

## In this issue

### Tales from the I-O world

- Izmir Regional IOT 2008 p. 1
- Israel benchmark IOT 2006 p. 1

### Published papers and books in I-O analysis and related methods

- In the next *ESR* issue p. 2
- Highlights in journals p. 3
- Highlights in books p. 5

### In memoriam p.6

### Fellows corner

- Jan Oosterhaven p. 8
- Thijs ten Raa p. 9

### A look to the past p.10

### Upcoming conferences p.10

## Tales from the I-O world

### Izmir Regional I-O Tables 2008 available !

Izmir Regional Development Agency (IZKA), Izmir, Turkey has funded a project that targets the construction of a regional input-output table for Izmir, Turkey's 3<sup>rd</sup> biggest city. As an input for the Izmir Regional Development Plan 2014-2023, 2008 Izmir IZKA Regional Input-Output Table has been constructed by a team from the Department of Economics at Ege University, Izmir. Project was carried by a team consisting of Osman Aydogus (Prof., PhD, team leader), Çağaçan Deger (Assist. Prof., PhD), Elif Tunali çaliskan (RA, PhD student), and Gülçin Gürel (RA, PhD student).

The hybrid approach was adopted in the construction of regional I-O table. The approach requires an up-to-date national I-O table. However, the latest national table in Turkey is for the year 2002. Therefore, in the first step the project team has updated the 2002 national table to year 2008 by RAS method and using all the available statistical data from TURKSTAT and other sources. In the second step, the team constructed a regional table for Izmir through a location quotient method, using all the available statistical data from various sources and also superior data obtained through interviews with industry representatives.

This being the first publicly available regional I-O table in Turkey, researchers are welcome to examine the table, provide feedback and use it for various analysis.

[Data](#) and [Notes](#).

### Israel benchmark I-O Tables 2006 released!

In 2013, the Central Bureau of Statistics of Israel (CBS) released the benchmark I-O tables for year 2006. The tables were prepared in accordance with the recommendations of the System of National Accounts 2008 (SNA 2008). The I-O tables were categorized according to the ISIC Rev 3.0 (1993 International Standard Industrial Classification) and the ISIC Rev.4 (2011 International Standard Industrial Classification).

The tables were compiled for 250 industries and published in aggregations of 14, 65 and 159 industries for the ISIC Rev. 3 (1993), and published in aggregations, using the ISIC Rev 4.0 (2011), of 21 and 70 industries. The tables include data from several surveys: Products and materials in manufacturing survey, Imports Destinations Survey, Imports and Exports of Services Survey, Trade, Services, Transport and Communication Survey and others.

The tables are available free of charge on the [CBS website](#), under Israel's Economy category. For more information, please contact [Haydee Faur](#).

**NEUERE ANWENDUNGSFELDER DER INPUT-OUTPUT-ANALYSE. TAGUNGSBAND.** Papers of the 6<sup>th</sup> Input-output workshop 2012 of Institut für Wirtschaftsforschung Halle - IWH IWH - Sonderheft



## Published papers and books in IOA and related methods

### In the next ESR issue

Economic Systems Research

Journal of the IIOA

Volume 25, Issue 4 (December 2013)

<http://www.tandf.co.uk/journals/titles/09535314.asp>



**INPUT-OUTPUT ANALYSIS: THE NEXT 25 YEARS.** DIETZENBACHER E., LENZEN M., LOS B., GUAN D., LAHR M., SACHO F., SUH S. AND YANG C.

This year marks the 25th anniversary of the International Input-Output Association and the 25th volume of Economic Systems Research. To celebrate this anniversary, a group of eight experts provide their views on the future of input-output. Looking forward, they foresee progress in terms of data collections, methods, theory testing, and focus and scope.

**BENCHMARKING LARGE ACCOUNTING FRAMEWORKS: A GENERALISED MULTIVARIATE MODEL.** BIKKER R., DAALMANS J. and MUSHKUDIANI N.

We present a multivariate benchmarking model for achieving consistency between large quarterly and annual accounting frameworks. The method is based on a quadratic optimization problem, for which many efficient numeric solvers exist. The method combines several features, such as linear constraints, ratio constraints, weights, and inequalities, in one model. Therefore, a wide range of modelling possibilities is supported. This method is especially interesting for

national statistical offices, to simplify their processes to achieve consistency between publications.

**SIMULTANEOUSLY BALANCING SUPPLY-USE TABLES AT CURRENT AND CONSTANT PRICES - A NEW PROCEDURE.** NICOLARDI V.

According to the 1993 System of National Accounts, the annual Supply-Use Tables (SUTs) need to be compiled at both current and constant prices by the National Institutes of Statistics. The most appropriate way to obtain consistent SUTs at both current and constant prices is to balance them simultaneously but, in this case, the main complexity is the nonlinearity that inevitably occurs. This paper proposes a new method to balance extremely large sets of National Accounts simultaneously at current and constant prices. The distinctive features of the proposed balancing method are its flexibility, which is very high compared with the other methods in the literature, and its capability to allow the control of the consistency of the system of deflators that are used. This new balancing method has been applied to balance the Italian 2006 SUTs simultaneously at current and constant prices, and it has yielded very good outcomes.

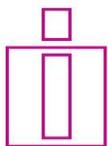
**THE BIAS OF THE MULTIPLIER MATRIX WHEN SUPPLY AND USE TABLES ARE STOCHASTIC** RUEDA-CANTUCHE J.M., DIETZENBACHER E., FERNÁNDEZ E. and AMORES A.F.

The literature on stochastic input-output (I-O) analysis has paid considerable attention to the bias in the Leontief inverse. This paper extends previous studies by assuming supply and use tables (SUTs) rather than I-O tables or input

coefficients matrices) to be stochastic. This is a natural starting point because SUTs have become the basic data sources for I-O applications. In a Monte Carlo simulation experiment, a given SUT is randomized in two different ways and the effects are determined for eight different multiplier matrices. The analysis is carried out for Spain, Italy, the Netherlands, Germany and Finland, using their SUTs for 2006. The findings indicate that, in general, biases are statistically significant but negligibly small. This corroborates earlier findings obtained for stochastic IO tables.

**IMPLICIT ELASTICITIES AND PRICE EFFECTS: AN UPDATED PROCEDURE.** CASLER S.D.

Based on the general procedure described by Casler [(2011) Coefficient Change, Price Effects, and Implicit Elasticities: Estimating Microeconomic Determinants over Two Time Periods. Economic Systems Research, 23, 153-174], this paper presents an updated approach to the estimation of input coefficient changes as functions of changing prices. The procedure makes direct use of relationships that emerge from the model of cost minimization subject to producing a desired level of output. Based on an initial specification of constant cross-price derivatives, the imposition of adding up and symmetry conditions allows the actual price and coefficient changes that occur between periods to identify implicit own and cross-price derivatives and corresponding elasticities, using data for only two time periods. With this updated approach, the calculation of derivatives is far simpler and leads to far more accurate measures of price-induced input-output coefficient changes than the original version.



## Highlights in journals

**SANCHO F. (2013)** SOME CONCEPTUAL DIFFICULTIES REGARDING 'NET' MULTIPLIERS. ANNALS OF REGIONAL SCIENCE 1 (2):537-552.

Multipliers are routinely used for impact evaluation of private projects and public policies at the national and subnational levels. Oosterhaven and Stelder (J Reg Sci 42(3), 533–543, 2002) correctly pointed out the misuse of standard 'gross' multipliers and proposed the concept of 'net' multiplier as a solution to this bad practice. We prove their proposal is not well founded. We do so by showing that supporting theorems are faulty in enunciation and demonstration. The proofs are flawed due to an analytical error, but the theorems themselves cannot be salvaged as generic, non-curiosum counterexamples demonstrate. We also provide a general analytical framework for multipliers and, using it, we show that standard 'gross' multipliers are all that are needed within the interindustry model since they follow the causal logic of the economic model, are well-defined and independent of exogenous shocks, and are interpretable as predictors for change.

**TIMMER M.P., LOS B., STEHRER R. AND DE VRIES G.J. (2013)** FRAGMENTATION, INCOMES AND JOBS: AN ANALYSIS OF EU COMPETITIVENESS. ECONOMIC POLICY 28:613-661

Increasing fragmentation of production across borders is changing the nature of international competition. As a result, conventional indicators of competitiveness based on gross exports become less informative and new measures are needed. In this paper we propose a new concept based on the value added that countries contribute to the production of final manufacturing goods, called "global value chain (GVC) income". We develop an ex-post accounting

framework to measure this and provide trends for European countries based on a recent multi-sector input-output model of the world economy. We find that gross exports overestimate the competitiveness of economies that rely heavily on imported intermediates, and this bias has increased over time. Based on GVC incomes, we find that revealed comparative advantage of the EU27 is shifting to activities related to the production of non-electrical machinery and transport equipment, and away from non-durables. We also find that the number of jobs involved (GVC jobs) is declining and increasingly carried out by high-skilled workers outside the manufacturing sector, highlighting the uneven distributional consequences of production fragmentation. The results show that a GVC perspective on competitiveness is needed to better inform the policy debates on globalization.

**DOBRESCU E. (2013)** MODELLING THE SECTORAL STRUCTURE OF THE FINAL OUTPUT. ROMANIAN JOURNAL OF ECONOMIC FORECASTING 16 (3):59-89

This paper examines the modelling complications that appear when some macroeconomic behavioral relationships interact with structural variables, even under a given A matrix. The main problem is concretized for the situation when, a) the final consumption, gross fixed capital formation, inventory changes, export, import (all of them at the market prices), and gross value added (at the production prices) are estimated as macro-indicators, and b) the output (at production prices) is determined on a disaggregated level. The so-called demand-side or supply-side approaches are possible; here, the supply-side approach is especially researched. With such a goal, the regression and linear weighted average (in the Fisher version) techniques are discussed as the main tools for estimating sectoral weights of the final output. For the linear weighted average method, the paper sketches, as a discussion proposal, a methodology for the optimal selection of the length of the moving average. The Romanian IOT 1989–2009, aggregated into 10 sectors were used.

**DOBRESCU E. (2013)** RESTATEMENT OF THE IO COEFFICIENT STABILITY PROBLEM. JOURNAL OF ECONOMIC STRUCTURES 2 (2)

The capacity of input-output tables to reflect the structural peculiarities of an economy and to forecast, on this basis, its evolution, depends essentially on the characteristics of the matrix A—matrix of I-O (or technical) coefficients. However, the temporal behaviour of these coefficients is yet an open question. In most applications, the stability of matrix A is usually admitted. This is a reasonable assumption only for a short-medium term. In the case of longer intervals, the question is much more complicated. We shall empirically discuss this problem by using Romanian input-output tables. Our statistical option was motivated inter alia by the existence of official annual data for two decades (1989–2009). As an introduction, Sect. 1 characterises the general framework of paper. Section 2—The main characteristics of I-O coefficients as statistical time series—examines the variability of technical coefficients expressed in both volume and value terms. The analysis is convergent to other previous works, confirming that the evolution of these coefficients in real and nominal terms is roughly similar. The main finding of this section is that, on one hand, the I-O coefficients are volatile, but on the other, they are serially correlated. Consequently, Sect. 3—Attractor hypothesis—examines a possible presence of attractors in corresponding statistical series. The paper describes a methodology to approximate these using new indicators obtained by summation—in columns and rows—of the technical coefficients. The RAS method is involved as a connecting technique between these indicators and sectoral data. Section 4—Conclusions—presents the main conclusions of the research and outlines several possible future developments. The database and econometric analysis are presented in Statistical and Econometric Appendix.



**BARRETT J., PETERS G., WIEDMANN T., ROELICH K., LENZEN M., SCOTT K., and LE QUÉRE C. (2013)** CONSUMPTION-BASED GHG EMISSION ACCOUNTING IN CLIMATE POLICY – A UK CASE STUDY, CLIMATE POLICY 13 (4):451-470.

Global GHG emissions continue to rise, with nearly a quarter of it due to trade that is not currently captured within global climate policy. In the context of current trade patterns and limited global cooperation on climate change, the feasibility of consumption based emissions accounting to contribute to a more comprehensive (national) policy framework in the UK is investigated. Consumption-based emissions results for the UK from a range of models are presented, their technical robustness is assessed, and their potential application in national climate policy is examined using examples of policies designed to reduce carbon leakage and to address high levels of consumption. It is shown that there is a need to include consumption-based emissions as a complementary indicator to the current approach of measuring territorial emissions. Methods are shown to be robust enough to measure progress on climate change and develop and inform mitigation policy. Finally, some suggestions are made for future policy-oriented research in the area of consumption-based accounting that will facilitate its application to policy.

**LENZEN, M., MORAN D., BHADURI A., KANEMOTO K., BEKCHANOV M., GESCHKE A. and FORAN B. (2013)** INTERNATIONAL TRADE OF SCARCE WATER. ECOLOGICAL ECONOMICS 94:78-85

Recent analyses of the evolution and structure of trade in virtual water revealed that the number of trade connections and volume of virtual water trade have more than doubled over the past two decades,

and that developed countries increasingly import water embodied in goods from the rest of the world to alleviate pressure on domestic water resources. At the same time, as demand continues to increase and climate change threatens to alter hydrological cycles, water scarcity is a growing problem. Does research into virtual water trade need to consider water scarcity and differentiate flows out of water-scarce regions from flows out of water-abundant regions? Previous studies sum and compare virtual water volumes originating in countries experiencing vastly different degrees of water scarcity. We therefore incorporate water scarcity into an assessment of global virtual water flows. We use input-output analysis to include indirect virtual water flows. We find that the structure of global virtual water networks changes significantly after adjusting for water scarcity.

**SU BIN, ANG B.W. (2014)** INPUT-OUTPUT ANALYSIS OF CO<sub>2</sub> EMISSIONS EMBODIED IN TRADE: A MULTI-REGION MODEL FOR CHINA. JOURNAL OF APPLIED ENERGY, 114: 377-384

Energy-related CO<sub>2</sub> emissions embodied in international trade have been widely studied at the national level in recent years. The embodiment estimates help to explain the "weak carbon leakage" between industrial and developing countries and to reveal the so-called "consumption-based" emissions (or carbon footprint). These findings have implications on national climate policy and international negotiations. For a large country like China, spatial aggregation issues are important in embodied emission studies. Dividing the country into several regions, previous studies propose the hybrid emissions embodied in trade (HEET) approach for regional emission studies and use step-wise distribution of emissions embodied in trade (SWD-EET) analysis to explain indirect absorption patterns. In this paper, we combine the HEET approach and SWD-EET analysis to conduct a comprehensive study of China's regional emission embodiments. We explain how inter-regional

trade and international trade affect China's regional domestic emissions, and present the resulting regional carbon footprint. Policy implications from the empirical results obtained are discussed.

**MORAN D., LENZEN M., KANEMOTO K., GESCHKE A. (2013)** DOES ECOLOGICALLY UNEQUAL EXCHANGE OCCUR? ECOLOGICAL ECONOMICS 89:177-186.

The hypothesis of ecologically unequal exchange posits that low and middle income developing nations maintain an ecological deficit with wealthy developed nations, exporting natural resources and high impact commodities thereby allowing wealthy economies to avoid operating ecologically impactful industries at home. In this survey we assess the footprint of consumption of 187 countries using eight indicators of environmental pressure in order to determine whether or not this phenomenon occurs. We use input-output analysis with a new high resolution global Multi-Region Input-Output table to calculate each trading pair's balance of trade in biophysical terms of: GHG emissions, embodied water, and scarcity-weighted water content, air pollution, threatened species, Human Appropriated Net Primary Productivity, total material flow, and ecological footprint. We test three hypotheses that should be true if ecologically unequal exchange occurs. One: The inter-regional balance of trade in biophysical terms is disproportional to the balance of trade in financial terms. We find this is true, though not strongly so. Two: Exports from developing nations are more ecologically intensive than those from developed nations. We find this is true. Three: High income nations disproportionately exert ecological impacts in lower income nations. We find this is false: high income nations are mostly exporters, not importers, of biophysical resources.



**WIEDMANN T.O., SCHANDL H., LENZEN M., MORAN D., SUH S., WEST J., AND KANEMOTO K. (2013) THE MATERIAL FOOTPRINT OF NATIONS. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.**

Metrics on resource productivity currently used by governments suggest that some developed countries have increased the use of natural resources at a slower rate than economic growth (relative decoupling) or have even managed to use fewer resources over time (absolute decoupling). Using the material footprint (MF), a consumption-based indicator of resource use, we find the contrary: Achievements in decoupling in advanced economies are smaller than reported or even non-existent. We present a time series analysis of the MF of 186 countries and identify material flows associated with global production and consumption networks in unprecedented specificity. By calculating raw material equivalents of international trade, we demonstrate that countries' use of nondomestic resources is, on average, about threefold larger than the physical quantity of traded goods. As wealth grows, countries tend to reduce their domestic portion of materials extraction through international trade, whereas the overall mass of material consumption generally increases. With every 10% increase in gross domestic product, the average national MF increases by 6%. Our findings call into question the sole use of current resource productivity indicators in policymaking and suggest the necessity of an additional focus on consumption-based accounting for natural resource use.

### Highlights in Books

**THE PRACTITIONER'S GUIDE TO MULTI-REGIONAL INPUT-OUTPUT ANALYSIS..** Edited by Murray, J. and Lenzen M. Champaign, USA: Common Ground. 2013

It contains descriptions and applications of the main MRIO frameworks such as EXIOPOL, GTAP, WIOD, Eora, IDE-JETRO, GRAM and GLIO, examples for sub-national and enterprise MRIOs. In particular it contains a Chapter on policy relevance of global MRIO frameworks, authored by representatives of the OECD, UN, EC, and APEC, amongst others.

**MACROECONOMIC MODELLING FOR POLICY ANALYSIS.** Edited by: Bardazzi R. and Ghezzi L. Firenze University Press, 2013

This book collects a selection of papers presented at the XXth Inforum World Conference held in Florence in September 2012. Over the last 30 years, the Inforum approach to macro modelling has been shared by several group of economists worldwide. Researchers have focussed much of their efforts to developing a linked system of international interindustry models with a consistent methodology. A world-wide network of research associates use the same methods and software obtaining comparable results. Contributions contained in this book relate to specific topics (total factor productivity, energy issues, external linkages, demographic changes) while others are oriented to multisectoral model building and simulations.

**ECONOMIC MULTISECTORAL MODELLING BETWEEN PAST AND FUTURE.** Edited by R. Bardazzi. Firenze University Press, 2013

This book is a tribute to the work of Maurizio Grassini, econometrician and model builder as well as old member of IIOA. The selection of his works in the first part of the volume is mainly devoted to research issues of multisectoral modelling. In fact, M. Grassini has dedicated a large part of his professional life to building and developing the INTIMO model for the Italian economy within the INFORUM research project. The book does not aim to be a celebration of the past but takes a look at the future of the multisectoral modelling which M. Grassini has contributed so much to. In the second part of the book, colleagues and friends who have encountered M. Grassini in the professional sphere on matters of quantitative economic analysis or still working with him on interindustry models (among them Clopper Almon and Josef Richter) have given their contribution to look at the future prospects of a research field firmly based on the experience of what has been done so far.

**LA RESPONSABILIDAD DE LA ECONOMÍA ESPAÑOLA EN EL CALENTAMIENTO GLOBAL.** Edited by: Roca J. Fuhem Ecosocial/Los libros de la catarata, 2013

The book examines GHG emissions in Spain from 1990. The main conclusion is that Spain's contribution the climate change is disproportionately higher compared to its share in the world population. If international trade flows are accounted for, the Spain's emissions during the economic growth is significantly higher than the official sources. We also link the emissions to the households expense patterns. Lastly, it analyses the share of each region in the total emissions from a novel perspective.



## In memoriam

**Leon MOSES** (1924-2013)



Yet another leaf has fallen from the tree. Leon Nathan Moses passed away on October 12, 2013. In my small nook of the input-output world, only Wassily Leontief, Walter Isard, and William Miernyk loomed much larger when I was a graduate

student. (Naturally Ronald Miller and Peter Blair were also major figures in my early input-output [I-O] life but proximity demands some arbitrary discounting on my part when assessing their importance to the seemingly narrower world of I-O.) I am sure some will wonder why I didn't list Hollis Chenery or Charles Tiebout as well since they surely laid down some key ground work for regional input-output analysts. Indeed, both burned brightly in our field for a few years. But both also had forever stopped working on the subject for one reason or another before I had even heard of interindustry analysis. To be frank, I was still wearing shorts and sneakers when they left!

Leon's very first work (Isard and Moses, 1950), co-authored while obtaining his Masters of Arts degree in economics at Harvard, was on transportation equipment manufacturing and business cycles. He didn't catch the I-O bug until a bit later, and it was Walter Isard who instilled it. My understanding is that Walter was hired to teach input-output analysis as it was indecorous for a

professor to teach his/her own original material in the 1950s...at least as far as Professor Leontief was concerned. Indeed, the Wikipedia entry for "input-output model" states "Walter Isard and his student, Leon Moses, were quick to see the spatial economy and transportation implications of input-output, and began work in this area in the 1950s developing a concept of interregional input-output." Savage (2006) confirms that Wassily Leontief was the supervisor of Leon Moses's PhD dissertation, however. It is even more certain that Leontief and Isard did not discourage young Leon Moses from leaning on the interregional trade framework already under development (Isard, 1951; Leontief, 1953; Chenery, Clark, and Cao-Pinna, 1953).

Leon Moses's PhD dissertation culminated in at least two publications in leading economics journals (Moses, 1955a, 1955b); both focused on the importance of location on economic development using input-output analysis at the core of the approach. The first is a rather scathing assessment of Isard and Kuenne's (1953) piece in the Review of Economic and Statistics. Indeed, the daring venture provides some insight into Leon Moses's "colorful character," as Savage (2006) notes. The offending authors were rather close colleagues of Leon's at this juncture in his life, and a rejoinder (Kuenne, 1955) clearly recognizes his senior Harvard colleagues were not pleased with Leon's concerns with their piece.

The second of the two publications was the core of Leon's PhD dissertation and appeared in the American Economic Review. This (along with its appendix co-authored with John Fei), his most cited I-O piece, centered on the estimation of subnational interregional trade. While it (along with Chenery, Clark and Cao-Pinna, 1953) has long been noted for the manner in which interregional trade was estimated, the piece largely focused on perceived problems in the model he created: (1) fixed input coefficients; (2) spatially constant technology; (3) and stable trading patterns.

And naturally he tarried longest on the last. Interestingly enough, he found that the trade relationships were fairly stable, at least for the three-region, eleven-sector<sup>1</sup> model of the United States in 1947 that Leon examined. This helped to substantiate largely unstated assumptions of earlier single-region analyses performed by others. But it perplexed Leon, who rightly conjectured that the price of an industry's goods or services should vary substantially from location to location due to transportation costs. Indeed, this henceforth became the center of Professor Moses's work. It also became the springboard for work by Leontief and Strout (1963) as well as Polenske (1972-1973) and others.

Leon published a somewhat more noteworthy I-O piece in a 1960 issue of the Review of Economics and Statistics. It is notable in that he "blended input-output and linear programming techniques in order to achieve substitution and optimization within a general equilibrium framework. What emerges is a multi-region, multi-commodity, empirical study in comparative advantage [emphasis in the original, p. 373]"<sup>2</sup> Thus trade patterns, regional outputs, and regional demands are endogenous to the model.

1 Leon informs us that the table was aggregated from a 192-sector national table to avoid computational constraints as well as to make use of the very aggregate data on interregional trade flows in the U.S. at the time. He further thanks his colleague Charlotte Taskier for all regional data reconciliation, which we now understand to be a monumental task, indeed. Regions: East, Middle West, and West. Sectors: Agriculture; animals; mines; forests; manufactures; petroleum and natural gas; electric light and power; transportation and communication; trade, finance, and banking; other services; and households.

2 Moses (1960) is also remarkable in that it cites no other academic piece, although he does acknowledge the Harvard Economic Research Project and five research assistants.

# Newsletter

## International Input-Output Association (IIOA)

Number 24; November, 2013



In the parlance of present-day modelers, Leon developed the first spatial input-output model since transportation costs were endogenous to the modeling process. Although not nearly as important, it also intrigued the mind of a recent faculty hire at Walter Isard's newly formed Regional Science Department at the University of Pennsylvania, encouraging Ronald E. Miller (1963) to undertake only his second foray into the I-O world.<sup>3</sup>

But as Savage (2006) notes, Leon became perplexed by an inability to restructure input-output models so that they could be consistent with theory and empirical findings in the ever-burgeoning literature on location analysis. With this mindset he plunged headlong into location analysis. He henceforth took only rare glimpses over his shoulder at interindustry relationships, albeit with a furrowed brow.

Given the above perspectives, Savage (2006) suggests that Leon Moses was tolling I-O's death knell. But parents do not scold wayward children if they believe the children are incapable of turning things around. Hence, it is my contention that Leon was trying to stir us, his colleagues, into action—to take up the banner he once waved. He was right. For his needs, I-O had weaknesses. The broader set of I-O based models that includes computable general equilibrium and econometric models (as well as those conjoined with I-O tables) have been advancing to overcome some of the issues Leon noted. Indeed, even more can be done now with assistance from panels of input-output tables via WIOD and similar data sets. Moreover, algorithms capable of using and interpolating reams of data are at hand to enable an even more realistic rendition of his spatial general equilibrium model (Moses, 1960).

<sup>3</sup> Miller (1957) was the first.



[Michael Lahr](#)  
Rutgers University

That is, the same goes for transportation models in spatial price equilibrium. It is clear that Leon Moses was an I-O researcher ahead of his time.

### References

- Chenery, Hollis B., Paul G. Clark, and Vera Cao-Pinna. (1953) *The Structure and Growth of the Italian Economy*. U. S. Mutual Security Agency.
- Isard, Walter. (1951) "Interregional and Regional Input-Output Analysis: A Model of a Space-Economy," *Review of Economics and Statistics*, 33,
- Isard, Walter and Robert E. Kuenne. (1953) "The Impact of Steel upon the Greater New York-Philadelphia Industrial Region," *Review of Economics and Statistics*, 35, 289–301
- Isard, Walter and Leon N. Moses. (1950) "Frickey, Burns and Mitchell, and the Transport Building Cycle," *Review of Economics and Statistics*, 32, 347–351.
- Kuenne, Robert E. (1955) "An Appraisal to Location Theory, Input-Output, and Economic Development: A Rejoinder," *Review of Economics and Statistics*, 37, 312–314.
- Leontief, Wassily. (1953) "Interregional Theory," in Wassily Leontief and others (eds), *Studies in the Structure of the American Economy*, New York: Oxford University Press, pp. 93–115.
- Leontief, Wassily and Alan Strout. 1963. "Multi-regional Input-Output Analysis." In Tibor Barna, ed. *Structural Interdependence and Economic Development*. London, Macmillan, pp. 119–150.
- Miller, Ronald E. (1957) "The Impact of the Aluminum Industry on the Pacific Northwest: A Regional Input-Output Analysis," *Review of Economics and Statistics*, 39, 200–209.

\_\_\_\_\_. (1963) "Comments on the 'General Equilibrium' Model of Professor Moses," *Metroeconomica*, 15, 82–88.

Moses, Leon N. (1955a) "Location Theory, Input-Output, and Economic Development: An Appraisal," *Review of Economics and Statistics*, 37, 308–312.

\_\_\_\_\_. (1955b) "The Stability of Interregional Trading Patterns and Input-Output Analysis," *American Economic Review*, 45, 803–826

\_\_\_\_\_. (1960) "A General Equilibrium Model of Production, Interregional Trade, and Location of Industry," *Review of Economics and Statistics*, 42, 373–397.

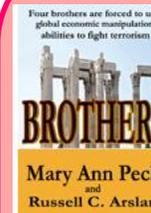
\_\_\_\_\_. (1974) "Outputs and Prices in Interindustry Models," *Papers, Regional Science Association*, 32, 1–18.

Polenske, Karen R. (1972–1973) *Multiregional Input-Output Analysis*. Three volumes. Lexington, MA: Lexington Books, D.C. Heath and Company.

Savage, Ian. (2006) "Biography of Leon N. Moses," in Ross B. Emmett (ed) *Biographical Dictionary of American Economists*, Vol. 2. London: Thoemmes Continuum, pp. 644–649.

[Northwestern University profile](#)  
[Chicago Tribune obituary](#)

### Brothers: a novel on I-O!



"Brothers" portrays today's world terrorism and economic problems. Harvard Economics Professor, Marko Fushier, in anguish after his mother and Ambassador father were abducted by Supremenistas and subsequently died used the I-O macroeconomic system to prove the

Velgrove brothers were using their companies in 251 countries to manipulate world economy. Marko threatens to expose them if they do not use their influence to stop terrorism.



## Fellows corner

**Jan OOSTERHAVEN (1945)**

### How was it that you started working on IOA?

Once upon a time, the University of Groningen formed a federation with the research and economic development institutes of the three Northern provinces (FNEI). I participated from the university and had to answer questions like: what are the income and employment impacts of a relocation of the headquarters of the Dutch, then state-owned telecom company, and of a 4,000 hectares large land reclamation plan. Both questions typically call for an IO approach, while the latter question got me into issue of how to use or better not use the supply-driven IO model, but to modify it such that it could be used properly. All that happened in the early 1970s, but at that time all results only ended up in Dutch language research reports and in the headlines of Dutch newspapers. It was not until the late 1980s that English language articles resulted.

**You have impeccable credentials (degrees, professorships, fellowships, etc.), but having degrees doesn't automatically prepare one to do great research work like you have done. How did you pick up your impressive reasoning skills? What sets you apart from other researchers? What's your secret?** Thank you for the compliment, but I don't know. Maybe it was because I had to explain complicated modelling issues to journalists and politicians at an early age, or maybe it was because I was quite active in several student clubs even earlier. I really don't know.

**What are from your point of view the hot topics that IOA could address and has not done yet (or too slightly)?** We should be much more aware of the



fundamental economic assumptions of the IO model in our applied research. And then I specifically think of infinite supply elasticities and zero demand elasticities, that is of horizontal supply curves and vertical demand curves.

**What other disciplines could enhance IOA the most?** What do you mean: other than economics, broadly defined, including business economics? Not much I would say, maybe geography and history, as many applied IO analyses strongly depend on time and place specifics, which we pay little attention too.

**What is your pet peeve with IOA-related published papers?** I needed [Wikipedia for "pet peeve"](#), and then the answer is the overdose of key sector articles that do not pay attention to the policy issue that they suggest to give an answer to, but consequently do not.

**Do you have other tips for doing great applied research work?** No, only listen more carefully to the questions asked, and then you will discover that the standard models with their standard answers often are not satisfactory, which may then set you on an innovative research path.



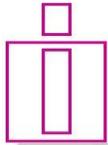
## Free Access to Data Base!

Individuals who contribute an I-O table for the GTAP Data Base will receive a FREE copy of the data base. By GDP and population size, the top countries not yet in GTAP are Algeria, Angola, D.R. Congo, Libya, Sudan, and Uzbekistan. Other IO tables in serious need of updating are Hong Kong and Zimbabwe. These countries will not be included in the GTAP 9 Data Base unless we receive more recent I-O tables. You can contribute a new country or it could be more recent data. [A list of all the countries in GTAP and their reference year.](#)

## Job openings

Research Professor and Director  
Senior Research Economist

[Further information](#)



#### Thijs ten RAA (1952)

##### How was that you started working on IOA?

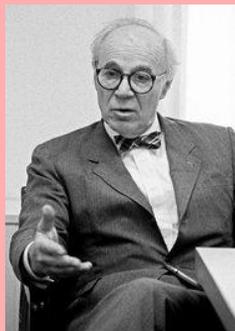
When I started the graduate program in mathematics at NYU (we were eight students), I took input-output analysis as a minor. At some point Wassily Leontief presented a proposition which I distrusted and I quickly constructed a counterexample. I raised my hand and he let me ask. I said that I did not understand his proposition and would like to see an example. Leontief was a theorist, not used to go down to examples, and shrugged. So I said, why don't you take this example? He wrote it on the blackboard, applied his proposition and then, slowly, turned around and looked at me with enemy eyes. He said: "OK, pathological cases, like your examples, must be excluded." After class he told me I had to come to his office. There he offered me a research assistantship. I had to work on the minerals project. The Arabs had boycotted the USA for its support of Israel in the Yom Kippur war and the Americans wanted to know if their economy was vulnerable to nonfuel mineral boycotts as well. We had to construct detailed nonfuel mineral input coefficients. I used the Bureau of Economic Analysis methodology and found it sensitive with respect to the units of measurement. I suggested an alternative, but later realized my method was flawed for other reasons. I decided to investigate the problem more systematically. Wassily was supportive and urged me to analyze Canadian data. "They are much better" he said.

**You have impeccable credentials (degrees, professorships, fellowships, etc.), but having degrees doesn't automatically prepare one to do great research work like you have done. How did you pick up your impressive reasoning skills? What sets you apart from other researchers? What's your secret?**



I try to make a clear distinction between what I want to explain (the endogenous variables) and what I consider to be given (the exogenous variables). For the latter I usually take the structure of an economy or a system of economies: its technology, endowments, and the consumption coefficients. Then I always take a fresh look at the problem. Referees complain that I do not review the literature, I plead guilty and include their suggestions. I also get ideas when refereeing other papers, particularly flawed ones.

#### L.R. Klein passed away



Professor Lawrence R. Klein passed away on Sunday, October 20<sup>th</sup>, at the age of 93.

He won the Nobel prize in 1980 and his contributions have also been important for the development of input-output. He delivered a keynote address at the international input-output conference in Montreal in 2002 and his speech was published in 2003 in *Economic Systems Research*. [More](#)

#### What are from your point of view the hot topics that IOA could address and has not done yet (or too slightly)?

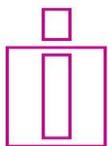
A weakness of many input-output studies is the presumption of fixed trade coefficients. Hot topics, however, are the access of third world economies to Western markets and international respecialization that would reduce global emissions. These raise the question how trade shares vary. Another hot topic is the business cycle. Andras Bródy has published a book on this, just before his death, which I have reviewed in *Economic Systems Research*. It is a fountain of ideas, but Andras has applied them only to US input-output tables, which are more than half a century old.

#### What other disciplines could enhance IOA the most?

There may be two-way reinforcements. Input-output can be used to analyze systems with feedbacks. For example, in biometrics the importance of a journal is determined by the citations it transmits to receiving journals. I find it reasonable to weigh these citations by the importance of the receiving journal, that cites. The journal indices thus become the eigenvector of the cross table of citations between journals, precisely as outputs are determined in the closed input-output model. If you divide science in subbranches (such as engineering and social sciences), you get the open input-output model for each of them. Conversely, input-output analysis could benefit from statistics. Modern computers and data base management allow us to preserve the micro input-output data without consolidating them in aggregated tables.

**What is your pet peeve with IOA-related published papers?** IOA is a tool. It should not determine your research agenda.

**Do you have other tips for doing great applied research work?** Interact with economists who use no IOA. Attend seminars.



## Newsletter

# International Input-Output Association (IIOA)

Number 24; November, 2013

### A look to the past ...



Picture taken (by Gerhard Gehrig) at Leontief's 80<sup>th</sup> birthday party given at the 1986 Sapporo Conference. It shows Leontief and most of the first Council members of the newly founded IO Association. In the first row from left: Emilio Fontela (Spain), Jiri Skolka (Austria), Kimio Uno (Japan), Jochen Schumann (Germany), Andras Brody (Hungary), Jinkichi Tsukui (Japan), Valerij Makarow (UdSSR), unknown organiser of the Sapporo Conference. In the second row: Ambica Ghosh (India), Anne Carter (USA), Wassily Leontief (with Japanese birthday decoration on his head), Ana Gelai (UNIDO).

### Upcoming conferences



The biannual conference of the [ISEE](#) will be hosted by the University of Iceland August 13 - 15 2014. As economic, social and environmental systems worldwide face increasing pressures and the call for an alternative economic approach becomes louder, we aim to provide a welcoming environment for critical conversations on the role and ability of Ecological Economics to provide paths and tools towards effective alternative solutions for the future - towards Wellbeing and Equity within Planetary Boundaries.

To achieve this aim the conference will concentrate on three overarching themes that all relate closely to the focal idea of the conference: Planetary boundaries and resource constraints, Equity and economic development dynamics, A great transition ahead? For each theme a number of sub-themes have been identified in addition to an open category. We invite abstract submissions for oral and poster presentations linked to the identified sub-themes. In addition we invite session proposal submissions that relate to the conference overall theme.

Paper and poster abstract submissions as well as proposals for sessions open on September 20<sup>th</sup>.  
**Deadline for abstracts: November 15<sup>th</sup> 2013.**

Newsletter Editor:

**Antonio F. Amores** [newsletter@iioa.org](mailto:newsletter@iioa.org)

*Institute for Prospective Technological Studies  
European Commission's Joint Research Centre*