing family lived in Colorado and Massachusetts, arriving in Morgantown in 1964. They were married 63 years, and sadly, Mary preceded him in death in 2005.

Dr. Miernyk attended Ft. Lewis College in Durango, then earned bachelor's and master's degrees in economics from Colorado University followed by master's and doctoral degrees in economics from Harvard University.

Dedicated to research, he also discovered a love of teaching that would stay with him throughout his entire professorial career. He taught economics at Harvard, Northeastern University, the Massachusetts Institute of Technology, and the University of Colorado before being recruited to West Virginia University to establish the Regional Research Institute. He originally committed to only a temporary stay at WVU, but found the area and work so appealing that he abandoned his plans to return to Colorado, and continued as Director until his retirement in 1983.

While at WVU, he was the recipient of many honors and awards. In 1989, he was inducted into the Order of the Vandavia. In 2005, the first "William H. Miernyk Research Excellence Medal" was presented at the annual meeting of the Southern Regional Science Association. His titles at WVU were Claude Worthington Benedum Professor of Economics, Professor Emeritus, and Director Emeritus of the RRI.

Perhaps best known for his widely distributed and well-received *The Elements of Input-Output Analysis* (1965), his interests and contributions to knowledge have focused on a much broader set of topics within and beyond regional science. His research has included such topics as pollution abatement, energy prices, unemployment, labor force participation, and migration in the Appalachian states. Known for his critical insight, rigor, and excellence in research, his writing was always clear and concise. Dr. Miernyk served as a consultant for U.S. Senate committees, the Appalachian Regional Commission, and The World Bank, among many others. Dr. Miernyk authored and co-authored over 40 books, and 144 monographs, articles and reviews. In addition to his contributions to the academic literature, he extended his sphere of influence to the general public through 17 years of weekly columns published in the *Charleston Gazette*.

During much of his career, Bill was closely affiliated with the Southern Regional Science Association. He was an SRSA Fellow, and was the organization's fifth president in 1975. It was largely through his efforts and influence that West Virginia University developed into a center of regional science research. Lasting evidence of his role in this context includes the longest-standing regional science oriented university research institute, the Regional Research Institute, and the long list of subsequent WVU contributors to service to several Regional Science councils and

executive committees, including the current President and Treasurer, and one council member in the SRSA. He also was active in the Regional Science Association International, where he served as Vice President in 1972-1973. Bill also was presented with the first RSA Distinguished Scholar Award in 1982. The text of that award read:

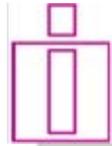
In recognition of his contributions to the field of Regional Science, particularly in the areas of regional input-output modeling, regional energy analysis and regional growth and development theory.

Bill's contributions to regional policy and analysis are substantial. His contributions to both theory and method include *Elements of Input-Output Analysis* on which so many relied for IO introduction, and the construction of a survey-based West Virginia IO model that many more of us used in testing and demonstration of our research. His early applications of regional input-output modeling set the standard for similar analyses for years to come, and are still singled out as exemplars in the field.

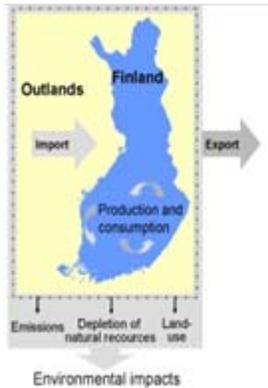
Dr. Miernyk loved life, and followed a path of his own. He enjoyed telling of his days riding one of the early K-model Harley Davidson motorcycles. Then, in part due to an aversion to the long drive from Morgantown to Charleston, West Virginia's capitol city, he sought and obtained his pilot's license. He loved to fly, and for many years had a small plane that he often flew over the Morgantown area just for the sheer joy of it. He quickly came to love his adopted home in West Virginia, and was a longtime fan of WVU football.

He will be remembered by his friends and colleagues, and by his children, Jan Miernyk of Columbia, MO, Judith Miernyk of Washington, DC, Jeanne Miernyk of San Francisco, CA, and James Miernyk of Olympia, WA; by his granddaughter, Briana Lomax of Tampa, FL, his sister Irene Miernyk of Los Angeles, CA, and two nephews, Bill Miernyk of Anchorage, AK, and Dick Miernyk of Las, Cruces, NM. In addition to his wife Mary, his brothers, John and Andrew, preceded him in death.

Randall Jackson, Director,
Regional Research Institute, Morgantown, WV 26508



Relevant national projects



Environmental impacts of material flows caused by the Finnish economy (ENVIMAT) (2006-2008)

The aim of this project is to define the life cycle environmental impacts of the material flows used for production and consumption in the Finnish economy allocated to different activity sectors and product groups. In the project, the focus is not restricted to domestic environmental loads. Impacts on the environment caused by imported raw materials and goods are also taken into account. The final objective of the project is to create a so called hybrid model by which the relationships between environmental impacts and economic effects caused by the use of natural resources in Finland can be assessed. In the environmental assessment, life cycle methodology and databases are connected to the national material flow accounts and input-output analysis.

The project is one of the projects funded by the Environmental Cluster Research Programme (4th phase: Ecoefficient Society). The ENVIMAT project has started in June, 2006 and will be finished by the end of 2008.

Project leader: Prof. **Jyri Seppälä**
More information at: [ENVIMAT](#)



Supply-import-use mathematical model under linearity assumptions

The Latvian Bureau of Statistics has already three times collected the National Accounts information according to the standards of the European System of Accounts ESA 95, and we hope it will continue this work. The National Accounts contain supply, imports, and use interaction tables and square input-output table as well. By utilizing input-output tables as an information base, it is possible to create the well-known classical input-output mathematical model for analysis and forecasts of economies. In this research, we apply von Neumann's economic model to offer the concept of supply-import-use model under linearity assumptions. The core of the model is constructed the supply, import, and use tables. It also could be useful for monitoring and understanding the national economy from a comparative static's point of view.

Traditionally, the core of input-output analysis is a square industry-by-industry input-output table. The important idea of our research is to use the supply, use, and imports tables as basic information for supply-import-use analysis, bypassing the square table all together. Supply, import and use tables are matrices by industry and by commodity describing the domestic production processes and the transactions in products of the national economy in detail; therefore the results can be more readily interpreted and more directly applied for analysis and forecasts of production, investments, energy, structure of demand,

proportions of export, necessary import, prices and costs, employment, structure of value added and for investigation of sensitivity analysis. The results of the present research appear to be innovative, not discussed in literature available to the author of the present paper. The theoretical questions examined require further investigation.

The supply-import-use information system together with user-friendly software will allow improving the quality of decisions in the fields relating to national economic structure, and therefore the project is topical also with respect to improvement of the culture of political and economical decision-making in Latvia.

We hope that our modest research will become the first step towards project "Tools of knowledge-based analysis of Latvia's economy" exactly corresponding to the strong orientation towards the knowledge based economy declared by Latvian government. This research is supported by the Latvian Council of Science (grant No. 04.1357).

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