Tales from the I-O world

Input-Output Tables in ESA 2010 experience from the Czech Republic

New international standard SNA2008 and its European modification ESA2010 bring new view on economy. Development in economy should be taken into account in order to provide suitable and reliable data on economy. Globalisation of international trade and separation of physical movements of goods and monetary flows cause that traditional concept of import and export is not sufficient. New concept of Research and Development (R&D) significantly changes view on R&D as the asset. It is clear that many economies are driven by Research and Development. Similarly military expenditure is classified as investment that provides services of defence.

Standard ESA2010 is legal act in European Union whose implementation is obligatory for all member states. Theoretically, it ensures very high level of comparability. All member states are supposed to publish data in ESA 2010 since 1st October 2014. In order to reduce burden of National Statistical Institutes (NSIs) Eurostat (Statistical Office of EU) requires data on IO tables for the year 2010 and onwards. Data for previous years can be provided on voluntary basis. Moreover, some countries will provide data later than on 31st December 2014 which is the deadline for data transmission of IOTs. On

the other hand users of IOTs tables will not be satisfied. They can use data for very short time period that does not enable any analysis of technological changes. IOTs in ESA1995 and IOTs in ESA2010 are not definitely comparable. It is not only question of level of GDP and its components, but also input coefficients are significantly affected. It means that input-output analysis leads to different results under the same assumptions.

The Czech Statistical Office (CZSO) has decided to provide as much data as possible. It was decided to revise whole time series: sector accounts since 1993, supply and use tables since 1990. The revision started in 2012 and lasted about two years. During this very demanding period new methods and procedures were developed in order to transform data from ESA1995 to ESA 2010. Next reservations and recommendations of European Commission were implemented to national accounts, e.g., taxes on registration of cars. Moreover CZSO took opportunity to incorporate improvements based on its initiative, e.g. to update intermediate consumption related to self-supply and imputed rent. Consequently CZSO has applied for no derogation and provided all data.

At the beginning data in ESA 1995 were transformed to ESA2010 simultaneously in sector accounts and in IOTs tables. This transformation - theoretically - does not cause balancing difference between supply and use side. Than all other improvements were added in order to obtain data before balancing in supply and use tables. Adjustments had to be allocated to appropriate commodities. Product structure selected adjustments as processing, re-export or R&D is clear. On the other hand there is no data on commodity structure of intermediates related to non-observed economy or other adjustments therefore previous structure (data

in ESA1995) was used.

As some adjustments had impact on commodity balances supply and use tables had to be balanced. Supply and use tables were prepared for period 1990–2013 at current prices and previous years' prices (with exception of the year 1990). Revision has a minor impact (usually less than 0.3 p.p.) on
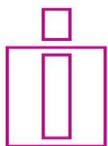
deflator because of changes in product structure and new methods of deflation. Processing service is now deflated by PPI (previously deflated by price indices of foreign trade). A special method of deflation of retail trade has been developed which is based on separated deflation of purchases and sales in the territorial breakdown.

Symmetric input-output tables (product by product as well as industry by industry) were compiled. Symmetric tables are derived from supply and use tables. SIOTs are available for 1990, 1995, 2000, 2005 and 2010. Hopefully published data satisfy users' needs and provide time series in the same methodology framework.

CZSO offers annual sector accounts, balance sheets for the period 1990/1993 to 2013. It makes possible to analyze development of economy from different point of view. Revision was finished by publishing IOTs and regional accounts on 31 December 2014.

Petr Musil
Czech Statistical Office

A look into the past ...

The 25th Anniversary of

R | E | A | L
THE UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Like any network of researchers specializing in a

field of academic research, the global I-O community has always had a few "centers-of-gravity" (CoG). These are schools or departments that have had a large impact on the field, by training bunches of PhD students, by publishing lots of high-quality research articles, by "selling" heaps of applied work to external parties and/or by supporting conference organizations by paying registration fees for dozens of attendees. The Regional Economics Applications Laboratory (REAL) in Urbana-Champaign has been such a CoG for the field of I-O analysis. In 1989, REAL was founded by Geoff Hewings and the late Philip Israilevich, as a joint effort of the Federal Reserve Bank of Chicago and the University of Illinois. Its 25th anniversary was celebrated in early November, on the day preceding the 61st North-American Regional Science Conference in Bethesda. A series of presentations was followed by a festive, informal dinner.

The presentations made clear that REAL has always offered much more than a home for I-O. Its "eternal" director Geoff Hewings (who is also a Fellow of the IIOA) has ensured that I-O analysis has been integrated with many other types of techniques to study regional phenomena. Merging insights from (spatial) econometrics and CGE analysis with more traditional I-O methods has led to lots of cutting-edge work. Interestingly, more and more studies following this approach are conducted outside the Urbana-Champaign city limits. Although the "REAL Mafia" is still headquartered in Illinois, it now has lots of subsidiaries, in countries as distant from the US as Brazil, Portugal, Spain, Japan, Indonesia, Chili, Mexico, Austria and Colombia. The program as compiled by Sandy Dall'erba and many co-organizers stressed this: many of the presentations started with some funny stories (for example about IIOA Council

Geoffrey Hewings and Adrianna

member Joaquim Guilhoto, who was REAL's first PhD graduate), after which the current impact of the Mafia members in setting up foreign activities in the tradition set by REAL were highlighted. These overviews clearly showed that there is a bright future for policy-relevant research using the mix of I-O techniques and other analytical methods as pioneered by Geoff and his many, many colleagues and students.

The meeting was attended by more than one hundred Mafiosi and members of related gangs. Those newsletter readers who know some of these people will not be surprised by the fact that the atmosphere at the meeting and the subsequent dinner was better than one could wish for. Many funny pictures of

colleagues in their younger days were shown, the Brazilian delegation had avoided U.S. import restrictions bringing their own cookies-to-share and many delegates came up with funny jokes


Joaquim, Carlos and Jiemin

about the performance which recently invited the biggest fan of the club (who happens to be the founder of REAL) for a cup of tea. Some members of the REAL Mafia had a hard time the next morning when the NARSC conference started, Cardiff City FC, the wealthy Malaysian owner of which should definitely be seen as a sign of the success of REAL. Hopefully, REAL and its subsidiaries will remain CoG for the I-O field for many years to come!

Esteban Fernández-Vázquez (University of Oviedo)
Oliver Fritz (WIFO, Vienna)
Bart Los (University of Groningen)

Pictures courtesy of Dana L. Jung photography and Esteban López (the last one)

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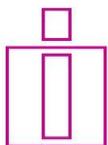
Published papers and books in IOA and related methods

Latest articles in ESR

Economic Systems Research

Journal of the IIOA

Latest articles (as of 31st January 2015)

LABOUR DEMAND IN GERMANY BY INDUSTRIAL SECTOR, OCCUPATIONAL FIELD AND QUALIFICATION UNTIL 2025 – MODEL CALCULATIONS USING THE IAB/INFORGE MODEL. TOBIAS MAIER, ANKE MÖNNIG and GERD ZIKA

By means of a trend extrapolation of microcensus structures (undertaken by the German Federal Statistical Office) for the time period 1996-2007, the projections for labour demand by industrial sector which the IAB already has at its disposal can be transferred to demand by occupational field and subsequently by qualification level until 2025. The findings which have been claimed for some time now are upheld: production-related occupations will lose in significance, while further increases in employment particularly in occupations in the service sector are to be expected. Accordingly, the demand for personnel with a degree from a university or a university of applied sciences will go on rising, while the labour market opportunities for unskilled workers will continue to fall. However, vocational training or its academic counterparts still remain the dominant form of training in Germany. A

continuing employment trend is to be expected here.

THE LABOUR FOOTPRINT: A FRAMEWORK TO ASSESS LABOUR IN A COMPLEX ECONOMY. JORGE GÓMEZ-PAREDES, EIJI YAMASUE, HIDEYUKI OKUMURA and KEIICHI NISHIHARA

As addressing labour becomes crucial in the move towards sustainability, there is the need for assessment tools suitable for current complex economic systems. This article presents an input-output based framework ("labour footprint") for evaluating labour issues behind the production of different economic commodities, including entire supply chains. In line with the guidelines of the International Labour Organization, six labour issues are considered: collective bargaining, forced labour, child labour, gender inequality, hazardous work, and social security. This conceptual article sets to (a) define this footprint's labour dimensions, (b) cite relevant data sources, (c) describe its calculation, (d) illustrate its application through a case study, and (e) discuss this framework's relevance from "conscious consumption", "supply chain responsibility", and regulators' standpoints. Since it advances the evaluation of fundamental labour issues and the scope of multi-criteria analyses, this footprint may be a valuable tool for sustainability assessments.

COMPLEMENTARITY IN INPUT–OUTPUT ANALYSIS AND STOCHASTICS. THIJS TEN RAA and VICTORIA SHESTALOVA

The complementarity between the quantity and value systems of input-output analysis is shown to be the

basis of the complementarity problem approach to computable general equilibrium. The numerical superiority of the latter to the linear programming approach facilitates stochastic analysis of input-output scenarios. For the example where Kyoto targets are underachieved to uncertain degrees, confidence intervals are derived for the associated consumption reductions.

WHITHER PANAMA? CONSTRUCTING A CONSISTENT AND BALANCED WORLD SUT SYSTEM INCLUDING INTERNATIONAL TRADE AND TRANSPORT MARGINS. Gerhard Streicher and Robert Stehrer

This paper extends work done within the World Input-Output Database project (WIOD), which compiled supply and use tables (SUTs) for 40 countries, covering about 85% of the world economy, by adding SUTs for the "rest of the world" (RoW), the approximately 15% of the world economy not covered by the 40 countries included in the WIOD database, ensuring a consistent and balanced world SUT system. The term "consistency" means that at the world level, all flows of goods and services balance, properly accounting for trade and transport services used in international trade (the "cif-fob difference"). This results in SUTs for the RoW which, together with bilateral trade matrices for all commodities (and together with the 40 national SUTs from the WIOD project), describe a consistent SUT system at the world level.

THE EXTENDED ECONOMETRIC INPUT–OUTPUT MODEL WITH HETEROGENEOUS HOUSEHOLD DEMAND SYSTEM. KIJIN KIM, KURT KRATENA and GEOFFREY J.D. HEWINGS

This paper proposes an extension to the regional econometric input-output model (REIM) [Conway, R.S. (1990) The Washington Projection and Simulation Model: A Regional Interindustry Econometric Model. International Regional Science Review 13:141-165; Israilevich, P.R., G.J.D. Hewings, M. Sonis and G.R. Schindler (1997) Forecasting Structural Change with a Regional Econometric Input-Output Model. Journal of Regional Science 37:565-590]. We integrate a demand system with age and income parameters into the REIM. The extended model thus addresses concerns about the effects of household heterogeneity. The initial testing is conducted with a model for the Chicago metropolitan area. First, using aggregate expenditure data by income and age groups, the almost ideal demand system with group fixed effects is constructed. Next, the estimated demand system is linked to the REIM to reflect long-term changes in the age and income distribution of households. The long-range simulation from the extended model takes into account structural changes in expenditure type stemming from changing demographic composition. The extended model further broadens the scope of impact analysis under various scenarios associated with age and income changes.

DEVELOPING A MULTI-SCALE MULTI-REGION INPUT–OUTPUT MODEL. CHRIS BACHMANN, MATTHEW J. ROORDA and CHRIS KENNEDY

Many efforts have recently been devoted to developing global multi-region input-output (GMRIO) models. Unfortunately, the scales of GMRIO models do not allow them to capture the heterogeneity of regions within a single country. Multi-scale models can provide more comprehensive analyses capable of capturing the interdependencies of the global economy while preserving regional differences. The primary objective of this research is to develop methods for integrating multi-region input-output data sets from multiple spatial scales into multi-scale multi-region input-output (MSMRIO) models. These methods result in models that may have unusual features such as non-square trade coefficient matrices and a mix of industry-by-industry and commodity-by-commodity technical coefficients. To demonstrate the feasibility of MSMRIO modelling, a Canada-centric model was developed. This model includes 47 countries and Canada's 13 subnational regions. A MSMRIO model provides a tool to analyse global issues with a more spatially detailed focus.

REGIONAL AND SECTORAL DISAGGREGATION OF MULTI-REGIONAL INPUT–OUTPUT TABLES – A FLEXIBLE ALGORITHM. LEONIE WENZ, SVEN NORMAN WILLNER, ALEXANDER RADEBACH, ROBERT BIERKANDT, JAN CHRISTOPH STECKEL and ANDERS LEVERMANN

A common shortcoming of available multi-regional input-output (MRIO) data sets is their lack of regional and sectoral detail required for many research questions (e.g. in the field of disaster impact analysis). We present a simple algorithm to refine MRIO tables regionally and/or sectorally. By the use of proxy data, each MRIO flow in question is disaggregated into the corresponding sub-flows. This downscaling procedure is complemented by an adjustment rule ensuring that the sub-flows match the superordinate flow in sum. The approximation improves along several iteration steps. The algorithm unfolds its strength through the flexible combination of multiple, possibly incomplete proxy data sources. It is also flexible in a sense that any target sector and region resolution can be chosen. As an exemplary case we apply the algorithm to a regional and sectoral refinement of the Eora MRIO database.

ECONOMIC IMPLICATIONS OF POLICY RESTRICTIONS ON WATER WITHDRAWALS FROM SURFACE AND UNDERGROUND SOURCES. CARLOS LÓPEZ-MORALES and FAYE DUCHIN

The appropriation of water for economic activities is limited by regional surface and underground endowments, and symptoms of environmentally unsustainable withdrawals are already visible in many regions of the world. In this paper we investigate the economic implications of water policy imposing source- and region-specific restrictions on water withdrawals taking the Mexican economy as a case study. We use an inter-regional input-output model of Mexico's hydro-economic regions to allocate production subject to the availability of water and other factors of production. Water sustainability requires a reduction of 7.5 km^3/yr of groundwater withdrawals, which is compensated by an increase of 3.4 km^3/yr of surface water, an expansion onto an additional 1.4 million hectares of rainfed land, and modifications in subnational patterns of food trade. This framework for evaluating scenarios describing sustainability-oriented water policies is readily applicable to other regions.

ON THE ECONOMIC INTERPRETATION OF THE BRÓDY CONJECTURE. HENRYK GURGUL and TOMASZ WÓJTOWICZ

The aim of the paper is to study the economic aspects of the Bródy conjecture: an increase in the size of a (random) input matrix causes a

decline in the ratio of its subdominant and dominant eigenvalues and implies faster convergence to equilibrium [Bródy, A. (1997) The Second Eigenvalue of the Leontief Matrix. Economic Systems Research 9:253-258]. Simulation results provide evidence that this ratio depends inversely on the level of data aggregation and can therefore not be a good indicator of the speed of convergence of an economy to its equilibrium path. We show that this is consistent with findings based on actual input-output tables of EU member states. These results imply that theorems about the speed of convergence of random matrices are not useful in describing the cyclical dynamics of real economies.

Highlights in journals

TEMURSHOEV, U. and OOSTERHAVEN, J. (2014) ANALYTICAL AND EMPIRICAL COMPARISON OF POLICY-RELEVANT KEY SECTOR MEASURES, *SPATIAL ECONOMIC ANALYSIS* 9/3:284-308

We consider the 10 most salient key sector measures (linkages) and identify groups of the most similar indicators on both analytical and empirical grounds. We derive new closed-form formulas for the generalized complete and partial hypothetical extraction linkages and add the up-till-now-undefined forward counterpart of the net backward linkage. The analytical relations and some stylized facts enable us to formulate hypotheses about the direction and strength of the relationships between various linkages. To study policy-relevant measures, our empirical tests are based on income (GDP) linkages, CO2 emission linkages and employment linkages for 34 industries and 33 countries. The data show that the information on the 10 key sector measures may be summarized by three to at most four measures.

ZAFRILLA, J.E., CADARSO, M.A., MONSALVE, F. and DE LA RÚA, C. (2014) HOW CARBON-FRIENDLY IS NUCLEAR ENERGY? A HYBRID MRIO-LCA MODEL OF A SPANISH FACILITY. *ENVIRON. SCI. TECHNOL.* 48 (24):14103–14111

Spain faces the challenge of 80–95% greenhouse gas emissions reduction by 2050 (European Energy Roadmap). As a possible first step to fulfill this objective, this paper presents a two-level analysis. First, we estimate the carbon footprint of a hypothetical nuclear facility in Spain. Using a hybrid multiregional input-output model, to avoid truncation while diminishing sector aggregation problems and to improve environmental leakages estimations, we calculate the CO2 equivalent emissions associated with the different phases of the nuclear life-cycle—construction, fuel processing and operation and maintenance—taking into account the countries or regions where the emissions have been generated. Our results estimate a nuclear carbon footprint of 21.30 gCO_2e/kWh, of which 89% comes from regions outside Spain. In some regions, the highest impacts are mostly direct (92%, 95%, and 92% of total carbon emissions in the U.S., France, and UK, respectively), meaning that these emissions are linked to the inputs directly required for nuclear energy production; in other regions, indirect emissions are higher (83% in China), which becomes relevant for policy measures. Second, through the analyses of different scenarios, we unravel and quantify how different assumptions that are often taken in the literature result in different carbon emissions.

WIEDMANN, T., SCHANDL, H. and MORAN, D. (2014) THE FOOTPRINT OF USING METALS: NEW METRICS OF CONSUMPTION AND PRODUCTIVITY. ENVIRONMENTAL *ECONOMICS AND POLICY STUDIES*:1-20.

Metal use and modern society are intrinsically linked and it is no surprise that global processes of industrialization and urbanization have led to ever increasing amounts of metal use. In recent decades, global supply and demand networks for metals have become increasingly complex. Industrial Ecology research is well placed to unpack this complexity and to explore potential resource efficiencies for metals. This is especially important during the current period of rising ore prices. We examine patterns of supply and demand for iron ore and bauxite, and recent trends in resource productivity of these two important metal ores. We introduce a consumption perspective and compare the material footprint of metal ores to the GDP of countries to look at how much economic benefit countries achieve per unit of metal footprint. We find that for the past two decades global amounts of iron ore and bauxite extractions have risen faster than global GDP, that both supply and demand of iron ore and bauxite have been concentrated in a handful of countries and that resource productivity from a consumption perspective has fallen in developed nations, as well as globally. The research shows no saturation of metal ore consumption at any level of income. Policies will be required to enhance both the productivity of metal production and the economic productivity of consumption (GDP per metal footprint) through more efficient mining, product design, reuse and recycling.

GILJUM, S., BRUCKNER, M. and MARTINEZ, A. (2014) MATERIAL FOOTPRINT ASSESSMENT IN A GLOBAL INPUT-OUTPUT FRAMEWORK. *JOURNAL OF INDUSTRIAL ECOLOGY*.

Material flow-based indicators play an important role in measuring green and resource-efficient growth. This article examines the global flows of materials and the amounts of materials directly and indirectly necessary to satisfy domestic final demand in different countries world-wide. We calculate the indicator Raw Material Consumption (RMC), also referred to as material footprint (MF), by applying a global, multiregional input-output model based on
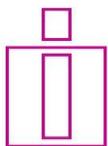
the Global Trade Analysis Project (GTAP) database and extended by material extraction data. We examine world-wide patterns of material extraction and materials embodied in trade and consumption, investigating changes between 1997 and 2007. We find that flows of materials related to international trade have increased by almost 60% between 1997 and 2007. We show that the differences in MFs per capita are huge, ranging from up to 100 tonnes in the rich, oil-exporting countries to values as low as 1.5 to 2.0 tonnes in some developing countries. We also quantify the differences between the indicators Domestic Material Consumption (DMC) and RMC, illustrating that net material exporters generally have a DMC larger than RMC, whereas the reverse is observed for net importers. Finally, we confirm the fact that most countries with stable or declining DMCs actually show increasing RMCs, indicating the occurrence of leakage effects, which are not fully captured by DMC. This challenges the world-wide use of DMC as a headline indicator for national material consumption and calls for the consideration of upstream material requirements of international trade flows.

OOSTERHAVEN, J. (2015) TOO MANY JOURNALS? TOWARDS A THEORY OF REPEATED REJECTIONS AND ULTIMATE ACCEPTANCE, *SCIENTOMETRICS*

Under a set of reasonable assumptions, it is shown that all manuscripts submitted to any journal will ultimately be published, either by the first journal or by one of the following journals to which a manuscript is resubmitted. This suggests that low quality manuscripts may also be published, which further suggests that there may be too many journals.

KOKS, E.E., BOCKARJOVA, M., MOEL, H. DE and AERTS, J.C.J.H. (2014) INTEGRATED DIRECT AND INDIRECT FLOOD RISK MODELING: DEVELOPMENT AND SENSITIVITY ANALYSIS. *RISK ANALYSIS*.

In this article, we propose an integrated direct and indirect flood risk model for small- and large-scale flood events, allowing for dynamic modeling of total economic losses from a flood event to a full economic recovery. A novel approach is taken that translates direct losses of both capital and labor into production losses using the Cobb-Douglas production function, aiming at improved consistency in loss accounting. The recovery of the economy is modeled using a hybrid input-output model and applied to the port region of Rotterdam, using six different flood events (1/10 up to 1/10,000). This procedure allows gaining a better insight regarding the consequences of both high- and low-probability floods. The results show that in terms of expected annual damage, direct losses remain more substantial relative to the indirect losses (approximately 50% larger), but for low-probability events the indirect losses outweigh the direct losses. Furthermore, we explored parameter uncertainty using a global sensitivity analysis, and varied critical assumptions in the modeling framework related to, among others, flood duration and labor recovery, using a scenario approach. Our findings have two important implications for disaster modelers and practitioners. First, high-probability events are qualitatively different from low-probability events in terms of the scale of damages and full recovery period.

Teaching materials

Environmentally Extended Input-Output Analysis

ALPEN-ADRIA UNIVERSITÄT KLAGENFURT | WIEN GRAZ

Second, there are substantial differences in parameter influence between high-probability and low-probability flood modeling. These findings suggest that a detailed approach is required when assessing the flood risk for a specific region.

YÜCER, A., GUILHOTO, J and SIROËN, JM. (2014) INTERNAL AND INTERNATIONAL VERTICAL SPECIALIZATION OF BRAZILIAN STATES– AN INPUT-OUTPUT ANALYSIS. *REVUE D'ECONOMIE POLITIQUE* 124(4):597-610

WTO, OECD with many others, suggest the trade in value-added would be a "better" measure than gross value to understand the impact of trade on employment, growth, production etc. We use in this work an Input-Output table for 2008, to calculate the value-added exported by Brazilian states. We distinguish the value-added exported directly by the state itself or indirectly via other states. Then, we define the extent of vertical specialization among Brazilian states by using value-added indirectly exported. We calculate equally the import content in states' exports. If the share of import content in Brazilian exports is low, we show evidence that inter-state trade is quite high across some Brazilian states. Inter-state vertical specialization then operates at upstream stages of the value chain before the good be exported to foreign countries. However the value-added of a state; indirectly exported by another state is quite balanced by the value-added of its own exports which is imported from other states, then the export shares of each state in total Brazilian exports in value-added terms or in gross terms are close.

MURADOV, K. (2014) ACCOUNTING OF VALUE ADDED IN INTERNATIONAL TRADE. HIGHER SCHOOL OF ECONOMICS ECONOMIC JOURNAL 18(4):645-680

Gross exports accounting is a novel sub-area of research that seeks to allocate the value added in gross trade flows to its true country and sector of origin and country or sector of destination. Various frameworks have been recently proposed to perform such decompositions. This paper presents another effort to generalise the accounting framework so that it may be easily interpreted, customised and implemented in matrix computation software. The principal contribution is therefore a relatively simple way to derive the formulae for the decomposition of cumulative value added flows embodied in international trade. The underlying accounting approach is found to be largely similar to that of [Koopman et al., 2012; Stehrer, 2013], but the block matrix formulation allows the user to simultaneously decompose all bilateral flows at the country and/or sectoral level. The refined framework is applied to describe Russia's export performance from the global value chain perspective using the data from the WIOD for 2000 and 2010. According to the findings, the countries that directly receive most of Russia's exports are not exactly those that use most of Russia's value added. Russia's mining sector is found to be an intrinsic part of a complex downstream value chain where it indirectly contributes value to partner exports.

Highlights in Books

GHG EMISSIONS AND ECONOMIC GROWTH: A Computable General Equilibrium Model Based Analysis for India. Barun Deb Pal, Vijay P. Ojha, Sanjib Pohit and Joyashree Roy. Springer India.
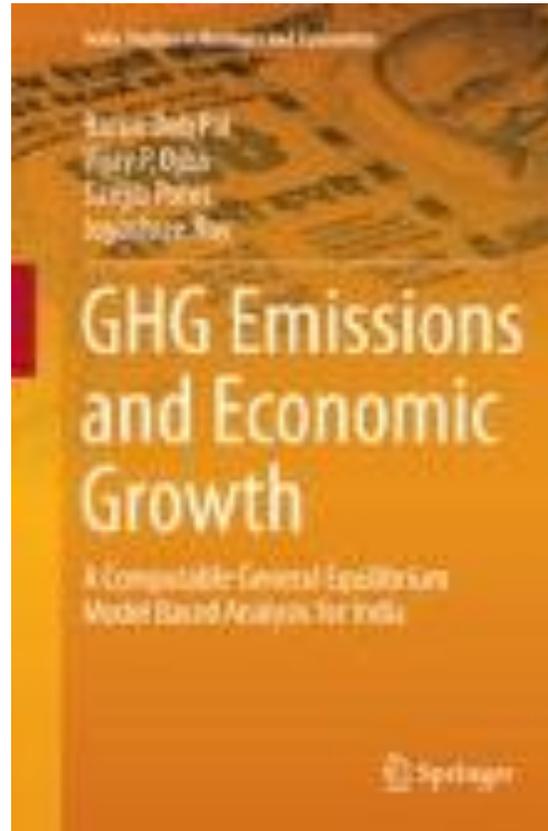

Fellows corner

Erik Dietzenbacher

1. How was it that you started working on I-O? Are there people or events that have been influential in your career?

As a master student in Mathematical Economics, I did a course on input-output analysis in 1980. We did the book by Jochen Schumann, written in German. Some of my fellow students were not very enthusiastic about this book (because they felt it lacked applications) but I loved it. The book is very thorough and discusses all the mathematical details. I had one major problem with I-O though and that was the assumption that today's production requires inputs that are also produced today. In other words, production takes no time. I felt this was a very strong assumption that was not questioned, and I started working on a model using the other extreme assumption. That is, today's inputs are used for generating tomorrow's final demands. The teacher of the I-O course suggested that I would talk to the specialist in our department: Bert Steenge. This was 1981 and the starting point of a long friendship. Yes, Bert has been very influential in my career. He supervised my masters and my PhD theses, but I think he was much more important in showing me the joy of doing research—working hard, but also having lots of fun at conferences. I think it is fair to say that I-O was my first love.
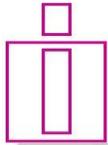
2. You have impeccable credentials but having degrees doesn't automatically prepare one to do great research work like you have done. How did you pick up your reasoning skills? What sets you apart from other researchers? What's your secret?

I am not sure young kids should read this. As mentioned above, I was in Mathematical Economics, and my PhD thesis is almost 300 pages of theorem-proof, theorem-proof, etc. Sometimes I had the theorem and the proof, but didn't know what question it answered. So then I had to look for the problem that my theorem could solve. Times were very different then (we are talking about the late 1980s, early 1990s). If a paper contained sufficient math it was considered sophisticated and got published. Of course, I am exaggerating a little. But it is true that today people are (rightfully) more critical towards the uncritical use of math. My suggestion to young researchers is to start with the question (not with the answer). Another "skill" is that I tend to be very critical towards the papers I read (I never believe what I read – I need to be convinced – and always think I can do better). This has advantages (every paper I read generates three ideas for further research) but also disadvantages (I am not the world's greatest reader).

3. What place would input-output analysis occupy in the history of economic thought? How would you relate input-output to different (and sometimes competing) schools of thought (classical/Keynesian/neoclassical)?

I do not see IO as a school of economic thought.

In my view, it is rather a tool, a technique, an approach. If it is to be compared with something, I would compare it with econometrics, simulation techniques, convex (or any other type of) programming. Unlike these other techniques (or tools), I-O has not seen too many recent developments though. I think structural decomposition analysis was the last one.

4. From your point of view, what are the hot topics that IOA could address and has not yet done so (or as yet touched on too lightly)? What other disciplines could enhance IOA the most?

Consumption-based emission accounting and global value chains are still hot topics and similar calculations have been applied to many other cases as well (like biodiversity threats). They have led to very important insights, sketching a picture that is much more accurate than ever before. Now, however, the next question is: what are we going to do with this new knowledge? Describing and measuring the situation is great, but what's next? How can we use the consumption-based approaches in designing policies to reduce GHG emissions or increase a country's GDP? Firms buy their inputs where they are cheapest, which means that we are dealing with gross trade and this is also where typically policies take place. Can a consumption-based or GVC approach change this?

5. What do you think the most important recent developments in the field have been? What do you think will be the most exciting and productive areas of research in IOA during the next few years?

Data and more data are my answers to the two questions. In the last ten years, much progress has been made due to the construction of global MRIO tables. I expect that this will continue and

generate exciting results in unexpected areas. I think that researchers will start linking all sorts of wild data sets (the number of coughs and sneezes by workers in an industry) to world I-O tables. Some of this linking will make little sense (or rest on absurd assumptions), some will. It is our community's task to be open-minded but also critical. Another consequence of all the data handling (and sometimes also manipulating) is that we need to know the limits of what can be established "with certainty." This calls for sensitivity analyses and, one step further, Monte Carlo type of analyses.

6. How do you conceive the interaction between prices and quantities in an input-output system?

There is no interaction. The advantage of this dichotomy is that it creates a model that is incredibly simple and yet able "to do a good job" in many cases. The disadvantage is that prices and quantities do interact in a number of other cases. For example, issues on taxation often aim at changing behavior, implying that the price-quantity interaction is a crucial element. In those cases we simply should not use an I-O model – neither the quantity version nor the price version – but think of using an alternative. For example, a CGE model or an Inforum-type of econometric I-O model. Now, for most economists substitution and elasticities reflect behavior and are almost sacred. For me, however, if I gain more from adding a lot of industry-country detail than I lose from sacrificing sacral substitution, I know what choice to make.

European Commission searches post doc researchers

The most important innovation of the **call** is the possibility for candidates to enrol and update their CV continuously while abiding to a rigorous selection process. This will allow greater flexibility and JRC scientific services will have the possibility to access a constantly updated database. Shortlisted candidates will be invited at JRC sites for interview and a computer-based competency test provided remotely by **EPSO**.
This Joint Research Centre system, being the result of a close collaboration both internally and with **DG Human Resources** and **EPSO**, is the first solution of the kind ever implemented by the European Commission.

7. Your best work is...?

Always my next paper. Looking back, however, a paper that is very special for me is "In vindication of the Ghosh model" published in 1997 in the *Journal of Regional Science*. Not so much the paper itself, but the way that paper was "born." Of course, I knew the work by Jan Oosterhaven published in 1987 and very much agreed with him. He made a very strong case in showing that the (then) common supply-driven interpretation of Ghosh's 1958 model was implausible. At the same time, with the stubbornness alluded to above, I had the feeling we were all missing something and that there had to be an explanation. One evening in my office (in those days I always went back to office from 9 to 11 PM after the children were in bed) I was playing with numbers in a 2x2 I-O model. I don't know what I was trying to do, but at a certain stage I calculated a price change. I multiplied the answer with the given quantities to arrive at the changes in output values. And there it was: the outcome with the Ghosh model. Eureka! Shivers down my spine, in a split second all the pieces of a 40-year old puzzle fell into place. It was like magic. Something you only read in books or see in movies and you think it is a lousy book or movie because these things never happen in real life.

8. You obviously have a very successful research career. How do you feel now about the pressure to publish? Has your view changed over the years?

Times have changed. When I started working, some of my colleagues (like Bert Steenge)
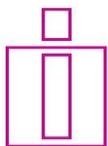
were publishing in international journals. They were considered oddballs by the older generation and if there was any pressure it was their own personal drive. After a few years, however, the situation changed when two professors started publishing an annual Top-40 economists in the Netherlands, which is based on the weighted number of publications in the last five years in top field journals in economics. This meant a change in the attitude of researchers and made them focus on international publications. I think we went pretty far. Our requirements for a PhD thesis are that it contain 3-4 papers of publishable quality, and many students already have 1-2 publications. Yes, it is a tremendous pressure and some students suffer. The same applies to our staff in tenure-track positions. In recent years, we slowly see a change from quantity to quality. Rather one paper in a true top journal than five papers in journals that are just good. I think it is an improvement for readers, less and better papers. But it doesn't make things easier for young researchers. Putting all your time and effort in a single paper is like putting all your money on a single horse. Good luck!

Ongoing Multinational Research Projects
GVC and productive complementarity in South America

The purpose of the study is to investigate South America's demand for intermediate goods with regional supply and to promote productive complementary among South American countries for goods. Thus, it was necessary to build a regional IOT for each country, trade tables between South America countries and to calculate vertical specialization, backward and forward linkages and "upstreamness" indicators. As part of this study a single-region 40x40 IOT (considering ten countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela). The partners in the consortium are: IPEA (Institute for Applied Economic Research), ECLAC (economic Commission for Latin America), CAF (Development Bank of Latin American), OECD, and ABDI (Brazilian Agency for Manufacturing Development).The next issue of the newsletter will include more news.

Events

Southern Regional Science Association Annual Meeting. March 25th-26th 2015, Mobile, AL (USA)

Individual papers and sessions are welcome. Proposals of sessions to: Santiago Pinto. Deadline abstracts submission **Feb 12, 2015.**

Workshop on Assessment methodologies: energy, mobility and other real world applications. June 19th 2015, Coimbra (Portugal)
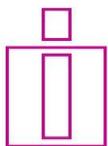
WAM 2015

This workshop has as main objective to bring together researchers working in the broad area of project appraisal and impact assessment methodologies, contributing to both theoretical and methodological advances. Participants are encouraged to submit their contributions on areas of assessment methodologies including, but not limited to, Input-output analysis, Environmental and social impact assessment and Life cycle assessment.

Deadlines:
Abstract+paper submissions: **Feb 15, 2015**
Early registration deadline: **May 29, 2015**

IELab Conference June 11th-12th 2015, Manly, Sydney (Australia)

The 1st Conference of the Industrial Ecology Virtual Laboratory (IELab) will be held on June 11th-12th 2015 at Harbord Diggers, Manly, Sydney. The I-O community is cordially invited to participate in this milestone event of the IELab project. The registration (already open) includes conference materials and the conference dinner in the historic former St. Patrick's Seminary (now site of the International College of Management, Sydney).

The IELab provides the most comprehensive, environmentally extended I-O database available for use in Australia. The goal of the conference is to share information about the exciting IELab research platform, demonstrate projects using IELab, discuss new collaboration and projects ideas, provide hands-on training and guidance in using the IELab analytical toolbox, and network with researchers, practitioners, analysts and experts of Industrial Ecology.

VI Spanish Conference on Input-Output Analysis, September 7th-9th 2015, Barcelona (ES)

The VI Spanish Conference on Input-Output Analysis and the 1st edition of the Spanish School of I-O Analysis will be held of September 7th–9th 2015 in Barcelona. The Hispanic-American Input-Output Society (SHAIO), the University of Barcelona (UB), the Autonomous University of Barcelona (UAB), and the Statistical Office of Catalunya (IDESCAT) are working together to organize this conference that will take place at the Faculty of Economics and Business (UB).

The 1st edition of the Spanish School of Input-Output Analysis (SSIOA) will be on the September 7th 2015. The SSIOA will offer three modules of teaching sessions (in Spanish) on core topics of interest in input-output analysis.

The conference sessions will take place on the 8th and September 9th 2015. These two days aim to promote and stimulate the exchange of ideas among all participants with interest in input-output analysis and related methods. The sessions will seek a strong collaboration between researchers, statisticians and policy makers. The official languages of the conference sessions will be Spanish and English. You can submit papers in any of these two languages.

We specially encourage the participation of young (under 40) researchers by applying their papers to the IV Emilio Fontela Research Prize for the best conference paper.

We are joining forces to make the conference and your stay in Barcelona fruitful and successful. Looking to seeing you in Barcelona !!!

Submission of abstracts:	**May 10, 2015**
Notification of acceptance:	**May 31, 2015**
Early registration ends:	**July 20, 2015**
Submission of full papers:	**July 20, 2015**
Reduced Registration ends:	**July 24, 2015**
Regular Registration ends:	**Aug 31, 2015**

23rd International Input-Output Conference. June 22nd-26th 2015, Mexico City (Mexico)

The International Input-Output Association (IIOA), the Faculty of Economics at the Universidad Nacional Autónoma de México (UNAM), and the Instituto Nacional de Estadística y Geografía (INEGI) join forces to request your attendance at the 23rd International Input-Output Conference. The conference promotes and stimulates worldwide exchange of ideas among economists, government officials, policy makers, engineers, statisticians, and managers with interests in interindustry analysis.

Submission of abstracts:	**March 2, 2015**
Special session proposals:	**March 13, 2015**
Registration opens:	**February 16, 2015**
Notification of acceptance:	**March 13, 2015**
Submission Leontief Mem. Prize:	**March 13, 2015**
Travel grants application:	**March 13, 2015**
Early registration ends:	**April 17, 2015**
Submission of full papers:	**April 17, 2015**
Online registration ends:	**June 8, 2015**
International School of I-O:	**June 22, 2015**