22nd IIOA Conference in LISBON

BOOK OF ABSTRACTS
AND LIST OF AUTHORS

13/Jul/2014 - 18/Jul/2014

International Input-Output Association
Vienna, AUSTRIA
www.iioa.org

Scientific Program Committee:

Chair: Kurt Kratena
Austrian Institute of Economic Research (WIFO)
Ana Sargento (School of Technology and Management - Polytechnic Institute of Leiria, Portugal)
Andreas Loeschel (Center for European Economic Research, University of Heidelberg, Germany)
Bart Los (Faculty of Economics, University of Groningen, Netherlands)
Eduardo Castro (Department of Social Sciences, Politics and Territory - University of Aveiro, Portugal)
Elsa Vaz (School of Social Sciences - University of Évora, Portugal)
Erik Dietzenbacher (Faculty of Economics, University of Groningen, Netherlands)
Esteban Fernández Vázquez (Faculty of Economics, University of Oviedo, Spain)
Gerhard Streicher (Austrian Institute of Economic Research, Austria)
Ignazio Mongelli (EC-Institute for Prospective and Technological Studies, Spain)
João Albino (Faculty of Economics - University of Algarve, Portugal)
João Ferreira do Amaral (UECE - ISEG - University of Lisboa, Portugal)
João Rodrigues (IST - University of Lisboa, Portugal)
Joaquim Guilhoto (Department of Economics, University of São Paulo, Brasil)
Jose M. Rueda Cantuche (EC-Institute for Prospective and Technological Studies, Spain)
Mário Fortuna (Department of Economics - University of Açores, Portugal)
Michael L. Lahr (Edward J. Bloustein School, Rutgers University, USA)
Pedro Ramos (GEMF, Faculty of Economics - University of Coimbra, Portugal)
Robert Stehrer (Vienna Institute for International Economic Studies, Austria)
Rosa Duarte (Faculty of Economic, University of Zaragoza, Spain)
Umed Temurshoev (EC-Institute for Prospective and Technological Studies, Spain)
Local Organizing Committee:

UECE - ISEG, University of Lisboa, Portugal
Chairs:
Susana Santos
João Carlos Lopes
João Ferreira do Amaral

Table of Contents

Impact assessment of green investment on environmental sectors in Japan using input-output analysis

Topic: Environmental Input-Output Analysis
Author: Ambiyah Abdullah
Co-Authors: Xin Zhou

Abstract

Title: Impact assessments of green investment on environmental sectors in Japan using input-output analysis

By Ambiyah Abdullah, Xin Zhou
Green Economy Area, Institute for Global Environmental Strategies (IGES), Hayama, Japan

In June 2010, the Japanese government announced the “New Growth Strategy” for the purpose of achieving a strong economy and social security system, robust public finances, and a 20% reduction in national GHG emissions by 2020 through the creation of additional demand and employment in four priority areas: green innovation, life innovation, Asian economy and tourism. Green innovation, as one of four priority areas, is targeted to create demand over 50 trillion JPY in new environmental market, about 1.4 million new environmental jobs, and 1.3 billion tons of CO2 emission reduction. In order to spread green innovation, the Japanese government is currently focusing their main policies on green investment and technological innovation through several supported policies such as green carbon tax, green gift, feed-in tariff on renewable energy and others. As a result, the amount of the Japanese government’s budget on environmental sectors (green investment) in year 2012 has reached 1.5 billion JPY (Ministry of Environment of Japan, 2013). Most of the previous studies in this area focused either only on a single sector (e.g. renewable energy) or on a specific impact assessment (e.g. job creation). However, it is necessary to assess the comprehensive impacts of green investment (socio and economic impacts) on all environmental sectors related to the green innovation in Japan. To complement the previous studies, this study will estimate the socio-economic impacts of green investment on all of environmental sectors within the scope of the green innovation area using input- output analysis. The main research questions of this study are as follows. First, “What are the job, income and economic impacts of an additional green investment on all environmental sectors in Japan” Second, “Which sectors and economic agents within the economic structure of Japan will get the larger benefits from the additional green investment on environmental sectors” Third, “Which sectors among all of environmental sectors will give larger benefits for socio and economics in Japan” This study utilizes the Japanese government’s classification of environmental sectors (EGSS) and maps it with the sector classifications in the 2005 Japanese input-output table. The multiplier effects (income, job, value added and output multipliers) and structural path analysis will be calculated in this study to answer the three mentioned questions. The results of this study will have important implications for better and more efficient green investment policy design in Japan.

Foreign Aid and the Environment: A Critical Analysis using MRIO

Topic: Input-Output Analysis for Policy Making
Author: Adolf Acquaye

Abstract
While classical economist would argue for an increase in trade between nations because production and consumption drives the creation of wealth and economic development; ecological economist are concerned with preserving ecosystem services and the earth's natural capital which is placed under pressure because of economic activities and drivers such as trade, production and consumption. As a result, a creative conflict and tension is created between the economic and environmental sustainability principles. Other studies also posit that trade flow which is driven by production and consumption trends create an imbalance in the ecological exchange between two countries and/or regions. Understanding the implications of these is therefore very important in formulating effective policy measures. This is particularly so in developing economies where foreign aid from developed nations are used as a policy instrument to support development and economic activities such as production.

Using multi-regional input-output (MRIO) analysis, the linkage between environmental impacts of production and consumption patterns as a result of trade and foreign aid between the UK and the countries in the African region are assessed. It is envisaged that the analysis would shed light into the discourse of foreign aid and the environment since there is a noticeable gap in research on how aid flows are linked to the environment in developing economies. A review of extant literature suggests that there is a strong body of evidence of the effects of foreign aid on poverty reduction, social justice, economic growth, human capital accumulation. The paper therefore attempts to use the theoretical constructs of MRIO analysis to inform policy discussions by extending the knowledge base in critically understanding the casual linkages between foreign aid and environment particularly in developing economies.

Keywords: Environmental Impacts, Foreign Aid, MRIO, Production, Consumption

Construction of the Trade Data for the GTAP Data Base

Topic: Supply, Use and IO Tables: Different approaches to reconcile world trade asymmetries (I)
Author: Angel Aguiar
Co-Authors: Mark Gehlhar, Robert Andrew McDougall, Badri G Narayanan

Construction of the Trade Data for the GTAP Data Base*
*Paper for the Organized Session on Different Approaches to Reconcile World Trade Asymmetries

By
Mark Ghelhar, Robert McDougall, Badri Narayanan, and Angel Aguiar

In the GTAP Data Base, countries are connected through bilateral trade. The construction of the trade data for the GTAP Data Base brings together trade statistics for merchandise and services trade data from different sources. The main source for bilateral trade data is the United Nations COMTRADE data. However this covers only merchandise trade (trade in goods not services, but including electricity). Accordingly, we need another data source for services. In GTAP 8, we use UN service trade data and EUROSTAT's international trade in services (Narayanan, et al., 2012).

In the GTAP model, an accounting identity exists whereby the value of imports at cif prices minus the value of transportation services equals the value of exports of exports at fob prices. For a given bilateral transaction, the reported import value can be substantially less than, or several times greater than the reported export value. Thus, reported trade statistics in their "raw" form are not suitable for the GTAP data base.

Furthermore, the reliability of trade data affects credibility of model results. The fact that large discrepancies exist in the reported trade statistics suggests that there is some degree of uncertainty attached to the trade structure. Uncertainty associated with any component of the initial base data is troubling given that it is a permanent fixture in the GTAP model. Then the question becomes, how to minimize these trade asymmetries?

Starting in GTAP version 7, the reconciliation procedure used in previous versions of the GTAP Data Base (Gehlhar, 1996) was enhanced by adding an optimization procedure to obtain more accurate trade results for China and Hong Kong. The Gehlhar method to reconcile bilateral merchandise trade data for the GTAP Data Base Trade reconciliation is a decision to accept or reject reported trade flows or a decision to compromise by adjusting data using a weighting scheme.

However, the largest discrepancies in bilateral trade are the result of re-export activity. A large part of China's trade passes through Hong Kong, which earns substantial revenue from the difference between import and re-export prices. We account for this revenue as an export of trade services from Hong Kong to the countries of destination of the merchandise. In GTAP 8, we also account for re-exports for the Netherlands.

The GTAP Data Base also contains data on international trade margins, that is, the services used or costs incurred in moving goods from point of export to point of import. Margin services are considered exports of the country that supplies the service, and imports of the country that receives the merchandise to which they are applied to. Accordingly, they are included in the services trade statistics.

Another special case is travelers' expenditures. The services trade statistics treat travelers' expenditures as a distinct commodity, but in the GTAP data structure, they are counted as trade in the goods and services actually purchased. Purchases in one country by residents of another country are considered exports from the first country to the second. This includes tourism, but also such things as expenditures incurred in short-term employment overseas.

The result of this construction process is a reconciled trade data set that can be used for economic analysis in a general equilibrium type of model.

References
1)Gehlhar, M.J., 1996, Reconciling Bilateral Trade data for Use in GTAP, GTAP Technical Paper No. 10
Narayanan, G., Badri, Angel Aguiar and Robert McDougall, Eds. 2012. Global Trade, Assistance, and Production: The GTAP 8 Data Base, Center for Global Trade Analysis, Purdue University

2)Wang Z, M. Gehlhar, and S. Yao. "A Globally Consistent Framework for Reliability-Based Trade Statistics Reconciliation in the Presence of an Entrepot," China Economic Review, 21 (2010), 161–189.

Organisation for Economic Co-operation and Development

Topic: (Panel Session) European Statistics for Competitiveness in a Globally Competitive World: what is the role of Input-Output Statistics?
Author: Nadim Ahmad

European Statistics for Competitiveness in a Globally Competitive World: what is the role of Input-Output Statistics?

The Impact of Final Demand and Technology Shocks on the French Input-output Network

Topic: Input-Output and the Network Theory
Author: Martha Gabriela Alatriste Contreras

We investigate the diffusion mechanisms of shocks on final demand and technology creating avalanches in the French economy. The economy is represented by the input-output network, which is constructed using the table of intermediate demands. To model the spreading of shocks in the input-output network we apply three diffusion models. The first model considers the spread of a shock on final demand based on the Input-output model. The second is an adaptation of a network diffusion model to study the impact of changes in the technological relationships between sectors by decreasing the flow of inputs, where the capability of a sector to spread a shock is determined by the size of the shock with respect to the size of the sector and the connectivity of the sector. The third model is an extension of the second, were we introduce an additional step: after a sector gets hit by a shock, the flow of inputs decreases and each sector updates its production level to these new conditions. Results of the first model show that the effect of a shock on final demand translates into homogeneous and large avalanche sizes. On the other hand, the second and third models show more heterogeneous but predominantly large avalanche sizes. The sectors that triggered the largest avalanches applying the network diffusion models have high global centrality in the network.

Stochastic Input-Output Analysis and Extensions: A Case Study of the United States

Topic: Impact Analysis: Multipliers
Author: Jalal Ali
Co-Authors: Joost Reyes Santos

The input-output (I-O) model's capability to provide macroeconomic policy insights on interdependent economic systems has recently been extended in the field of quantitative risk analysis. As with any quantitative models, estimates of input data and associated parameters are inevitably prone to some kind of error or bias. The same statement can be said about the susceptibility of the I-O technical coefficients to imprecision originating from various sources of uncertainty. Hence, this paper provides a methodology based on stochastic I-O analysis to address these issues and subsequently measure the uncertainty when using the I-O model. The research uses the supply and use tables from the US Bureau of Economic Analysis for a period of 14 years (1998-2011) to estimate the probability distributions of the technical coefficients. The coefficients are assumed to follow the Dirichlet distribution, and their moments are evaluated by using a Monte-Carlos Simulation of 10,000 iterations. The simulation methodology is implemented in MATLAB and the results are used to generate key sector analysis. Probability distributions can be

established to measure the backward and forward linkages for each economic sector. In addition, we used the eigenvalue method to determine the key sectors based on their contribution to the economy and to assess the sensitivity of the sectors to economic disruptions. In sum, this research develops a stochastic model based on historical I-O data and the results are envisioned to contribute positively to strategic economic planning and macroeconomic risk analysis.

Analysing Effects of International Trade on Global Income and Employment

Topic: International Trade
Author: Ali Alsamawi
Co-Authors: Manfred Lenzen, Joy Murray

Analysing Effects of International Trade on Global Income and Employment
Industries rely on people to produce their goods yet the social dimensions of innovation and efficiency, in themselves cornerstones of industrial ecology, are little understood (McBain, in press). By extending previous studies, such as those dealing with carbon, biodiversity, water, and ecological footprints, to include social responsibility – in this case we construct employment and income footprint accounts – we are bringing to businesses new ways of understanding 'impacts, performance management, system design and innovation' (Lenzen, in press; McBain, in press). The field of social footprinting provides quantitative, consistent and rigorous methods for calculation of the third pillar of the Triple Bottom Line (TBL). As a part of the Triple Bottom Line, the rationale for reporting on such indicators (employment and income) quite naturally falls within the corporate/national social responsibility ambit.
Using a new Multi-Regional Input-Output (MRIO) database (Lenzen et al. 2013; Lenzen et al. 2012), our study allows us to group the world's nations into what we are calling 'master' countries that enjoy a lifestyle supported by others and 'servant' countries that support the lifestyle of 'masters'. To this end, we calculate global employment footprints – these include a country's domestic employment and that recruited along the supply chains of, and hence embodied in, its imported goods and services. Employment footprints can be compared with the domestic workforce to reveal either: how many workers a population needs, in addition to its own workforce, to satisfy its consumption through imports; or how many workers in a domestic workforce work for the sake of producing exports, in addition to satisfying the population's own consumption. The former are net importers of employment, while the latter are net exporters. Continuing our metaphor, the population of the former countries occupy the role of 'masters' for whom foreign 'servants' work, while the population of the latter are servants to the masters. In addition we determine the income footprints of nations, which include a country's domestic wages and those paid along the supply chains of, and hence embodied in, its imported goods and services. In combination with the employment footprint we determine the average wages of the servants of master countries. This work allows us to divide the world into 'master' nations and 'servant' nations – in Adam Smith's terms the 'imposers' and the 'imposed upon'.

Our results allow us to group the world's nations into 'masters' that enjoy a lifestyle supported by workers in other countries, and 'servants' that support the lifestyle of 'master' countries. We show that in 2010 employment footprints of all countries differed substantially from their own workforce footprints. Hong Kong, Singapore, the United Arab Emirates and Switzerland occupy the top-ranking positions of 'master' countries, while many African and Asian countries are 'servants'. Our findings show that the commodities that are 'servant-intensive', such as electronics, agricultural products and chemicals, tend to have complex supply chains often originating in third world countries. The quantification of these master-servant relationships and the exposing of implicated supply chains could be of benefit to those concerned with Corporate Social Responsibility and committed to fairer

trading or those developing policy around fair globalisation.

Lenzen, M. (in press). An outlook into a possible future of footprint research. Journal of Industrial Ecology.
Lenzen, M., D. Moran, K. Kanemoto, and A. Geschke. 2013. Building Eora: A global multi-region input-output database at high country and sector resolution. Economic Systems Research 25(1): 20-49.
Lenzen, M., K. Kanemoto, D. Moran, and A. Geschke. 2012. Mapping the structure of the world economy. Environmental Science & Technology 46(15): 8374–8381, http://dx.doi.org/8310.1021/es300171x .
McBain, D. (in press). Comment on the Role of Social Footprinting in Industrial Ecology. Journal of Industrial Ecology.

The analytical complementarity of input- and output-driven models: theory and practice

Topic: Methodological aspects of input-output analysis IV
Author: Aleix Altimiras-Martin

Input-driven (Ghosh) and output-driven (Leontief) models are algebraically equivalent; however, their use has not been interpreted as equivalent.
Leontief models determine the total requirements of the economy to produce specific final goods and Ghosh models have been interpreted as the economic response to using certain primary inputs.

This paper aims to clarify the “equivalence” between both models, specifically by revising the interpretation and use of input-driven models, and to show that both models can be simultaneously used to better understand the structural features of the economy.

In the theoretical part, first, the concepts of “multiple-related outputs IOT” and “multiple-related inputs IOT” are developed. They are fundamental to use output-driven models when different types of final outputs coexist (e.g. as in Physical Input-Output Tables) and to use input-driven models when different types of primary inputs coexist (as in traditional Monetary Input-Output Tables with several primary inputs rows). Second, the concepts of “product-based” and “input-based” structures are introduced to show how the same algebraic structure (i.e. the corresponding Leontief or Ghosh inverse matrices) may be used to answer different questions. In particular, the output-driven model reveals what primary inputs are required to produce a specific final output, and the input-driven uncovers in which final goods each primary input ends up.

In the practical part, the previous concepts are applied to a MIOT. It is shown that, despite being equivalent, both models reveal different structural features, as mentioned above, thus enabling different types of analyses.

The paper concludes that when a system is driven by its outputs (as an economy), only output-driven models can “drive” the system into a new state; however, within a given state, input-driven models can be used to provide complementary analyses. Thus, this paper crystallises the use of the Ghosh model, expanding the analytical options of IOA and clarifying previous work.

Taxing Diamonds to Reduce Unemployment in Namibia: Would it Work?

Topic: CGE and Econometric Input-Output Analysis
Author: Maria Teresa Alvarez-Martinez

In this paper we evaluate the effects of raising tax rates on extractive industries (e.g., diamond and uranium mining) on employment rates for skilled and unskilled labor in Namibia. Using a Social Accounting Matrix for Namibia in 2000 kindly provided by Lange (2004), we built a Computable General Equilibrium (CGE) model that accounts for two types of labor and six types of households based on income level. We analyse several scenarios where tax rates on mining activities are increased in order to subsidize other industries to examine resultant effects on employment, GDP and household welfare. The preliminary results show that the mining sector has a significant impact on the whole economy and the negative effects of raising tax rates for these industries exceeds any positive employment-related effects of subsidizing other industries, even among the poorest households.

Assessment of Fiscal Incentive to Support the Development of Renewable Energy in Indonesia

Topic: CGE and Econometric Input-Output Modeling
Author: Hidayat Amir
Co-Authors: Anda Nugroho, Verina Januati Wargadalam

Energy demand continues to increase rapidly along with the Indonesian strong economic growth. The energy demand grew by an average of 7 % per year during the period of 2000 - 2010. In 2010, 96% of the national energy mix is coming from fossil fuels which depends heavily on import. This creates a trade deficit problem as a complimentary of the energy deficit problem for the country. On the other hand, Indonesia has a great potential of domestic renewable energy resources such as biofuel, geothermal, and biomass. However, renewable energy only represents 4% of today’s energy use. The Government Regulation No. 5/2006 set a target to utilize renewable resources by 17% on the energy mix in 2025. In addition, many efforts have been done to pro¬mote renewable energy such as developing new energy policy and giving fiscal incentives, but still did not give much result. In the literature, so far there is only limited study that assess the government’s fiscal incentive supporting the development of renewable energy in Indonesia.
This study develops a Computable General Equilibrium (CGE) model of Indonesia equipped with fiscal and energy features to assess specific government’s fiscal incentive for the development of renewable energy in Indonesia, particularly biofuels. We extend the existing model of INDOFISCAL that already has capability on evaluating a range of fiscal incentive such as exemptions from or reductions in import duties, income taxes and VAT. The extention focuses to improve the model to have capability to address energy specific issues, such as inter-energy substitution. The assessment of the specific fiscal incentive would lead the government to be more effective and efficient in management of energy resources.

Estimation of balanced PYP supply and use tables: the European experience

Topic: Supply, Use and IO Tables: Previous Year Prices
Author: Antonio F. Amores
Co-Authors: Sanjiv Mahajan, Marisa Asensio Pardo, Elena Márquez Ordóñez, Cesar Martin Nuñez, José Manuel Rueda-Cantuche, Isabelle Rémond-Tiedrez

The Eurostat Handbook on Prices and Volumes classifies deflators in different groups according to their suitability for each type of category household final consumption expenditure, gross fixed capital formation, government output, etc.). However, applying different sets of deflators to each part of a set of Supply and Use Tables (SUTs) does not ensure that the system remains balanced after deflation or that deflation is on a consistent basis conceptually.

This paper presents a different but consistent and transparent approach to deflating SUTs that retains a balanced system at every step, ensuring consistency and furthermore, generating a pure double deflation of Gross Value Added.

Firstly, a series of steps are undertaken to transforms the SUTs at purchasers' prices into producers' (not basic) prices. Then, domestic supply and uses of domestically produced products (intermediate and final) are deflated row-wise by appropriate producer price indices while imports are deflated by import price indices. In both cases, this ensures that the current price values and the indices are on a consistent valuation basis, i.e. producers' prices. Finally, SUTs in previous years' prices (PYPs) valued at purchasers' prices can be obtained by applying the rates in the previous year current price SUTs applied to the tables at that stage in volume terms at producers' prices to estimate the trade and transport margins and taxes and subsidies on products. After the whole process is complete, a set of quality checks and reconciliation of various components using direct deflation (e.g. household final consumption expenditure at purchasers' prices using consumer price indices) is undertaken. Any subsequent adjustments would then be implemented in a balanced manner.

The above approach is under discussion in Eurostat in order to estimate consolidated EU SUTs in PYPs at basic prices.

Methodology to estimate European matrices of VAT, other taxes and subsidies on products

Topic: Supply, Use and IO Tables: Methodology and Comparability
Author: Antonio F. Amores
Co-Authors: Marisa Asensio Pardo, Elena Márquez Ordóñez, Cesar Martin Nuñez, José Manuel Rueda-Cantuche

To simulate different tax schemes is a very relevant topic for some of the economic modellers that provide support to EU policy makers. For such purpose, the Joint Research Centre of the European Commission estimated detailed tables of taxes less subsidies on products with: non-deductible Value Added Tax, other taxes on products (such as alcohol/tobacco excise duties, import duties, …) and other subsidies on products, separately. The estimation is initially made for each layer separately by means of actual tax rates and exemptions determined by the corresponding tax regulations, which are ultimately benchmarked with the total official figures published by National Statistical Institutions. Moreover, the overall sum of estimated taxes less subsidies on products must also be consistent with the SUT framework and the (sometimes revised) official figures from National Accounts. This approach has been applied to all Member States of the EU for one single

year 2007 as a test case. The comparison of our results with the full set of official tables available for Austria and Belgium will also provide insightful information on the relative reliability of the final estimates.

Productivity and economic structure in under-development

Topic: Methodological aspects of input-output analysis III
Author: FIDEL AROCHE
Co-Authors: Marco Antonio Marquez

Following the Input-Output (IO) methodology, on the supply side, gross output equals intermediate consumption (IC) plus value added (VA), which means that if one of those grows as a proportion of output, the other diminishes. Hence, if intermediate consumption grows, output per unit of factor decreases as well. In a neoclassical interpretation of the IO model, factors' productivity is a result of the use of each of those factors per unit of output and if VA is given, increasing labour productivity implies decreasing capital's -if the economy is moving on the production possibilities frontier. In terms of the composition of economic structures, when CI is higher than VA, in general one can expect that sectors are highly interrelated: the structure is more complex. Higher factors productivity comes along with more complex economic structures. This paper explores those relationships for a Brazil, Korea and Russia using OECD STAN database.

MODELLING ECONOMIC STRUCTURES FROM A QUALITATIVE INPUT-OUTPUT PERSPECTIVE: GREECE IN 2005 AND 2010

Topic: Input-Output and the Network Theory
Author: FIDEL AROCHE
Co-Authors: Ana Salomé García Muñiz

The Input-Output model has made extensive use of methods originally developed in graph and network theory in order to carry out structural analysis. It is customary in the field to take a deterministic perspective. Yet the model has been extended to include stochastic experiments. This paper aims at modelling the connectivity in the Greek economic structure from a qualitative viewpoint for 2005 and 2010, dividing sectors by groups of differentiated technology intensity. The methodology adapts a model based on families of distributions that allow predicting and analysing network structures. Results produce interesting insights about the Greek economic structure, useful to understand some of the structural problems this economy has faced.

P-Graph Approach for the Optimal Allocation of Human Resources to Economic Sectors in Crisis Conditions

Topic: Input-Output Analysis of Desasters
Author: Kathleen Bernardo Aviso
Co-Authors: Christina de Joya Cayamanda, Anne Maybelle Ramores Danga, Michael Baliwag Promentilla, Joost Reyes Santos, Raymond Roca Tan, Krista Danielle Sy Yu

The impact of disasters manifests not only in the destruction of infrastructure and ecological resources but also in the form of human casualties. Economic losses resulting from disasters create ripple effects throughout the economy by virtue of the interdependencies between economic sectors

-- and human resources will play a vital role in rebuilding the economy. The need to attend to the victims of disasters for example will require a large supply of trained medical and healthcare service providers. Post-disaster rebuilding efforts on the other hand, need a good technical project workforce. However, since humans are not immune to the impact of disasters, inoperabilities within the workforce will also occur during crisis conditions. P-graph is a graph theoretic methodology for the synthesis of networks; current applications have been restricted to process engineering applications such as chemical reaction mechanisms, process plant design and supply chain optimization. In this work we propose an extension of the P-graph methodology for economic systems. The input-output structure of the economy is represented into a P-graph model for optimizing the allocation of human resources between economic sectors in consideration of worker skill and expertise. A case study using the input-output tables of the Philippines will be utilized to demonstrate the capabilities of the model.

Fuzzy Linear Programming Approach to Updating Input-Output Technical Coefficients

Topic: Methodological aspects of input-output analysis II
Author: Kathleen Bernardo Aviso
Co-Authors: Michael Baliwag Promentilla, Joost Reyes Santos, Raymond Roca Tan, Krista Danielle Sy Yu

Technical coefficient matrices in input-output (IO) models are empirical and thus inherently historical in nature. Numerous methods have been proposed to update these matrices to enable IO models to be more accurate in forecasting. In this work we propose a fuzzy linear programming approach to updating the technical coefficients of IO tables. This method determines the updated set of coefficients by finding the smallest deviation from the previous set of technical coefficients necessary to satisfy updated final demand and total output data. Trapezoidal fuzzy numbers are assumed to define the allowable bounds for updating the coefficients and max-min aggregation is utilized to identify the optimal set of coefficients. We demonstrate this methodology on two case studies. The first case study will utilize data from literature while the second case study uses the Philippine IO data.

Two aspects to the economic growth: a SUT based attribution method and net export method

Topic: Supply, Use and IO Tables: Global value chains, economic growth and environment
Author: Zlatina Balabanova
Co-Authors: Ilja Kristian Kavonius

The purpose of this paper is to compare the effects of the attribution method versus the net export method in measuring Gross Domestic Product (GDP) growth. The paper analyses the economic growth in the euro area countries using the two methods. The net export method assigns the growth contribution of the whole domestic demand to GDP. The attribution method allocates imports to the corresponding domestic demand components by using SIOT tables.

An Input-Output Model with Resource-Constrained Sectors: An Application to the Agri-Food Development Strategy in the Context of a Portuguese Bi-Regional Model

Topic: Input-Output Analysis for Policy Making
Author: Eduardo Barata
Co-Authors: Luís Cruz, Pedro Nogueira Ramos, Ana Lucia Marto Sargento

The Portuguese economy may be divided into two main regions (not coincident with the official NUTS II arrangement): the Interior and the Coast. The Interior region amounts to 11% of national GDP and remains very dependent on agricultural exports (mainly to the Coast). Accordingly, one very common policy proposal for the Interior economy is to add value to these products by transforming and delivering them elsewhere as agri-food transformed products. This argument is based on the idea that the agriculture sector production capacity in the Interior is limited, such that the products used in the new agri-food plants have that destination instead of being directly exported. This paper analyses the case where an agri-food expansion is admitted, but the farming products used in the new production are subtracted from the exogenous exports or from other sources of final demand. This study is based on a bi-regional Interior-Coast version of the MULTI2C input-output model, developed by a group of researchers, from the Coimbra University, Portugal. The local transformation of the agricultural products in the agri-food industry, instead of other untransformed uses, has (as predicted) a positive impact in regional GVA; but this impact is relatively small, less than the one that might arise if the agriculture itself could be expanded to match the additional demand. Furthermore, the impact of this kind of agri-food expansion is smaller than those that would result from other shocks on the demand for other products not constrained by resources availability. As a rule, the major local impacts in the Interior region derive from the increase on the demand for the so-called “non-traded” products, or other products with high income effects, namely because households’ income is in its turn largely employed in those “non-traded” products (e.g., personal services).

On linking country models through bilateral international trade flows: data and modelling equations

Topic:
Author: Rossella Bardazzi
Co-Authors: Leonardo Ghezzi

International models linking several economies through trade flows have been developing extensively in the past decades. Several major contemporary issues – such as climate change, trade agreements, international imbalances , transmission of shocks – are better investigated with a global perspective and this evidence has further stimulated the development of this field. Since their first stage of development in the 1970s much progress in data quality and availability as well as in computer capabilities has occurred. However, building and maintaining international multi-country models is still a daunting task.
After a brief survey of a selection of these models to compare their main characteristics and their potential in explaining and forecasting international phenomena, we focus on presenting a highly detailed database of bilateral trade flows specifically built for a bilateral trade model (BTM) which links multisectoral country models. This approach is applied to the INFORUM international system of models, which has been active for several decades and has always paid attention to modelling international trade. The main features of BTM are (i) a detailed disaggregation of commodity classification, (ii) the econometric estimation of import shares, and (iii) the linking system between

national models.
The high level of disaggregation in trade flows is particularly useful for fully capturing the complex interrelations between economies and to investigate issues of international competitiveness as well as for simulating the detailed aspects of trade policies which are often tailored to specific commodity categories. Trade shares are computed and used in many multi-country models. However, exogenous assumptions are dominant in modelling trade shares and trade flows, either with parameters assumed from existing literature or with exogenous hypotheses on shares behavior. In BTM trade shares are econometrically estimated as functions of a set of explanatory variables at the commodity level. Finally, the linking system of national models through BTM is a key feature to understand the transmission channels of shocks via international trade. The final result of this study will be the availability of a highly detailed updated dataset of bilateral trade flows (120 commodities) and trade shares. Moreover estimates of import shares equations will be presented as a tool for simulations and forecasts.

Disaggregation of Economic sub-sectors based on Optical Development in the Spanish Economy

Topic: Impact Analysis: Multipliers
Author: Margarita Barrera-Lozano
Co-Authors: Alfredo José Mainar Causapé, José Vallés Ferrer

In order to enable the development of Health Sectors in accordance to social needs, a more detailed sectorial analysis must be accomplished. Considering the differences existing among different disciplines in health and therefore, in the importance of certain highly specialized sub-sectors, three criteria have been considered: demand changes of households, technological change and economic interrelation. Ophthalmic Optical manufacturing and optician´s retail trade sub-sectors accomplish the three criteria.
Both of them are included in wider branches of the Spanish Input-Output frame and the following disaggregation is proposed: On the one hand: The division of “other manufacturing” into “manufacture of ophthalmic goods, eyeglasses, sunglasses, lenses ground to prescription, contact lenses and safety goggles” and “manufacture of other goods” and on the other hand “retail trade services” into “activities of Optician´s” and “other activities”, based on NACE Rev.2.
Disaggregation of these two sectors following Wolsky´s Method combined with the use of the data contained in Fuentes & Mainar Social Accounting Matrix (SAM) of Spain for 2008 represent the methodology used. As a result, the construction of the Accounting Multipliers Matrix will be accomplished and used for the assessment of the impact of exogenous-demand changes. The following three changes denote the importance of our research: (1) Aging of population, (2) increasing visual needs of the whole population and (3) the enormous development carried out in the field of Optics and its applications to Ophthalmic Optical goods. Furthermore, the assessment obtained will enable the design of policies and pertinent economic performance by the Authorities.

KEYWORDS: Social Accounting Matrix, Spanish Economy, Optics, Ophthalmic Optical Sector

TOPICS: 1. Development of Input-Output Benchmark Accounts and Statistics; 11. Computable General Equilibrium Modeling and Social Accounting Matrices; 31. Input-Output-based Policy Analysis

Income Effects of Cash Subsidy Payment, Social Accounting Matrix Approach: The Fixed Price Multiplier

Topic: Effects of Infrastructure Investments
Author: Fatemeh Bazzazan

The main aim of this study is to measure direct and indirect income effects of cash subsidies on producing activities, factors of production and institutions incomes with the focus on rural and urban households incomes. Assessment in the social accounting matrix model takes place via fixed price multiplier matrix in which the relationship between income injection and income distribution policies is given. Therefore, the 2006 Social Accounting Matrix (prepared by Majlis Research Center in 2012), Census of Population and Housing Census of Iran and subsidies for a fixed monthly payment are employed as main data resources. The results are shown that the effect of cash subsidy on total productions is approximately 1 percent per year, and on income of activities production, income of factors production, and income of institutional accounts are 0/672, 0/786, 2/17 percents respectively. The results also show that the income impact of this policy on rural households is more effective than urban households. Moreover, service, agricultural, home appliances, food and retail seller sectors have greatest influence of the policy in the activity production accounts.
Key words: social accounting matrix, accounting multiplier, constant price multiplier, Cash subsidies

Economic Impact of Climate change in Iran- SAM Approach

Topic: Impact Analysis: Multipliers
Author: Fatemeh Bazzazan

Economic Impact of Climate change in Iran- SAM Approach
Bazzazan F. and Khaleghi S.

Iran has a highly diverse climate and environment which is due to its unique geography and ecosystem. Iran is also heavily dependent on rain-fed agriculture, and its geographical location and topography in combination with low adaptive capacity entail a high vulnerability to adverse impacts of climate change. Such condition may increase mean temperatures and decrease rainfall in the region as a result cause agriculture production reduction. The main aim of this paper is to study the impact of such climate change on Iranian economy using SAM approach with output constrained. This study has three steps: first, output production function for agriculture sector in which one of its input is climate factor will be estimated. The second, by defining different scenarios for climate change until 2025 the production changes will be estimated. Third, a link between production changes in agriculture sector and other sectors and institutions are will be defined through SAM Model.

The Effects of Technological Change in Agriculture on Tropical Deforestation: An Economy-wide Analysis of Brazil

Topic: CGE and econometric input-output modeling II
Author: Maksud Bekchanov

Area expansion in soybean cultivation and beef cattle production are the primary causes of deforestation and land clearing in the Amazon and Savannah regions of Brazil. The environmental damage associated with this process is large and largely irrecoverable, but, as one of two remaining

agricultural frontier areas on the planet, the international community increasingly looks to the Amazon/Savannah as sources for meeting future food needs. To help manage this trade-off, policymakers often look to technological change, but what types of product- and perhaps region-specific technological change will likely be most effective in reducing the encroachment of agriculture into frontier areas while still helping to meet global food/feed/biofuel needs is not known. We develop an multi-regional Computable General Equilibrium (CGE) macroeconomic model to estimate the effects of alternative types (e.g., labor-saving versus land-saving) of product-specific technological change for four macro-regional in Brazil. The core of the CGE model is an agriculturally disaggregated and multi-regional Social Accounting Matrix, which links agriculture to other economic sectors within and across macro-regions. Preliminary results suggest that, if short-term capital and labor flows are constrained spatially and across production activities, a 25% increase in total factor productivity (TFP) in agricultural in the Amazon will have a muted response, e.g., output of sugarcane and soybeans will increase by approximately 0.6% and 0.5%, respectively. However, once labor, capital and other inputs are allowed to freely move spatially and across economic activities, responses within the Amazon to the same 25% increase in TRF are much more significant, e.g., coffee production increases by 163% and soybean production increases by 15.6%. Yet, owing to the competitive disadvantage of beef production vis-à-vis other agricultural alternatives, beef output is expected to decline by 28%. A 25% in TFP of all agricultural activities within the Amazon will increase the demand for cultivable land and hence deforestation by approximately 40% in the factor-mobility-constrained short-run and by approximately 130% in the factor-mobility-unconstrained long-run. TFP increases in regions outside of the Amazon region may reduce the demand for the deforested land in the Amazon, but factor mobility will also govern the extent to which and the location of effects. One key policy message is the need for focus on institutional and other impediments to the flows factors of production across all economic activities (not just across agricultural activities) and across macro-regions.

A Dynamic Input-Output Model for Small Regions: The Mexican Case.

Topic: Regional input-output modeling I
Author: Ari Beorlegui
Co-Authors: Alejandro Brugués, Noé Arón Fuentes

Recently, in Mexico, special attention has been paid to the empirical construction of regional input-output matrices. As a result of this, a wide variety of regional intersectoral matrices have been estimated (Fuentes, 2005; Armenta, 2007; Chapa, 2009; Cruz, 2008; 2005; Rosales, 2010; Fuentes, Brugués and Díaz, 2013). In all cases, the regional multisectoral model has been seen as an instrument, which provides a basis for economic programming and projection, but in no case has it been used in the construction of dynamic simulation models. This text aims to develop a regional multisectoral and intertemporal model, and perform an empirical application of the same to a system of dynamic simulation (Stella/IThink).

The analysis of the dynamic regional multisectoral model is approached from an analytical approach and a systemic approach. The analytical approach consists of studying in great detail the various algebraic relations of this model. This approach can be very fruitful, but has a disadvantage consisting of the detailed knowledge of the model that can lead to the solution only with great effort. The systemic approach, meanwhile, allows the analysis of the system from a global perspective, reproducing its behavior through the interconnected operation of various partial relations that make up the model, and thus, study the evolution in time of the included variables for a predefined period, it shall be that where the validity of the assumptions used in the construction of the model is maintained. Thus, the combined analysis allows considering the algebraic detail and the

reproduction of the behavior of the dynamic regional intersectoral model.

Key words: Input-Output, Regional Development and Dynamic Simulation.

Effects of household consumption patterns on employment: Evidence from Spain during the economic crisis

Topic: Structural change and dynamics II
Author: Fernando Bermejo
Co-Authors: Eladio Febrero

The aim of this paper is to evaluate the impact of household spending on the Spanish labour market during the Great Recession. After a decade of prosperity, we are caught in a downward spiral, in which lower household consumption raises unemployment rates and the risk of becoming unemployed hinders consumption.
The present paper proposes an analysis based on the Input-Output framework to evaluate the effects on employment of the changes in the consumption pattern imposed by the recession. On this basis, using expenditure data on goods and services provided by the Household Budget Survey of the National Statistics Institute of Spain and Input-Output methodology, we first measure the labour directly and indirectly linked to the consumption demands of the most representative types of households. In this regard, we make use of a standard classification by household earnings as well as a distribution based on the professional activity of the household reference person. Next, we develop a structural decomposition analysis (SDA) to identify the driving forces of changes in employment which cause the variation of the expenditure pattern of the households previously defined. This paper is intended as an empirical exercise to shed some light on the ongoing debate that nowadays is taking place in Spain about unemployment and the recent labour market reforms.

Impact of carbon based unilateral trade measures on exports from developing countries: A case study of India

Topic: Environmental input-output modeling IX
Author: SOUVIK BHATTACHARJYA
Co-Authors: Saswata Chaudhury

At a time when countries are struggling to arrive at a consensus in fighting climate change, countries and primarily developed, are planning to move unilaterally and adopt strategies to curb local and global GHG emissions. Developed countries perceive that if developing countries do not commit on emission cuts in a post 2012 global climate policy regime, emissions intensive production units in developed countries may relocate to the developing nations (carbon leakage), and undermine the global combat against climate change. As a result, developed countries are exploring trade measures in the form of carbon based border adjustments on imports from developing countries to create a level playing field for industries of developed nations. These strategies have important trade implications for developing countries.

In such a possible scenario, the paper tries to identify countries that can possibly adopt such policies and the impact of these policies on exports from developing countries. It learns whether they comply with the existing WTO and UNFCCC principles, and finally suggests a possible roadmap that would create win-win situation and help in addressing the global problem of climate change.

Extensive literature review is undertaken to understand the impact of domestic carbon taxes on carbon leakages from developed countries and how effective are carbon based border taxes in preventing carbon leakages. The study also makes a detailed review of existing voluntary trade barriers and qualitatively analyse the key impacts being already faced by certain exporters from India. The study estimates the possible impact on India's exports revenue under two border carbon tax scenarios i.e. €20 and €30 per ton of carbon embodiment in India's products exported to US, UK, France and Germany. It uses India's energy and environment input output table (derived from the latest economic input output table, sectoral energy use and the carbon emission factors). Further it uses and commodity and country specific price elasticities that are estimated from the unit values of exported products (calculated at the 8 digit level) published by CEPII. These results along with India's exports to selected developed countries help in estimating the decline in total exports. Results reveal that decline in exports revenue from certain sectors like cotton textiles, glass and ceramic, leather, and iron and steel can be as high 40 percent. Many of these sectors involve a lot of manual labour any impact on revenue will result in short run to medium unemployment and can potentially affect capital investment. This may also affect possible improvement towards making production processes resource efficient. The study identifies and presents certain best practices primarily focusing on technology collaboration and transfer, and presents a possible win-win strategy for industries from developed and developing countries while addressing the global problem of climate change.

Estimating the Cost of Reducing CO2 Emissions by 17 Percent by US in 2020

Topic: Environmental input-output modeling VI
Author: Niaz Ahmed Bhutto
Co-Authors: Michael L Lahr

US is facing serious climate problems i.e. extreme weather, hurricanes, storms and floods their frequency has increased in recent years which caused huge economic and social loss (WRI, 2013). The unsustainable human production and consumption patterns have brought about these problems that have posed serious threats to biodiversity, ecosystem, and global mean temperature. Every country will have to face these issues (Onishi, 2007). Although most of climate problems are global in nature but all these problems are very important to be addressed seriously and carefully.
Human activities have contributed greenhouse gases (GHGs) emissions in atmosphere significantly since industrial revolution (Raman et al., 2012). Increase in anthropogenic emissions of GHGs caused global warming that causes chain of climatic problems to human and other living beings on planet earth. According to Fan et al., GHGs effect will put an end to environment, humans and every other living thing (Fan et al., 2007). Fossil fuel is the main source of energy production and GHGs emissions. In order to get rid of serious climate issues, nations of the world have to reduce consumption of fossil fuel significantly (IPCC, 2007).
Growing awareness regarding the current and future implications of global warming brought together both developed and developing countries to cooperate in forming platforms to address and solve this serious issue. For this, in Kyoto Japan in 1997 about 160 countries reached on common agreement that resulted in Kyoto Protocol. According to this agreement, Annex I countries have to reduce GHGs emissions by average 5 percent below to 1990s level in 2008-2012 and Kyoto Protocol became effective after ratified by Russia in 2004 (Lixon et al., 2008).
On the one hand Europe was attempting to reduce GHGs emissions with compliance to the targets set under Kyoto Protocol and on the other hand, US had no interest to address climate change issues seriously and Kyoto Protocol seemed to be a dirty thing for Bush Administration (Black, 2001), whereas US was emitting more CO2 per capita than any other OECD country (Byrne et al., 2006). Bush Administration also opposed Kyoto Protocol on the grounds of it exempts 80 percent of

world population mainly China and India from reducing GHGs emissions and this would damage US economy seriously (Byrne et al., 2007). The withdrawal of US from Kyoto Protocol created uncertainty and division among the countries to proceed further as the world's largest GHGs emitter deviated from its earlier promise (European Commission, 2001).
US showed great support and interest in 15th Conference of the Parties for United Nations Framework Convention on Climate Change (UNFCCC) held at Copenhagen in 2009. New reductions targets were given to the members of Annex I countries with respect to 1990 or 2005 levels emissions. This conference also focused on methods and principles that determine climate change targets (Turner et al., 2012). As conference was supported by new players like President Obama who made commitment to reduce GHGs emissions by 17 percent compared to the level of 2005 emissions (WRI, 2013) but this conference was not more than a promise and discussion (Suranovic, 2013). Nonetheless, US commitment was a great step towards reducing GHGs emissions globally.
The purpose of this paper is to estimate the cost of implementing the commitment made by President Obama in Copenhagen conference that is reducing GHGs emissions by 17 percent by 2020 using input-output technique. The opportunity cost will be measured in terms of GDP and employees' compensation in 2005 year prices. This paper focuses only CO2 emissions as the international scientific community has consensus that carbon dioxide gas (CO2) is the key GHGs that has significant impact on global warming (Solomon et al., 2007). The study further uses policy scenarios i.e. improvement CO2 per dollar intensity in few important sectors of the US economy developed on the basis of recommendations given in WRI report 2013. We expect that improvement in CO2 intensity in key sectors will help US economy to reach closer to its target.

Sectoral linkages in the knowledge economy, a comparative analysis of Mexico with OECD countries by the database: STAN-IO

Topic: World input-output modeling and databases II
Author: Rafael Bouchain
Co-Authors: Rafael César Bouchain, Mariana Velazquez

In the late twentieth century the world economy falls squarely on the knowledge economy, which has been made possible by the development of Electronics and Information and Communications Technology (E&ICT). The push to E&ICT sector has been a task that the countries have followed differently, as it is one of the essential elements to encourage development and economic growth.
In this work we can find a comparative analysis of the importance of the sectors: Office, accounting and computing machinery, Post and telecommunications and Computer and related activities among the OECD countries. The methodology used is based on the calculation of sectoral linkages, backward linkages (BL) and forward linkages (FL), and the classification of key industries from Leontief´s Input-Output model. Data were drawn from OECD STAN IO Matrix Inverse mid 2000s.
A first approach shows that the electronic sector in Mexico is relatively disconnected for the domestic economy (BL & FL below average), but this industry becomes key when considering the total economy (domestic and imported inputs), with values well above to OECD countries, above Germany, Finland and Canada. This shows the success of the strategy based of maquiladora exports industry.
The telecommunications sector in Mexico is a key industry, with high levels of BL & FL (in domestic and total economy), these linkages are similar to countries like USA, Germany, Finland, Denmark, Chile, Portugal and Spain . This is related to the development of the network of the dominant company Telmex/Telcel in the fixed and mobile telephony.
The computer industry in Mexico is driving (high FL) well above of OECD countries, but lower BL, well below of countries concerned. The computer industry in Mexico is in a similar situation to USA,

Germany and Denmark, in Canada and Korea is a driven industry.

Multiple technologies in an input–output framework: the role of constrained primary resources

Topic: Sustainable production and consumption I
Author: Maaike Corinne Bouwmeester
Co-Authors: Albert Steenge

To allow for ‘multiple technologies’ to produce a homogeneous output in input–output models, Duchin and Levine [(2011) Sectors may use multiple technologies simultaneously: the rectangular choice-of-technology model with binding factor constraints. Economic Systems Research, 23(3), 281-302] propose an optimization model constrained by primary resources. Sectors can use more than one technology to minimize total factors costs for a given exogenous final demand. In the initial situation production factors are in sufficient supply and sectors use only one technology. An additional technology, which is relatively more expensive, is activated as soon as a binding factor constraint is encountered.
In this paper we show that the Duchin-Levine model contains two different mechanisms by which multiple technologies can arise, both linked to different strands of economic theory. The different mechanisms are a consequence of the fact that factors can be used economy-wide, sector-wide or technology-specific.
If the factor in short supply is used economy-wide or sector-wide, the underlying mechanism is based on how efficient this factor is used. To be able to use this type of factor interchangeably in multiple technologies, the factor has to be homogeneous in the sense that an additional technology can readily replace an inefficient technology, where both use exactly the same factor. In fact, higher-cost technologies that are more efficient in resource use effectively push out inefficient lower-cost technologies. In such a case, scarcity rents are earned by all technologies that use the factor in short supply, relative to how intensively they use the factor. An example of multiple technologies with a sector-wide factor is the use of different irrigation techniques.
In contrast, if the factor in short supply is technology-specific, higher-cost technologies complement the original lowest-cost one, which stays active. The technology-specific factor cannot be used as input by an alternative technology even though it produces the same output. Therefore, a constraint on a technology-specific factor will only limit the use of the (single) technology that uses this factor. The original, lowest-cost technology will be used to produce output until it exactly exhausts the scarce factor, after which additionally required output will be produced by a higher-cost technology using a different primary factor. The rents that are generated by the scarce factor can be directly attributed to the technology-specific factor, or to the single related technology, in contrast to the distributed rents of economy-wide or sector-wide factors. An example of multiple technologies in case of technology-specific factors is the simultaneous use of different technologies to extract oil. Extracting oil from a Saudi Arabian field requires a distinctively different technology than extracting oil from deep sea oil fields.
The fact that a property of a factor has such large consequences for the prices of the produced commodities, the quantities produced by each technology and the earned rents, means that users of the model must carefully consider which property they wish to attribute to a factor.

Economic impact of natural gas flow disruptions

Topic: Input-Output analysis of disasters I
Author: Maaike Corinne Bouwmeester
Co-Authors: Jan Oosterhaven

In aiming to ensure a resilient energy system, the European Union (EU) has set forth an extensive energy policy package. Natural gas has been given an important role in meeting EU-wide future energy demand. It can be flexibly produced and stored and is therefore a good backup for intermittent renewable energy. Significant natural gas demand growth and demand variability is foreseen, especially for certain regions. Due to dwindling European gas reserves dependency on non-EU gas flows will increase even more. To support these developments, multiple far-reaching measures have been taken in order to arrive at one well-functioning internal gas market. The continuing integration of the gas market facilitates, and also contributes to, larger gas flows across all European countries.
However, this international dimension of the gas market also implies that any supply shock will be propagated extensively through the network. In this paper, we investigate the impact of disruptions in the supply of natural gas. We focus on the main natural gas extracting countries that supply to the EU gas market. A non-linear programming model is used to predict the short-run interregional and interindustry economic impacts of disruption scenarios. These short-run impacts are determined by the attempts of economic actors to continue their familiar activities and stay as close as possible to their established trade patterns. This behavioral response to a disruption is implemented by minimizing the difference between the pre- and the post-disruption pattern of economic transactions.

Several scenarios will be analyzed based on data from the EXIOPOL international input-output database. The database’s detailed classification of sectors includes a separate natural gas extraction sector. One scenario is that the gas sector may cease to exist altogether in a specific country, due to exhaustion of the gas reserves. Alternatively, a country may decide to block exports of natural gas in order to use all domestically extracted gas for domestic production exclusively. In addition, we will investigate scenarios in which particular cross-border disruptions occur. Physical pipelines may be damaged, or politicians may decide to limit cross-border flows. These can be simulated by reducing or removing the trade flow of natural gas between two countries. Limited changes in gas supply can be accommodated by EU’s gas infrastructure, because of the redundant capacity for security of supply reasons. However, constraints on the quantities that can be supplied, due to limited transport capacity, or limited possibilities to extract additional gas, will be imposed to exclude implausible adjustment predictions.
Our analysis of the economic impacts of gas flow disruptions will inform policy makers on critical gas supplier relations and critical cross-border pipeline connections. It also provides information regarding strains on the rest of the system following a gas supply disruption. This information can be used to further investigate mitigation strategies, for example, diversifying supply or investing in additional infrastructure.

The development of commercial local area resource and emissions modelling for the food retail sector

Topic: Sustainable production and consumption II
Author: Peter Treharne Bradley

Meeting near-future UK greenhouse gas (GHG) emissions targets will require all parts of the UK economy to contribute; in particular, significant changes in business practices will be required at the local level, including sustainable procurement. This paper presents a framework model to generate detailed benchmark estimates of GHGs (both on site and supply-chain related) for individual businesses and all businesses of the food retail sector within an area. This model aims to address the following question: What level of GHG are attributable to food retail businesses in Southampton and which types of food retail businesses (and their products) have the highest embodied GHGs? The input-output model makes use of available economic, geographic micro data as well as national environmental and economic accounts to develop estimates for businesses to the geographic level of individual postcodes. Where similar datasets exist in other parts of the world, such models may be applied elsewhere to inform local planning in relation to GHGs, waste and water use. The retail sector however, requires a unique methodological approach compared to other sectors, and this is where the current study innovates methodologically. The paper applies two different accounting perspectives: the production perspective (on site GHGs) and the provision perspective (supply-chain GHGs attributable to purchased inputs of a business or sectors production). The results show up dramatic variation in GHGs for the area, for different food retail businesses, and for products. From a planning and implementation perspective, such data can help inform business actions and help to prioritise choice editing and sustainable procurement by food retail business.

Accounting for global biomass and land flows embodied in trade – A comparison of approaches and a proposal for a way forward

Topic: Environmental input-output modeling V
Author: Martin Bruckner
Co-Authors: Stefan Giljum

Various approaches exist for quantifying the land embodied in international trade flows and consumption. These can be classified into a) economic accounting approaches, applying input-output analysis, and b) physical accounting approaches, using the available physical information on trade, processing and land intensity. The results of recent studies vary widely, thus hampering their application in policy making.

In order to study the disparities a literature review on recent land footprint studies was performed and differences in the applied methodologies and base data were identified. In order to empirically analyse these differences, a multi-regional input-output model was used to calculate global virtual land flows. The results were then compared to results generated with a comprehensive physical accounting model.

The literature review has shown that the two approaches have evolved strictly separated during the past decade within various research communities. Differences in the base data and methodologies have wide impacts on the results. The greatest divergences result from variations in the coverage of crops, processed products and supply chains. The choice of monetary or physical allocation procedures and the use of differing land use data in some cases may also result in deviations up to an order of magnitude. Variations in the handling of re-exports still cause differences of more than

100% for some crops and commodities. Furthermore, also the technology assumption applied at deriving input-output tables from supply-use tables as well as the regional and sectoral detail of the tables play a crucial role.

A hybrid accounting approach combining the advantages of both methodologies could provide a framework for the robust and transparent assessment of land footprints associated with global biomass flows. Such an accounting framework should be based on international agricultural statistics in physical units supplemented by monetary data for the commodities and supply chains otherwise not covered.

Using the Input-Output Approach to Measure Participation in GVCs: The Case of Costa Rica

Topic: Supply, Use and IO Tables: Global value chains, economic growth and environment
Author: David Ricardo Bullon
Co-Authors: Satoshi Inomata, Tayutic Mena Retana, Bo Meng, Gabriela Saborio, Natalia Sánchez

This paper makes use of a series of indicators that are calculated from an inter-country input-output table which includes Costa Rica and its main trade and investment partners. We have embedded Costa Rica´s national input-output table into the WIOD endogenously using a linear programming method based on Costa Rica´s foreign trade and balance of payments data. Various indicators of trade in value-added (TiVA) are used to place Costa Rica in the global economy. For example, gross exports are decomposed into five sources of value added to understand the sources of a country's competitiveness. In order to place these results in the wider context of GVCs, additional TiVA related indicators are then used to measure the extent to which Costa Rica participates in GVCs relative to other countries and the country´s position (upstream vs. downstream) in these GVCs. The country´s TiVA-based comparative advantages are then discussed, as well as the degree to which the country´s participation in GVCs is driven by specific economies.

Financial and Social Accounting Matrices for Brazil

Topic: Emerging Developing Countries
Author: Erika Burkowski
Co-Authors: Fernanda Finotti Cordeiro Perobelli, Fernando Salgueiro Perobelli

The present paper wants to analyze the direction and the strength between the real and financial side of the Brazilian economy. In order to enhance this point we present a methodology to construct the Financial and Social Accounting matrices for Brazil and calibrate the matrices for 2005 and 2009. The Financial and Social Accounting matrices can be understood as an extension of input-output model. These matrices take into account the productive transactions, the income transfers and flows of fund among all the agents in a specific economy during a period. We calibrated the matrix for 56 productive sectors and 3 components of value added (payment - households, gross operating surplus - financial corporations and non-financial corporations and taxes - government). We opened the final demand for 5 institutional agents: households, financial corporations, non-financial corporations, government and rest of the world. For each one of these agents we have information about the allocation of resources: current expenses, capital and financial accounts. We calculate the production multipliers and compared them to the Social Accounting Matrix multipliers, in which the financial flows are considered exogenous. This kind of specification enables us to analyze the impact of financial structure upon the real economy. In other

words, the impact of financial flows by productive sector upon real economy. Preliminary results show that, on average, taking into account financial flows increases the impact of a final demand shock on output by 2.07%. We also observe that a 1-unit increase in current income of households has a positive effect on Brazilian GPD, while a 1-unit increase in the investments funds of non-financial corporations presents an even larger effect. Furthermore, the impact of the variation in the demand by investments funds of the financial institutions is striking. This means that the savings not used to gross fixed capital formation are invested in domestic financial assets and become liabilities for other institutional agents.

Choices and consequences of sector allocation of embodied emissions in global production systems

Topic: Environmental input-output modeling V
Author: Maria Angeles Cadarso
Co-Authors: Guadalupe Arce, Luis A. Lopez, Fabio Monsalve

There are two main approaches of common use to quantify and allocate emissions responsibilities to countries: the production based approach and the consumption based approach. The first one is used by Kyoto Protocol to set appropriate national reduction targets. The second is widely used in the literature and increasingly included in policy measures (in the European Union Emission Trading Scheme, for example). The origin of the consumption base approach is not only the concern about fairness in the responsibility attribution to developing and developed countries, but mainly, and related to it, the concern about the role of consumption and international trade in the environmental impact of economic activities. In fact, globalization and offshoring process and the increasing international trade allows separating production and consumption activities, so the environmental impact of them are different and goes beyond the national borders. To analyse the complex network of global supply chains multiregional input-output (MRIO) models are very useful since they allow tackling with different technologies of production and environmental impacts by country or region considered. Sometimes and depending on the purpose, bilateral trade input-output models (BTIO) are also useful, although these do not take into account the full complexity of global value chains. Both models provide unique allocation of emissions with no double-counting and both provide the same total amount of emissions. But while MRIO treats intermediate traded consumption endogenously, BTIO treats them exogenously as well as final exports. This different treatment of intermediate exports implies a different emission allocation at sector level related to consider also at this level either a consumption based-principle or a production one. We analyse the consequences of using either a MRIO or a BTIO model in the assessment of the impact of international trade on the environment. Data used for both methods come from WIOD database.

Module Applied General Equilbrium: Session 4

Topic: Applied General Equilbrium: an Introduction
Author: Manuel Alejandro Cardenete Flores
Co-Authors: Ana Isabel Guerra

Applied General Equilbrium: an Introduction

Module Applied General Equilbrium: Session 3

Topic: Applied General Equilbrium: an Introduction
Author: Manuel Alejandro Cardenete Flores
Co-Authors: Ana Isabel Guerra

Applied General Equilbrium: an Introduction

Module Applied General Equilbrium: Session 2

Topic: Applied General Equilibrium: an Introduction
Author: Manuel Alejandro Cardenete Flores
Co-Authors: Ana Isabel Guerra

Applied General Equilbrium: an Introduction

Module Applied General Equilbrium: Session 1

Topic: Applied General Equilibrium: an Introduction
Author: Manuel Alejandro Cardenete Flores
Co-Authors: Ana Isabel Guerra

Applied General Equilbrium: an Introduction

Socioeconomic impacts due to enlarging the use of sugarcane straw in the Brazilian Economy

Topic: Sustainable production and consumption I
Author: Terezinha de Fátima Cardoso
Co-Authors: Antonio Bonomi, Mateus Ferreira Chagas, Luis Augusto Barbosa Cortez, Marcelo Pereira da Cunha, Joaquim Jose Martins Guilhoto

Brazil is the World leader in sugarcane production; this industry has a very important role in the Brazilian economy, considering both sugar and energy (ethanol and bioelectricity) production. From the last decade, pressures in terms of increasing the sustainability of the sector has resulted in growing the practice of mechanized green sugarcane harvesting eliminating the burning of the sugarcane straw. In this context, straw has been available for improving agronomic characteristics of the soil, as well as to be used as a raw material to increase surplus of bioelectricity or ethanol production – this one taking into account the possibility of the adoption of second generation technologies. The better use of straw depends on integrated analysis on the agricultural and industrial technologies choices in the sugarcane industry, because the trade-off between its interest (more straw used at a mill implies less straw available in the field). This study aims to quantify and analyze the socioeconomic impacts due to the use of sugarcane straw, considering different scenarios of combined technologies in agricultural area as well as industrial phase. For this purpose, a mixed based technology and interregional input-output model was developed and applied to accomplish this target. The model contemplates the most important sugarcane regions in Brazil; the scenarios evaluated include first and second generation technologies, as well as using or not sugarcane straw. The socioeconomic variables analyzed are the level of production (output), jobs

creation, income distribution, gross domestic product (disaggregated at regional level) and the possibility of subsidizing a technology looking for improving the complete use of sugarcane biomass as a renewable source of energy.

Enhancing the Eora MRIO database

Topic: World input-output modeling and databases I
Author: Diana Carneiro
Co-Authors: Keiichiro Kanemoto, Manfred Lenzen

Many studies show that aggregation in Multi-Region Input-Output (MRIO) databases can influence Input-Output Analysis results: when data are aggregated valuable information can be lost, allowing significant errors. For example, if aluminum and copper are grouped together in one industry sector (non-ferrous metals), this aggregation yields an underestimated energy intensity for aluminum, and an overestimated energy intensity for copper, as copper requires less energy inputs than the aluminum production process. Thus, MRIO databases should ideally cover the entire world at high sector and country resolution to avoid errors due to aggregation. At the time of writing the broadest and most detailed database is Eora World MRIO: in a total of 187 countries some comprise up to 500 sectors. However, many developing countries in the database are still weak in detail, containing only 26 sectors. This sector aggregation can affect, for example, tracing biodiversity and social consequences of consumption – often concerns in developing countries. We aim to enhance these countries sector resolution using 39 Social Accounting Matrices (SAMs) constructed and published by the International Food Policy and Research Institute (IfPRI). This paper describes the results from the Eora MRIO database update aimed at enhancing the sectoral level of developing countries that presented lack of Input-Output/SAM data in the past.

Welfare effects of tourism consumption: A CGE model for the Galician economy

Topic: Regional input-output modeling VI
Author: Andre Carrascal
Co-Authors: Melchor Fernandez

When the poor are not involved in tourism (actively or passively), tourism activities will help to make social inequalities deeper and will enlarge the gap between those with access to capital (physical and human) and those who are on the threshold of subsistence. Additionally, the better way of determining the degree of participation of low-income population is not through disposable income measures, but from a welfare point of view. This takes into account not only revenues gained from tourism but also the access to tourism products and the subsequent utility generated. Therefore, the main aim of this paper is to calculate how an increase in tourism consumption affects to households welfare disaggregated by level of income, using a static regional CGE model calibrated with a 2008 Galician SAM.

Industrial Policy and the Domestic Content of Mexico's Maquila Exports: A long-run perspective

Topic:
Author: Juan Carlos Castillo
Co-Authors: Gaaitzen de Vries

This paper studies the domestic value added content of exports by Mexico's maquiladora (export-processing) firms during the period from 1981 to 2006. Initially the government viewed maquiladoras as mere providers of employment. This view and subsequent industrial policies shifted with the increasing outward orientation of Mexico in the late 1980s. The government started to promote the sourcing of intermediates from upstream Mexican firms and the technological upgrading within maquiladora firms. We combine a recently released input-output table for maquiladora industries with detailed longitudinal data on value added, gross exports, employment by skill type, and domestic and imported intermediate inputs to study whether observed patterns are related to changes in industrial policy. We find substantial differences in the domestic value added content of exports across industries and over time. The domestic content is typically higher in labor-intensive goods manufacturers, such as textiles, compared to capital-intensive industries such as transport and electronic goods manufacturing. Over time, productivity and the share of skilled workers in maquiladoras improved only modestly. A long-run decline in aggregate domestic value added embodied in maquila exports, from 31 percent in 1981 to 21 percent in 2006, is largely explained by the falling domestic content within electrical machinery product manufacturing. The decline in domestic content appears mainly related to internal and external shocks and not to changes in the regulatory environment.

Tracking Footprints at the micro and meso scale: An application to the Spanish tourism by regions and municipalities

Topic: Environmental input-output modeling II
Author: Ignacio Cazcarro
Co-Authors: Rosa Duarte, Julio Sánchez Chóliz

The differences between the footprints estimations at the consumer and producer levels have been widely discussed in the literature of input-output with different treatment of responsibilities. Some methodological questions related to this are those related to the assumptions on the treatment of imports or sectoral scale at which the analysis are performed. In this case, we highlight the capabilities of combining the meso level input-output models with the GIS and micro data to lower the spatial scale, especially in order to provide information to local municipalities/villages/business on how to track their footprints, further than the level (17 Spanish regions or Autonomous Communities) at which we are capable of having economic input-output data. Previously we had developed a multiregional input-output model for these regions and the regions of European Union and Rest of the World, to move again towards the explicit spatial identification of areas of strong final demands (normally the most populated) linking them to the original hotspots or vulnerable areas, where most direct grey water consumption had taken place. Now we present a very specific application, where these aspects are shown more clearly since consumers and producers usually have very different origins, in particular looking at the tourism statistics, lifestyles and type of expenditures.

World Trade Model for freshwater fish and water type change scenarios

Topic: Addressing Resource Challenges in a Globalized Economy I
Author: Ignacio Cazcarro
Co-Authors: Faye Duchin

As in the present, in future years, we will keep on seeing numerous dam and water management projects, involving several main rivers and countries or regions (e.g. in China, affecting the downstream availability in South-East Asia, in the regions of India-Pakistan; Turkey-Syria-Iraq-Iran, or Ethiopia-Sudan-Egypt). This issue and others linked to food security call for an integrated economic, ecological and social approach for dam projects analysis, which can be properly captured with the World Trade Model (WTM). This framework of comparative advantage studies economic production, and use and scarcity of natural resources, with an appropriate alignment of input-output tables of all (key climatic and hydrological, from GTAP) regions in the world, their factor uses (especially of natural resources, and in particular water) and endowments. In this article we distinguish three technologies of fishing production, subsistence freshwater fishing, marine fishing and aquaculture, and model with them 2 scenarios.
The first one consists in studying the impact that the disappearance of freshwater fish would imply in terms of production, trade, land or water use, with particular impacts in regions such as Southeast Asia and certain areas of East Africa and South America. The second scenario looks in the opposite direction, examining which impacts would be avoided if the maximum historical freshwater fish catch could be attained because of their higher availability.
Three water type classes based on the water quality are introduced and discussed in the model, with respect to the type of constraints and changes in costs they impose.

European Commission, Directorate General of Trade

Topic: (Panel Session) European Statistics for Competitiveness in a Globally Competitive World: what is the role of Input-Output Statistics?
Author: Lucian Cernat

European Statistics for Competitiveness in a Globally Competitive World: what is the role of Input-Output Statistics?

CHANGES IN INDIRECT DOMESTIC VALUE ADDED IN MEXICO'S MANUFACTURING EXPORTS BY SECTORS AND COUNTRIES OF ORIGIN AND DESTINATION, 1995-2011

Topic: Structural change and dynamics
Author: Rosario Cervantes-Martinez
Co-Authors: Gerardo Fujii

In previous works (G. Fujii and R. Cervantes, 2013, "Mexico: Value Added in Exports of Manufactures", CEPAL Review, N° 109, April and, 2013, "Indirect Domestic Value Added in Mexico's Manufacturing Exports, by Origin and Destination Sector", Levy Economics Institute of Bard College, Working Paper N° 760) we have found that, in 2003, domestic value added contained in Mexico's manufacturing exports is relatively low, about 42 per cent. Most of this value added is direct, about 53 per cent of domestic value added, and most of the domestic indirect value added generated by manufacturing exports is non-manufacturing, 78.3 per cent of domestic indirect value

added. The aim of this presentation, based on the WIOD database, is to trace the changes of total indirect value added content in Mexico's manufacturing exports by sectors and countries of origin and destination in order to show more evidence of how the internal disarticulation of the Mexican economy, specially in the production of intermediate manufacturing inputs, helps to explain the low correlation between Mexico's exports' growth and economic growth. The method of analysis is based on classical techniques of input-output research.

Distinguishing the Processing Trade in the World Input-Output Table: A Case of China

Topic: Trade and Value Chains
Author: Quanrun Chen
Co-Authors: Xiangyin Chen, ZHU Kunfu, Peng Liu, Cuihong Yang, Lianling Yang

Empirical studies show that the input structures of processing trade and non-processing trade are significantly different for a specific product. For instance, the former uses more imports than the latter in the production. Studies based on national input-output tables have verified that a large bias could be caused in trade accounting if this heterogeneity is neglected. Therefore, distinguishing the processing trade is very important for countries with high shares of processing trade, such as China. As the prevalence of trade in value added and global value chain, many efforts have been made on compiling world input-output tables in recent years. As far as we know, however, all the well-known world input-output tables do not distinguish the processing trade. Considering the importance of China in international trade, this study attempts to distinguish China's processing trade in the world input-output table and to investigate the effect of this treatment on accounting results. We choose 2007 world input-output table as an example. The world input-output table by product is obtained from the World Input-Output Database (WIOD) since its supply and use tables are published on the website. The information on processing trade is obtained from the so-called DPN input-output table of China and the General Administration of Customs of China. Finally, a preliminary input-output analysis is made on our extended 2007 world input-output table, and the results are compared with those calculated from the original world input-output table.

The Average Propagation Length: An Extended Analysis

Topic:
Author: Quanrun Chen

The Average Propagation Length (APL) is a powerful tool in production chain analysis. It measures the average steps taken by the final demand increase in an industry to affect the output of another industry. The APL and its variant have been applied to many areas, such as important production chains identification, upstreamness measurement and fragmentation measurement. This study investigates the APL and its variant from a double counting perspective. It shows that the APL is equivalent to the double counting ratio (or times of double counting) of the primary input of an industry in the production of another industry's final product. Based on this point, we show that the APL can be easily extended to answer many other interesting questions in a clear manner. For instance, the APL can be extended to separately measure the average time of each industry visited by the primary input of a specific industry before it reaches the final product of another industry. The APL can be extended to measure the upstreamness of each country in the world production network of a specific product based on the world input-output table.

Reforming Energy Consumption Subsidies in Ukraine: A CGE Analysis

Topic: CGE and econometric input-output modeling III
Author: Maksym Chepeliev

In Ukraine energy subsidies are intensively used as a socio-economic policy measures. According to the IEA estimates in 2011 they amounted to 5,7% of GDP, since then their share is progressively growing, which is especially representative against declining world average rate of 0,88%.
While offsetting households' income differentiation, contributing social and political stability, such a wide use of energy subsidies distorts equilibrium prices, encourages overconsumption, reduces investment attractiveness, increases burden on the state budget, leads to the inefficient recourses' allocation and negative environmental effects. Furthermore, existing mechanism not only discriminates industrial consumers by means of cross-subsidization in electricity sector, but also benefits high-income households through preferential financial resources allocation, especially for steam and hot water supply.
In this study we use a recursive dynamic CGE model to investigate economy-wide effects of partial and full elimination of energy consumption subsidies. Special treatment in the model is given to households by dividing them into decile groups. Apart from disaggregated consumption, impact on sectoral production, investments, exports, imports and macroeconomic aggregates is analyzed. Furthermore, different options of compensating mechanisms that allow to reform tariff policy in a socially acceptable manner are considered. Results show that even in a short run subsidies' elimination has no severe impact on GDP due to rapid investment growth and gradual economic structural changes. At the same time residential sector suffers from regressive effects: poor households loose relatively more than rich. In his context progressive taxation as well as direct transfers prove to be efficient social dampers.

New Estimates of the Size of Tradable and Nontradable Sectors Based on World Input-Output Tables

Topic: Global Value Chain Analysis
Author: Luca Cherubini
Co-Authors: Michele Benvenuti

The ongoing globalization process and the rise of new global players, which act as both producers and consumers, make the distinction between tradable and nontradable sectors more and more important, not only for research purposes but also for its policy implications. In their seminal paper of 2005, J.B. Jensen and L. Kletzer developed a new empirical approach to identify tradable and nontradable sectors in the USA, using the geographic concentration of activities. Further works have highlighted some drawbacks of this classification. The most relevant one refers to a particular feature of globalization, i.e. the international unbundling of tasks: a good or service is produced and delivered to the final consumer in a series of steps, which together define a Global Value Chain (GVC). Each task of the process can be either classified as tradable or nontradable, thus influencing the tradability of the final product. In classifying economic activities one should therefore consider the linkages among all sectors (wherever they are located) that participate in the GVC. This issue can be properly addressed by using world input-output tables.
To this end, we use the publicly available World Input-Output Database (WIOD). It provides time-series of world input-output tables for 40 countries worldwide and 35 industries, as well as “satellite” accounts on labour and capital inputs at the industry level, covering the period from 1995 to 2011. Our contribution is twofold: first, we add a time dimension to the estimates of the size of tradable and nontradable sectors, including the most recent years of crisis, in terms of several

economic variables (value added, investments, and employment); second, we compare the economic structure of several countries, taking into account the dynamics of international fragmentation of production processes.

Trade in Value Added - Linking the Flemish regional EE-IO tables with (EE-)MRIO tables

Topic: Input-output analysis for policy making IV
Author: Maarten Christis
Co-Authors: Theo Geerken, An Vercalsteren

As Flanders has poor access to primary resources, policy makers have increased interests to analyse the global value chain of Flemish goods and services with a specific focus on resource and material use. Low physical data availability on the use of materials make input-output (IO) analysis and especially the linkage with MRIO suitable to fulfil lacking data. EE-IO tables enable the linking between economically based global value chain analysis and primary material use (and also other environmental extensions) and as such enables the monitoring of material flows on a macroscopic level. The main objective of the PhD is to screen different models that allow to correctly assess material flows in Flanders and to identify, develop and apply a model that is considered most appropriate with respect to the Flemish situation and availability of data.
Flanders (Belgium) is a geographically small region at the centre of Europe with an open economy which is characterised by the low accessibility to own material resources, high labour costs, etc. 98% of Flemish primary resource uses are satisfied by imports (in monetary values); 42% of total intermediary inputs are imported; 24% of Flemish final uses are direct import. With the large amount of imports by the Flemish economy, it is necessary to supplement the Flemish EE-IO tables (2003 and 2007 data) with (EE-)MRIO data to fully incorporate and understand the whole value chain of Flemish goods and services (both intermediate and finished goods and services). These tables capture the worldwide value chain and give insight into the creation of value added throughout the complete value chain of Flemish goods and services related to the composition of value added (employment, use of fixed capital, operating surplus and taxes and subsidies) as well to the use of material resources and the environmental impacts. This information provides a complete, but macro-economic, understanding on social, environmental and economic impacts of policy.
A case on glass recycling is introduced to illustrate the possibilities of this approach for policy analysis. This case illustrates the social and economic impacts of glass recycling for as well Flanders as the rest of world economy considering the whole value chain, thus including shifts between and rebound effects on all related sectors.
The presentation will discuss the framework and most significant findings with regard to the economic impacts and related impact on material flows of the Flemish glass production and consumption with a focus on reuse, repair and recycling.
The PhD is financed and coordinated by the Policy Research Centre Sustainable Materials Management. The EE-IO-model is developed under coordination of the Public Waste Agency of Flanders.

Assessing the evolution of energy and CO2 intensities in the EU

Topic: Productivity and efficiency analysis I
Author: Luís Cruz
Co-Authors: Jose Dias

Sustainability has been traditionally focused in the three pillar model - Economy, Ecology and Society - all considered to be interconnected and mutually enforcing pillars. One of today's major challenges is to tune environmental sustainability with economic growth and welfare by decoupling resources use and environmental degradation from the growth of the economy. However, the continuous growing demand for energy and resources - to sustain human needs and economic growth - and corresponding consequences on climate change are challenging this objective.
The main aim of this work is to assess these energy-economy-environment interactions by focusing on the analysis of energy and CO2 emissions intensities through a comparative examination of their recent progress in the EU countries, using data from the World Input Output Database (WIOD). The analysis of the progresses achieved in these indicators will be performed both by assessing whether resources use and/or environmental degradation are decoupling from the growth of the economies, and by the decomposition of the overall rates of change of energy and CO2 emissions into the different explanatory effects contributing to such progression (using a LMDI Logarithmic Mean Divisia Index approach).
One of the major contributions expected from this work is to derive policy recommendations from the analysis of energy and CO2 emissions intensity trends, with a greater geographical and temporal focus than prior studies (by exploiting the international dimension of the WIOD database).

Compilation of supply and use tables at previous years prices in Portugal

Topic: Supply, Use and IO Tables: Previous Year Prices
Author: Maria Cruz

Abstract:
Since the European system of national accounts (ESA) has been introduced in the country, in the early eighties of the past century, with start at 1977 economic year, Statistics Portugal (INE) included the development of the supply and use tables (or similar), both in current and at previous year prices, as fundamental instruments for the elaboration and simultaneously as outputs in the system framework related, at last extent, to the determination of the Gross Domestic Product (GDP).
With the introduction and the requirements of the ESA 95 specially addressed to the European countries, a complete series of SUT became available respecting the methodological changes thereafter made compulsory: from 1995 to 2011, up to now, SUT matrices (nominated more recently as Quadro de recursos e empregos - QRE) were built and edited, in current and at previous year prices, with full detail (127 industries by 433 products) in their preparation but limited when edited (to 82 industries x 88 products or, at least, 38 x 38 industries and products).
These SUT / QRE are fully integrated in the Portuguese national accounts. Why this and how far?
Well, such a long and continued experience in SUT elaboration helped in the improving of all the background concerning the compilation of the basic information, previously to the QRE integration itself, then in its conception, with full detail for all the components, afterwards in its operation (data full-up) and finally during the balancing procedures. QRE are matrices by industries and products that allow the description in a quite detailed way the yearly output processes and the product transactions over the national economy.
One important step before SUT building-up, is the elaboration of supply and use balances by product (EREs) with maximum detail in terms of classification of products and with standard display

of data or estimates for the different transactions, including their valuing components, like product taxes or trade margins, both in current and at previous prices, and the nominal and real resulting indexes, reported to the correspondent precedent year data, plus the indexes prices used, case by case. The balanced EREs enter directly in the first draft of the SUT at current or at previous year prices, depending on the same valuation obtained in the balance of each product.
EREs as well as previous Output and Intermediate Consumption (IC) matrices by institutional sector and the resulting tables of Output or IC by product, industry, sector and kind of output, (for Output only), with plenty details, constitute the main background instruments that ensure the consistency, coherence and, at the end, the quality of QRE (Portuguese SUT) built in current and at previous year prices simultaneously.
This paper focuses in particular the QRE / SUT at previous year prices elaborated yearly by INE, Portugal. The aim is to enhance the relevance of its construction in all stages of the work concerning the GDP estimation and the main sources and procedures developed to its establishment. Indirectly, these features of the QRE / SUT at previous year prices grant overall quality to Portuguese NA estimations, namely to the volume or real estimates, like GDP volume increase rates.
Not only the accounting framework and the background of the QRE / SUT assure an optimal integration and balancing of all the relevant economic information but the simultaneous and interactive processes of choices and adjustments guarantee the full consistency and coherence, notably to the current and previous year prices estimations for all the transactions concerned and their components. These, correspond to different dimensions, or (potential) sub-matrices, which make feasible to show each product item or aggregate at basic prices or at market prices with each valuing element in detail, like trade margin, GVA, other product taxes or subsidies. The perspective of product versus industry is still guaranteed in the system.
More, the synthesis of the QRE / SUT is made in closer connection with the synthesis of the relevant economic accounts of all the institutional sectors.
Finally, QRE / SUT matrices and all their background produced by INE, Portugal, provide full information that is necessary to produce Input Output matrices, five yearly required by Eurostat (EC).

An Environmentally Extended Input-Output Model for Investigating the Relative Economic Yield and Environmental Burden of Different Saltwater Fishing Modes and Segments

Topic:
Author: Yue Cui
Co-Authors: Ya-Yen Sun

Development of recreation opportunities and facilities is generally considered to have a positive contribution to local and regional economies. However recreation participation also involves the consumption of energy and the release of greenhouse gases (GHG) emissions. The amount and types of energy consumed varies between destinations, types of recreation and available technologies employed. For example fishing from a powerboat consumes more energy (e.g., boat fuel) than fishing from a pier or shore. In addition, the size of a boat, type of motors, on-water travel distance, and time the motor(s) are operated (e.g., trolling vs. still fishing) effects energy consumption. Efforts to better balance economic and environmental values and concerns including decisions related to investments and policies intended to encourage recreation development and marketing would benefit from information that compares the CO2 emissions associated with alternative recreation activities. This would include determining activities having relatively high economic impacts compared to their carbon consumption.

Estimating the carbon footprint of recreation activities is complex. Efforts have mostly been based on a linear relationship between recreation expenditures and CO2 emission. This research employs data collected from a comprehensive survey of saltwater fishing that gathering information on origin and destination, behaviors (e.g., travel distances, modes of fishing), and spending related to the trips. Anglers are segmented based on their trip spending, trip characteristics and fishing modes, and their economic contribution and carbon consumptions is estimated. An Environmentally Extended Input-Output Model is employed to better understand the relationship between visitor spending, activity and trip behaviors, and CO2 emissions. The economic impacts as well as the energy and environmental burden of different fishing modes (e.g., shore vs. boat) and angler segments are estimated. Socio-economic characteristics of the segments are profiled as a means of suggesting strategies for encouraging transference to higher eco-efficiency fishing.

An input-output analysis of energy and GHG emissions indicators of gasoline and diesel oil in Brazil

Topic: CGE and econometric input-output modeling IV
Author: Marcelo Pereira da Cunha
Co-Authors: Simone Tatiane do Canto, Joaquim Eugênio Abel Seabra

The goal of this study is to evaluate energy and GHG emissions indicators for gasoline and diesel oil in Brazil; the methodology chosen was the Input-Output (IO) Analysis. For this purpose, an economic IO model and a hybrid IO model were made to provide a comparison between them. The analysis considers 2009 as base year, because this is the most recent year which is possible to estimate the Brazilian input-output matrix from official data when the project started. Both models (economic and hybrid) have 25 sectors and 114 commodities; the approach allows all direct and indirect effects through production chain to be estimated. Into the whole Brazilian economy, energy sources and GHG emissions are accounted in terms of domestic and imported origin, as well as renewable and non-renewable. The main data collected and used to build the models were the use and make matrices (provided by The Brazilian Institute of Geography and Statistics – IBGE) and the consolidated matrix with energy flows for primary and secondary energy sources (provided by The Brazilian Energy Research Company – EPE). The results obtained with both models are very similar, considering gasoline as well as diesel oil; in general, the indirect effects captured by the hybrid model are a little bit higher due to the stronger linkage among the energy sectors when the transactions through these activities are accounted in physic (energy) units. From hybrid model, the main results are 1.201 toe and 1.202 toe embodied energy for 1 toe of gasoline and diesel oil, respectively; with respect to GHG emissions, the indicators are 75.32 gCO2eq/MJ to gasoline and 86.91 gCO2eq/MJ to diesel oil.

Socioeconomic and environmental assessment of biodiesel production in Brazil

Topic: Sustainable production and consumption I
Author: Marcelo Pereira da Cunha
Co-Authors: Joaquim Jose Martins Guilhoto, Arnaldo César da Silva Walter

The scarcity and the growing oil prices, climate change and energy security are issues that have motivated the international community to seek alternative sources of energy; among them, biofuels have been considered as an option in recent years. Biodiesel is a biofuel that can potentially bring environmental, economic and social benefits compared to fossil diesel oil, especially in developing

countries, considering the land availability. The objectives of this study are the evaluation and the comparison of socioeconomic and environmental impacts of the main routes of biodiesel production in Brazil. Five routes of biodiesel production were evaluated, defined taking into account the profile of this industry in Brazil – two from soybean oil, one from beef tallow, one from cotton oil and other from sunflower oil based on family farming production. The evaluation was performed using the input-output analysis; the Brazilian economy was aggregated in 73 productive sectors and 120 commodities. Impacts and indicators were quantified regarding the level of the total output, jobs created (including the assessment of their wages), the value added (GDP), the energy balance and greenhouse gases emissions. For this purpose, it was developed and implemented a mixed technology based input-output model to combine different routes of biodiesel production. Among the various results obtained, it is worth to mention the need of subsidies over biodiesel production, except for the production route from beef tallow. Considering the scenario in which part of the exported soybeans is driven to biodiesel production (to replace all imports of diesel oil), even with the need for subsidies, there would be an economic benefit estimated at US$ 0.60/L of biodiesel produced. Concerned to the production based on sunflower family farming route, the benefit in a B1 scenario would be US$ 1.71/L, but by means of an average wage 87% lower than the Brazilian average.

Denton PFD and GRP benchmarking are friends. An empirical evaluation on Dutch Quarterly Supply and Use Tables

Topic: Methodological aspects of input-output analysis II
Author: Jacco Daalmans
Co-Authors: Tommaso Di Fonzo

Temporal benchmarking according to Denton (1971) is widely used in the production process of statistical offices.
Statistics Netherlands has been using a multivariate Denton method for the compilation of large, fully consistent, quarterly and annual supply and use tables.
The purpose of Denton methods is to achieve consistency between high and low frequency data (e.g. quarterly with annual data). The high frequency data are adjusted to align with the low frequency data, while preserving as much as possible the short-term movements of the preliminary high frequency data.
It is often claimed that the Proportionate First Differences (PFD) variant of Denton's benchmarking, which is the most used in practice, is a close approximation of the Growth Rates Preservation (GRP) benchmarking, which is considered as an 'ideal' benchmarking procedure to preserve short term movements of the indicator series. In addition, the PFD criterion is more often applied, because the resulting mathematical problem is easier to solve.
In this paper we will search for empirical examples, from Dutch Supply and Use Tables, in which PFD does not work as expected. Examples are shown in which the dynamics of the indicator series are not preserved well by Denton PFD benchmarking, whereas GRP benchmarking works better.
A second aim of the paper is to present a simple heuristic procedure that approximates the GRP criterion in the multivariate case, whose implementation involves the solution of a standard quadratic-linear problem instead of a linearly constrained non-linear one. The heuristic will be empirically compared with PFD and GRP in order to evaluate its possible ability to preserve the preliminary growth rates better than the PFD procedure.

Manufacturing Industries, Final Demand and Economic Growth: Application of Econometric Analysis and Input Output Model with Indian Data

Topic: Methodological aspects of input-output analysis III
Author: Panchanan Das

The purpose of this paper is to incorporate randomness by applying econometric approach at least indirectly in constructing the output and final demand vectors over time based on the input output coefficient and final demand coefficient matrices at the base period. The study looks into the relative importance of different manufacturing industries, and estimates the role of final demand from different manufacturing industries in enhancing economic growth. The panel data economic approach has been used to capture the nature of dynamic adjustment in Indian economy due to exogenous shocks mostly in a structure of disequilibrium, and to forecast the growth rate of each sector and evaluate the effects of a policy on growth rates in different sectors. The projected series of output and final demand from 29 manufacturing industries have been calculated from the historical data on the components of total final demand with the base year final demand coefficient matrix. By analysing trend of the projected output from different manufacturing industry groups the study observes that most of the industries gained their relevance over time, some remained at the same level and a few lost their significance during the faster growth regime in India. The paper is organised in the following manner. Section 2 discusses the sources of data used in this study. The basic structure of input output transactions matrix in India is described in section 3. Section 4 deals with methodological issues applied in this study. Section 5 interprets the empirical findings. Section 6 concludes.

A Study on the Factor Content of India's Foreign Trade

Topic: International Trade II
Author: PARAMITA DASGUPTA

The notion that endowment of factors of a country has a role in determining its structure of trade (Heckscher-Ohlin theory) has generated a lot of interest in measuring the ‘factor content’ of trade. In this regard, India with its huge labour force and a relatively very small stock of physical capital offers an excellent case study. Moreover, consequent upon the policy reforms in the external sector, the structure of India’s foreign trade has undergone significant changes in the post-1991 period. Given this changing scenario, the study measures the ‘factor content’ of India’s trade and examines the role of factor endowments in shaping its structure of trade during pre-reform period (1983-84 to 1989-90) and reform period (1993-94 to 2003-04). For a comprehensive analysis, the factor content is studied for India’s trade with the Rest of the World (ROW), EU(27), North America and the Developing Countries of Asia.

Factor content of India’s trade is analyzed in the light of several theoretical developments of this literature. First, factor content is measured assuming identical technology based on the approaches developed by Leontief (1953) and Leamer (1980). Factor content is further studied by incorporating technology differences, considering factor-augmenting productivity differences (Trefler, 1993, 1995) as well as general difference in technology applying producers’ technology.
The study finds that India’s trade pattern with the ROW and EU(27) is in tune with its endowment of factors. Anomalies with the theory, observed for India’s trade with North America during reform period, disappear with technology differences which, however, do not disappear for its trade with the Developing Countries of Asia. The study also separately measures the factor content of inter-industry and intra-industry trade(IIT) and observes that endowment has a role to play in

explaining IIT which is otherwise assumed to be determined by product differentiation and economies of scale only.

Cost of production (Supply price) of Goods: Walras versus Leontief

Topic: Methodological aspects of input-output analysis II
Author: Ezra Davar

Cost of production (Supply price) of Goods: Walras versus Leontief

Abstract

By Ezra Davar

This paper discusses the relationship between Walras’s and Leontief’s determination of cost of production (supply price) of goods. It will be shown that, despite of that Leontief’s version is based on Walras’s theory and hence formally they are similarly, there are several crucial differences.
One of the conditions of equilibrium state according to Walras’s own law of equilibrium establishment is equality between supply price and demand price of each commodity separately for all four economies. However, since production economy, cost of production performs a role of supply price.
Walras considered three types of factors: land, labour and capital. In addition, Walras divided capital proper into two categories: fixed capital and circulating or working capital and stressed that they have different role in the calculation of cost of production. Yet, prices of new circulation capital goods equal price of goods multiplied by interest rate.
Leontief’s first compiled empirical input-output table and because of that the data, in general, were in monetary terms prices and quantities were not separated. Therefore, Leontief considered two different versions of input-output: (1) theoretical, where quantities (physical) and prices (money) are separated similar to Walras; and (2) according to empirical input-output, where quantities are in monetary terms and prices are in relative (or latent) form. Thirdly, Leontief’s theoretical model of input-output differs from Walras’s system despite and it does not completely describe reality. For example, issues such as money, capital (circulation), and others are discussed in very simplified form if at all. They are, in general, aggregated with other categories sometimes contradicting each other. Therefore, it is very difficult to take into account their influence on the calculating of cost of production. However, the results are considerably distorted from the point of reality.

Keywords: Walras, Leontief, Cost of Production, Money, Circulation Capital, Rate of Interest

JEL Classification: B3, B4, C6, D5

The Topic: 20. Examinations of the Input-Output Price Model
Preferred time my paper’s presentation is the Morning.

Author: Dr, Ezra Davar, Independent Researcher
Yehuda Hanasi St. 15/17, Netanya 42444 Israel
E-mail: ezra.davar@gmail.com

Comparative structural analysis of the Mexico economic regions, using interregional input-output models.

Topic: Regional input-output modeling III
Author: ALEJANDRO DAVILA FLORES

The results of a project conducted by the Network of Regional and Urban Economics, comprised of four Mexican academic institutions of higher education, consisting of build, with a common methodology seven interregional input-output models (IIOM) covering the entire national territory are used, for a comparative structural analysis of the economic regions of Mexico.

The IIOM are made up of two regions, the analyzed and the rest of the country. They were built using the indirect method best evaluated in the literature of subject (Flegg et al. 1997). It is a unique effort of regional research in Mexico and has allowed us to have comparative regional indicators (as regional multipliers and decomposition, considering the various effects associated with the impact of an economic phenomenon: initial impact, direct, indirect, income multipliers, spillovers and feedback effects) (Stone 1985. See Miller and Blair, 2009) .

In addition, there will be a comparative analysis of regional components of Gross Domestic Product, their respective uses, as well as the regional integration of exports and its share in regional income. Elasticities of total output, employment, wages and value added of each of the 7 regions studied are also discussed (Blair and Miller, 2009).

The economic impact of the artisanal fishing fleet: an application of input-output analysis for the case of Asturias (Spain)

Topic: Regional Input-Output Modeling
Author: Laura García de la Fuente
Co-Authors: Esteban Fernandez Vazquez, Carmen Ramos

TITLE: The economic impact of the artisanal fishing fleet: an application of input-output analysis for the case of Asturias (Spain)

Artisanal fisheries are defined as small scale fishing companies, normally owned by fishermen, developing their activity in the coastal area within a few hours from the ports where the vessels are based. At a European level it is widely accepted that artisanal vessels represent around 75–80% of the boats making up the European fishing fleet, and they are generally thought to constitute an important source of employment and income for many South European coastal communities as Asturias (northern Spain). However, there is little empirical quantification of the economic impact of this activity, due to the lack of detailed information on its output, intermediate consumptions or the primary inputs it uses.

This paper aims at quantifying the impact of artisanal fisheries in the region of Asturias by means of standard IO analysis. Taking as point of departure the symmetric IO table compiled by the regional statistical agency (SADEI) for 2010, and combining it with a recent survey conducted among the artisanal fisheries in the region, we disaggregate the IO information regarding the fishing activity distinguishing between artisanal and non-artisanal fisheries (industrial fisheries and aquaculture). This disaggregation is done by applying a standard matrix balancing technique based on the cross-entropy divergence (similar to RAS adjustment). The new IO table that differentiates the

artisanal fishing industry from other types of fishing allows for estimating the impact of these fisheries in terms of output, income and employment in the region.

Comparing Demand and Supply Multipliers: A Computable General Equilibrium Approach

Topic: Impact Analysis: Multipliers
Author: Francisco Javier De Miguel-Velez
Co-Authors: Maria Llop, Antonio Manresa

This paper presents an alternative methodological approach to compute demand and supply multipliers, by means of a computable general equilibrium (CGE) model. The analysis is applied to Extremadura, a small region located in the southwest of Spain. Demand multipliers are obtained by simulating demand increases in the foreign sector. Supply multipliers are computed by simulating productivity gains in each sectoral production technology. In both cases, we show the impacts on the main economic variables (prices, production and household welfare). This may allow to classify the key sectors according to these criteria. We also compare demand and supply multipliers to conclude if they show different information about the impact of the demand or supply exogenous stimulus considered. Given that the key sectors literature is traditionally limited to shocks in exogenous demand, our method can be considered novel in the sense that we take into account not only a demand perspective but also a production perspective. Our approach is useful to extend the knowledge about the sectoral ability to expand income and, additionally, it may suggest new conclusions for the economic and industrial policies.

TOPIC 25. Extensions in Multiplier and Linkage Analysis

The Offshoring of Business Functions in Global Supply Chains: Implications for Incomes and Jobs

Topic: Global Value Chain Analysis
Author: Gaaitzen de Vries
Co-Authors: Robert Stehrer, Marcel Timmer

This paper analyzes business functions involved in the various stages of global value chains across countries. We identify the emergence of global production networks by tracing the flow of goods and services across industries and countries in world input-output tables. The production of final manufacturing goods is decomposed into incomes and jobs in any country that are directly and indirectly needed for the various production stages. Our findings suggest that mature economies specialized in pre-production (e.g. R&D and design) and post-production stages (e.g. marketing and after-sales services), although patterns differ across countries. In all advanced countries, production jobs rapidly disappeared during the past decades.

Compilation of the supply and use/input-output tables according to the ESA 2010 for Estonia

Topic: Supply, Use and IO Tables: Future challenges in the SNA 2008/ESA 2010 (II)
Author: Iljen Dedegkajeva

This paper describes the main changes in the supply and use/input-output framework with the implementation of the ESA 2010. Some of conceptual changes (e.g. goods sent abroad for processing, research and development, weapons system) will affect production, expenditure and income components of GDP. As a consequence, the industry structure of the production and input/output coefficients will change significantly. This paper provides some examples which show the effects of the changes in the supply and use tables under the ESA 2010.

Compilation of US and EU supply, use and input-output tables in the European classifications and comparison of the two economies

Topic: Supply, Use and IO Tables: Different approaches to reconcile world trade asymmetries (II)
Author: Pille DEFENSE-PALOJARV

For the first time in autumn 2012 Eurostat has published along to European supply, use and input-output tables the US data in one similar activities and products classification (NACE, as the classification of activities, based on ISIC 4 and the CPA as the product classification bases on CPC). The paper will examine some of the assumptions made for the conversion (e.g. treatment of government enterprises, negative exports …) and compare the EU (including some major EU economies like Germany) and US economies.

An Application of the Hybrid Approach to Constructing Regional Input-Output Tables: Case of Izmir, Turkey

Topic: Regional input-output modeling I
Author: Cagacan Deger
Co-Authors: Osman Aydogus, Elif Tunali Caliskan, Gulcin Gurel Gunal

Authors:
Osman Aydoğuş (Prof. Dr, Ege University, Department of Economics)
aydogus@yahoo.com OR osman.aydogus@ege.edu.tr

Cagacan Deger (Ass. Prof. Dr, Ege University, Department of Economics, corresponding author)
cagacan@gmail.com OR cagacan.deger@ege.edu.tr

Elif Tunali Caliskan (MSc, Ege University, Department of Economics)
eliftunalicaliskan@gmail.com OR elif.tunali@ege.edu.tr

Gulcin Gurel Gunal (MSc, Ege University, Department of Economics)
gulcngurel@gmail.com OR gulcin.gurel@ege.edu.tr

Topic: 4. Estimating Annual, Regional, and Multiregional Input-Output Accounts

ABSTRACT

An Application of the Hybrid Approach to Constructing Regional Input-Output Tables: Case of Izmir, Turkey

Regional Input-Output (I-O) tables provide considerable information on interactions of sectors within a region's economy. Despite their considerable contributions to analysis, regional input-output tables (IOTs) are relatively few in number compared to national tables, primarily due to difficulties related to preparing regional IOTs. Once can prepare a regional IOT by holding comprehensive interviews and questionnaires in the considered region. This approach has high time and money costs. Alternatively, a regional table can be derived from a national IOT through a set of assumptions. But the reliability of assumptions is a major concern. Third approach is the hybrid approach to preparing regional IOTs.

The hybrid approach to constructing regional IOTs is cost efficient and relatively reliable. Even though road maps as to how to prepare regional tables are available, it is important to share experiences. It is also necessary to consider whether additional information provided by regional IOTs is worth the effort. This study details the preparation of the 2008 IZKA Izmir Table, a regional IOT constructed for the Izmir region. The important sectors implied by the regional I-O table are compared to IZKA's (Izmir Regional Development Agency's) previous analysis of the region to reveal the contributions of the regional table to the understanding of the region. It is concluded that IZKAs analysis and the regional table's results are consistent. Regional table provides more systematic sectorial details and points to sectors that should be examined in more detail through field work. Region's unique characteristics are identified. And the relative importance of sectors is quantified.

Keywords: input-output models, regional planning, applied regional analysis, hybrid regional tables
JEL Codes: C67, C81, O21, R11, R15, R58

The Impact of Population Ageing on Spanish Pension System: An approach

Topic:
Author: María del Carmen Delgado López
Co-Authors: Manuel Alejandro Cardenete Flores

The data show that the Spanish population, like Europe, is aging. This raises questions the viability of the Spanish pension system. In this study we evaluate the impact of demographic change on the labour market and the pension system with results tha we will be obtained from calibrated overlapping generations general equilibrium model for Spain in 2007. More specifically, this research aims to evaluate the effects of labour force decline and labour force ageing on several macro-economic variables and how population ageing impinges on the government expenditure constraint.

Modelling Rural Economies (MORE)

Topic: Input-Output Analysis of Tourism
Author: María del Carmen Delgado López
Co-Authors: Manuel Alejandro Cardenete Flores, Patricia D. Fuentes Saguar, Sergio Gomez y Paloma, CARMEN LIMA, Alfredo José Mainar Causapé, Sébastien Mary, José Manuel Rueda-Cantuche, Fabien Santini

This paper suggests a spatial impact analysis for Nomenclature of Territorial Units for Statistics 3 (NUTS 3) regions with the objective of capturing local rural/urban effects of the Common Agricultural Policy (CAP). The paper first builds a set of rural-urban SAMs for twelve NUTS 3 regions distributed across the EU, using official statistics and expert information locally available. With the help of CAP's Pillar I and Pillar II information at NUTS3 level, the SAMs are further used in a linear Computable General Equilibrium model for simple policy simulations. Finally, we identify backward and forward structural linkages as well as key sectors in each regional economy and we design an experiment consisting in exogenously shocking the demand of any combination of endogenous activities in the original SAMs, in order to capture the impact of the Common Agricultural Policy (CAP) in each NUTS3 for 2007.

The Statistical Reconciliation of Time Series of Accounts after a Benchmark Revision

Topic: Input-Output acccounts and statistics
Author: Tommaso Di Fonzo
Co-Authors: Baoline Chen, Marco Marini

In this study the 2003-2007 U.S. annual input-output accounts, GDP-by-industry accounts and expenditure-based GDP are reconciled with the 2002 and 2007 quinquennial benchmarks and all contemporaneous constraints of the input-output accounts for the in-between years. The series are adjusted according to statistical procedures able to deal with large systems of accounts subject to both temporal and contemporaneous constraints. Our objective is to adjust the preliminary levels of the series such that they (i) are consistent with the quinquennial benchmarks available, (ii) fulfill all the accounting relationships for any given year, and (iii) show movements that are as close as possible to the preliminary information. To this end we use a simultaneous least-squares procedure based on the proportional first difference (PFD) criterion, a movement preservation principle proposed by Denton (1971). According to our past experiences, we evaluate the possible adoption of (i) a pure proportional adjustment (PROP) for series with breaks and high volatility that deteriorate the meaningfulness of growth rates and (ii) a priori constraints for groups of variables according to their different reliability, where this can reasonably be assumed.

Evaluating the impact of alternative fiscal policy measures on public debt and on GDP with an input-output based model – application to Portugal

Topic: Input-Output Analysis for Policy Making
Author: Ana Maria Dias
Co-Authors: Emídio Graça Lopes

Following a public debt crisis, associated to soaring interest rates, after a decade of low economic growth and accumulated public and private deficits, Portugal has been involved since 2011 (until

2014) in an Economic and Financial Adjustment Programme (PAEF), under the joint assistance of the European Commission, ECB and IMF (the so-called Troika), aimed at restoring financial market confidence and at promoting sustainable economic growth and financial stability. The Programme has been acting on three fronts: fiscal consolidation, stabilisation of the financial sector and structural reforms.
In this paper we evaluate the impact of various alternative fiscal policy measures on public debt and on GDP using an input-output based model calibrated for Portugal, with the purpose of finding the "best" policies, in terms of having the lowest negative impact on GDP while attaining the same goal for public debt reduction and, therefore, making a contribution for policy planning.
This model is composed of a system of simultaneous equations, considering the interaction between macroeconomic and fiscal variables. It includes an input-output based block (determining output, employment and taxes, net of subsidies, on products by sectors), macroeconomic equations determining private disposable income and consumption, GDP, total employment and unemployment, and a public finance block which determines public deficit and debt. Model coefficients are estimated on the basis of a system of I-O tables for Portugal, 2008, as well as of other macroeconomic data.

Interregional feedbacks revisited from a global value chain perspective

Topic: Supply, Use and IO Tables: Global value chains, economic growth and environment
Author: Erik Dietzenbacher
Co-Authors: Michael L Lahr

Almost fifty years ago, Ronald Miller (1966, 1969) introduced the interregional feedback effects. They are calculated as the difference between the output (change) in a region for a given final demand (change) using a full interregional input-output model and using a single-region model. Interregional feedbacks reflect that stimulating the final demand in region A requires inputs from region B which, in their turn, require inputs from—and thus indirectly stimulate—region A again (perhaps via other regions). Feedbacks have been used to examine the importance of using a full interregional model rather than a single-region model. The results showed that interregional feedbacks are in general relatively small. In this paper, we revisit the feedbacks from a global value chain perspective and compare the results obtained from a world input-output model with those from a single country model. We argue that the feedbacks reflect a country's participation in the global value chain. If country A strongly depends on inputs from other countries and, vice versa, if other countries strongly depend on inputs from A, the participation of country A in the global value chain is considerable and it will show relatively large feedbacks. Although the size of the feedbacks is still small, it is the comparison over time and across countries that matters. We also calculate the so-called least upper bounds which indicate the potential for a country's participation in the global value chain.

Cellulosic Biofuel Potential in the Northeast: A Scenario Analysis

Topic:
Author: Naci Dilekli
Co-Authors: Faye Duchin

Secure access to energy and food are two of the challenges facing the Northeast region of the US. An alternative to traditional biofuel feedstocks, which compete for land and water, is advanced biofuel feedstock in the form of net forest growth and woody wastes, of which the Northeast has

abundant endowments. The federal government has committed to requiring 79.5 billion liters of advanced biofuel production annually by 2022.
This study introduces the production of biofuels, in particular cellulosic ethanol from woody biomass, in the economies of the Northeast as an alternative to gasoline. We evaluate both the capacity for its production and its cost competitiveness using an input-output model of consumption, production, and trade within the 13-state region. The model minimizes resource use required to satisfy given consumer demand for specified technological options and subject to resource constraints. We compile data from the technical literature quantifying state-level biofuel feedstock endowments and the process-level requirements for cellulosic ethanol production.
We find that exploiting this potential requires either restricting imports of gasoline or making the price of biofuels competitive through subsidies. Based on this initial investigation, we conclude that the region can produce significant amounts of advanced biofuel, up to 20.28 billion liters of cellulosic ethanol per year, which could satisfy nearly 12.5% of gasoline consumption that is now devoted to motorized transport in the region. Relying on import restrictions alone to assure full capacity utilization would increase the unit price of motor fuel in the region by 44%. Depending on the amount of subsidy, biofuel production could be competitive in some states but not in others. Using the 2007 spot price for gasoline in New York as a reference, a subsidy of $0.29 per liter (or $1.09 per gallon) would be required for the entire potential to be achieved.

Application of EE-IO models in the Flemish policy context : examples and requirements

Topic: Input-Output Analysis for Policy Making
Author: Evelien Dils
Co-Authors: Theo Geerken, Ann Van der Linden, An Vercalsteren

In Flanders, (regional) EE-IO tables with high resolution (120x120) have been developed in recent years, both for 2003 and 2007. The model includes data on imports and exports, both from and to Europe (data from EU NAMEA 2000, adapted resolution) and the rest of the world (US IO 1998, adapted resolution). Data availability on economic and environmental side have influenced the current model structure. Meanwhile, the Flemish EE-IO model is used in several policy studies, but the general feeling is that the model offers much more (unexploited) opportunities. For that reason the Flemish Environment Agency commissioned VITO a study to assess as many examples as possible of studies that use an EE-IO model to support environmental policy making at any stage of the policy cycle. Based upon our experience so far and the knowledge we will gain in this study, we will highlight in our presentation some important issues when developing regional EE-IO-models to ensure a maximal potential for policy assessments.

The first policy study based upon the Flemish EE-IO model is the assessment of the environmental impact of Flanders from a production as well as a consumption perspective. This study already pointed out new requirements to the sectoral level of the model for food related studies: the dis-aggregation of the single (due to economic data) overarching agricultural sector. Other policy studies, focused on sustainable materials management and ecodesign, identified other new requirements to the model e.g. the need for a better representation of the recycling sector. So an important point of attention is the definition of the sectoral level in the model. Other issues are related to the environmental extension tables: how to include primary and secondary materials in physical amounts and allocate these to the correct sector? For that reason it is highly important to clearly identify the policy applications that need to be addressed by the EE-IO model, before starting to develop and complete the model itself.
The presentation aims to give a critical but constructive view on regional EE-IO models and discuss

points of attention and opportunities to ensure that the wide range of policy applications for EE-IO model can be actually exploited.

This study is financed and coordinated by the Flemish Environment Agency. The EE-IO-model is developed under coordination of the Public Waste Agency of Flanders.

Net Indirect Taxes and Sectoral Structure of Economy

Topic: Input-Output Accounts and Statistics
Author: Emilian Dobrescu

Usually, the sectoral structure of economy is measured either a) as weights of the main branches in total gross value added (wvi) or b) as the respective weights in gross domestic product (wgi). The differences between vectors a) and b) infer from the distribution of the net indirect taxes rates (rniti), which represent ratios of the sectoral net indirect taxes to the corresponding gross value added.
This issue has been explored using the Input-Output tables of Romania for almost a quarter of century, which offers a double advantage. On one hand, the exercise can e considered relevant since the series are annually and methodologically homogenised for the entire period (years 1989-2011) according to the last Eurostat classification. On the other hand, such an application is interesting because data relates to a very dynamic structural process, as the one registered by the Romanian economy during transition from the centrally planned system to the functional market mechanisms. To be acknowledged that primary information resulted from the extended branch nomenclatures (from 90 to 105 positions) has been aggregated into ten sectors.
The comparative analysis of the mentioned sectoral vectors involves five structural coefficients (SC), derived from the Euclidean 1-norm distance, Bhattacharyya coefficient, Hellinger distance, Cosine similarity coefficient, and the so-called Jaccard index.
There are also examined some computational ways to estimate – as autoregressive processes - the sectoral rates of the net indirect taxes.
Several concluding statements end the paper.

An Input-Output Model with an Expanded Composition of Endogenous Parameters: Synthesis of the Keynesian Income Multiplier and the Leontief Model

Topic: Methodological aspects of input-output analysis I
Author: Zorikto Bato-Dugarovich Dondokov

The author develops a «household income input-output model» (HIIOM), in which household consumption is included into the category of endogenous parameters. This model is based on a hypothesis of homogeneity of intermediate consumption and consumer expenditures, which determines the possibility of their summation for modeling.
According to the proposed approach, income and expenditures of households are considered across sectors. Each household is considered as a separate economic unit receiving income in certain sectors and using it for the purchase of products of various sectors.
The households are grouped into sectors according to the sources of their income. The column-vector of household consumption is substituted with a «household income input-output matrix», the structure of which is analogous to the 1st quadrant of input-output table.
The author conducted a comparative analysis of this model against other input-output models that include household consumption into the composition of endogenous parameters – Social

Accounting Matrices, the Miyazawa model.
The method of forming «household income-expenditures matrix» is explained stage by stage. The author describes basic statements in the questionnaire on household income and expenditures. Distinctive features of this questionnaire are that the distribution of income and expenditures is conducted in accordance with the All-Russian National Classification of Economic Activities. The author also describes the process of developing a matrix of household expenditures based on the results of population survey, as well as the algorithm of creating the matrix of household income and calculating relevant coefficients.
Finally, the paper presents the results of experimental calculations of the matrix based on the study conducted in the Republic of Buryatia, one of Siberian regions of Russia.

Development of Input-Output Tables in Russia: Experience of the Republic of Buryatia

Topic: Regional Input-Output Modeling
Author: Zorikto Bato-Dugarovich Dondokov
Co-Authors: Konstantin Pavlovich Dyrkheev

The goal of this article is to present Input-Output Tables (IOT) for the Republic of Buryatia (RB), one of Siberian regions of Russia, for 2011. In the Russian Federation, such IOT are developed for the first time since 1995. Before that, IOT, then called intersectoral balances, were created by the Central Statistical Administration of the USSR on a regular basis (for the years of 1959, 1966, 1972, 1977, 1982 and 1987). Presently, basic input-output tables in Russia are created according to the System of National Accounts methodology, which corresponds to market economy, and based on the All-Russian National Classification of Economic Activities.
IOT for RB have been developed in accordance with international and Russian standards and include four types of tables:
• Resource table of goods and services;
• Use tables of goods and services;
• Symmetric input-output table;
• Auxiliary table of extra transport and trade charges, taxes and subsidies for products.
These tables are composed for 50 different economic activities based on the information on large and medium enterprises of the private sector, budget organizations, as well as on a sample of small and individual enterprises.
The authors conducted a comparative analysis of direct, indirect, and total costs, and evaluated the degree of openness of the region at the sectoral level. The article also provides the results of scenario calculations of indicators of the social and economic development of the region, including tax revenues and employment.

A New Interregional Input Output Table for China: Construction and Application

Topic: Global Value Chain Analysis
Author: Yuwan Duan
Co-Authors: Erik Dietzenbacher, Bart Los, Cuihong Yang

Given China's high involvement in globalization and the serious regional inequality, the issue how the globalization extends inside China has aroused high attention in academia. However, the existing studies ignore a pronounced feature of China's foreign trade: the prevalence of processing trade with uneven distribution between regions. Due to the distinctive input structure of processing

exports, the previous studies which fail to separate the processing exports apart from other productions may lead to biased estimates or misleading conclusions. In order to capture a true picture on China's regional involvement in globalization as well as its domestic value chain, we aim to construct a new interregional input-output table for China which differentiates the production of processing exports from other productions at regional level. We will firstly describe how the information from a wide range of data source have been harmonized and used to arrive at the new input output table. Then, some applications based on the new table are further thoroughly addressed.

Tracking Footprints at the micro and meso scales: An application to the Spanish tourism by regions and municipalities

Topic:
Author: Rosa Duarte
Co-Authors: Ignacio Cazcarro, Julio Sánchez Chóliz

The differences between the footprints estimations at the consumer and producer levels have been widely discussed in the literature of input-output with different treatment of responsibilities. Some methodological questions related to this are those related to the assumptions on the treatment of imports or sectoral scale at which the analysis are performed. In this case, we highlight the capabilities of combining the meso level input-output models with the GIS and micro data to lower the spatial scale, especially in order to provide information to local municipalities/villages/business on how to track their footprints, further than the level (17 Spanish regions or Autonomous Communities) at which we are capable of having economic input-output data. Previously we had developed a multiregional input-output model for these regions and the regions of European Union and Rest of the World, to move again towards the explicit spatial identification of areas of strong final demands (normally the most populated) linking them to the original hotspots or vulnerable areas, where most direct grey water consumption had taken place. In this line, we present a specific application, where these aspects are shown more clearly since consumers and producers usually have very different origins, in particular looking at the tourism statistics, lifestyles and type of expenditures.

Access to Resources and Resource Rents

Topic: Addressing Resource Challenges in a Globalized Economy I
Author: Faye Duchin

Decisions impacting the worldwide economic system reflect rules of global multilateral institutions such as the World Bank and the IMF, regional multilateral and bilateral arrangements such as the European Union and NAFTA, and unilateral actions taken by individual nations. In these early years of the 21st century, the need for cooperative solutions for three emergent sources of global instability becomes clear: preventing financial crises and containing their spread, reducing pressures on resources and ecosystem services, and moderating highly skewed distributions of income and wealth. The meso-level relationships that characterize input-output economics make it uniquely well situated to help understand and address these challenges. The first step is articulating the new kinds of questions that need to be investigated and representing them as scenarios embodying potential solution concepts. It is these questions that need to drive the necessary conceptual extensions to analytic input-output frameworks and the identification and systematic incorporation into input-output databases of supplementary sources of information. This paper addresses three

sets of incentive, regulatory, and intervention structures, intended to discourage trade imbalances, reduce environmental footprints, and help weaker parties negotiate the sharing of scarcity rents on resources. The idea is to create simple and transparent blueprints of how such actions might be implemented, ones that could be applied in tiers to countries at different stages of development. These would provide the material for scenario formulation.

Global Economic Networks: Tracking Material Flows and Money Flows, Downstream As Well As Upstream

Topic: Inpu-Output Economics and Network Theory I
Author: Faye Duchin
Co-Authors: Stephen Harris Levine

Environmental Efficiency Analysis of Biodiesel from Waste Cooking Oil

Topic: Productivity and efficiency analysis I
Author: Shogo Eguchi
Co-Authors: Shigemi Kagawa, Sangwon Suh

Environmental Efficiency Analysis of Biodiesel from Waste Cooking Oil

Shogo Eguchi†*, Shigemi Kagawa†, Sangwon Suh§ and Yuki Kudoh‡

†Faculty of Economics, Kyushu University, 6-19-1 Hakozaki, Higashi-ku, Fukuoka 812-8581, Japan
§Bren School of Environmental Science & Management, University of California, Santa Barbara, 3422 Bren Hall, CA, USA
‡Research Institute of Science for Safety and Sustainability, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan
*Corresponding author: miero2004jp@yahoo.co.jp

Abstract
This study presents an assessment of the productive and environmental efficiency of an advanced biodiesel plant in Japan using Slack-adjusted Data Envelopment Analysis (S-DEA). The empirical analysis uses monthly input data (waste cooking oil, methanol, potassium hydroxide, power consumption, and the truck diesel fuel used for the procurement of waste cooking oil) and output data (biodiesel, glycerin, and life-cycle CO2 emissions derived from producing biodiesel) of the biodiesel plant for August 2010-March 2013. Based on the environmental input-output database, we estimated life-cycle CO2 emissions associated with the biodiesel productions with and without the life-cycle emissions as an environmental externality in the S-DEA framework. The results show that of the 32 months, there are 12 whose productive efficiency scores as estimated by the S-DEA without environmental externalities are unity (maximum) and the lowest score is 0.83 (February 2011). In addition, the environmental efficiency scores were estimated by the S-DEA including environmental externalities and it was found that the productively efficient 12 months are also environmentally efficient. The unit production cost in the month with the lowest productive efficiency was \13 yen/L. As a result, the highest unit production cost was \19 yen/L in December 2012, while the lowest unit production cost was \10 yen/L in March 2011. Comparing the efficient production cost to the mean unit production cost on the production possibility frontier at \4 yen/L revealed that

the cost of producing the average amount of biodiesel during the study period could be reduced by as much as \120,000 yen. This study goes on to discuss how the biodiesel plant could improve its production activities, regarding the enterprise input-output structure.

Labor force requirement and return migration policy in Romania

Topic: Input-Output Analysis for Policy Making
Author: Andrea Karim El Meligi
Co-Authors: Maurizio Ciaschini, Nicoleta Anca Matei, Claudio Socci

The cohesion policies promoted by the European Union aim at creating economic and social conditions that lead all member states to the euro convergence criteria.
Since 1992, as enshrined in Article 159 of the Treaty on European Union, the Structural Funds are of primary importance in order to meet this goal and constitute an important EU policy instrument to bridge the gap between areas with specific needs of intervention and development.
The study focuses on the evaluation of the structural plans and provides a tool for analyzing the direct and indirect effects of these funds with reference to the 2014-2020 Romanian Programming.
The contribution aims at assessing the employment impact for different income groups by measuring the system's capacity of creating both new investments as well as new jobs and, as a second step, to assess its ability of attracting labor force, when exogenously assuming to satisfy the domestic labor demand.
This analysis requires the construction of an accounting scheme that comprehensively includes the circular flow of income and that takes into account also the labor demand, giving a picture of the workforce. To this end, a Social Accounting Matrix (SAM) is proposed as a tool able to provide a complete framework of analysis and as a starting point for a dynamic application, able to take into account exogenous components.
The paper therefore makes use of a dynamic multisectoral extended model taking into account the exogenous shocks of the programmed policy, where the requirement of labor depends on the production changes.
An external accounting scheme, related to migratory flows and disaggregated by economic sector, will form the basis for the evaluation on the effect of an unexpected return migration policy. The short-term dynamic model will be used for assessing the labor force growth for the seven years of programming when examining two hypothetical scenarios. The first one will take into consideration the dynamics given by the domestic labor force, and the second one will propose an assessment of the impact considering back migratory flows of the labor force from abroad. Finally the two solutions of the model will provide an overall assessment of the impact of structural funds on the domestic and foreign labor force.

Keywords: Labor force growth, Return migration policy, Social Accounting Matrix, Dynamic multisectoral model.
JEL codes: E16, H23, O15, O52.

Measuring the built environment carbon footprint: a case study of Brisbane

Topic: Environmental input-output modeling VII
Author: Romulo Neves Ely
Co-Authors: Diana Carneiro, Guangwu Chen, Thomas Oliver Wiedmann

A number of studies have been published demonstrating the importance of measuring greenhouse gas (GHG) emissions from a consumer perspective in addition to the traditional producer perspective, triggering debates among politicians with respect to countries' responsibility for carbon emissions. Multi-Region Input-Output (MRIO) Analysis has been used as an appropriate tool for GHG emissions studies appraising the trade between the regions: country, state and city-level, for example. It has been shown in the literature that more detailed MRIO tables (high level of sectors and regions) are more likely to produce reliable results. Whilst MRIO tables have not been available for small regions in the past, this situation is about to change with the emergence of new techniques for regionalisation of IO table. The Australian Industrial Ecology Virtual Lab is such a detailed MRIO, including environmental satellite accounts. Thus, we are able to obtain an MRIO table of one specific city and check its relationship with the rest of the state, the rest of the country and the rest of the world. We aim to assess Brisbane's carbon footprint, especially from the construction sector and the built environment. Brisbane's recent economic growth caused a boom in the construction industry. We seek to evaluate city's responsibility for CO2 emissions in the built environment, from the producer and consumer perspective.

The Policy Space Dimentions of Trade in Value-Added

Topic: Global Value Chain Analysis
Author: Hubert Escaith

The paper is still in progress. Hare are the main points: Motivation, expected results, limitations.

Thanks to an increasing international fragmentation of production networks, Global Value Chains (GVCs) have become a dominant feature of today's global economy. This phenomenon has variously been called fragmentation, unbundling, offshoring, vertical specialization, slicing-up of the value-added chain or trade in tasks. This new phase of the globalization process challenges conventional understanding on how to interpret trade and, therefore, trade policies. Some researchers even suggest GVCs, by undermining the old Ricardian law of comparative advantages, determined a paradigm change in international economics (Grossman and Rossi-Hansberg, 2006). Even if this remains an open question, the fact is that GVCs alter many of the stylised facts on which international economics models are based.

Yet GVCs are still an unchartered territory, from an empirical perspective. While anecdotic data were available through cases studies, aggregate level analysis have been more limited. It is not before the 2000s that systemic efforts to produce internationally consistent estimators were put in place, first in the academia (eg, Daudin et al., 2006, building on Hummels et al., 2001) then thanks to national and international statisticians. Building on the results of research projects, in particular from IDE-JETRO and WIOD, the first "official" databases fully dedicated to the measure of trade in value-added indicators was released in 2013 by OECD and WTO (see OECD-WTO, 2012 for a background and technical notes on the TiVA database).

The proposed essay intends to start filling this empirical gap on the policy dimensions of trade in value-added by building a typology of value-added traders according to their structural economic

characteristics and their trade policy options. In this perspective, the approach adopted here differs and complements the research programmes aiming at mapping global value chains from the trade network geographical perspective (who trades what with whom?) as is most often intended (Ng and Yeats, 1999; Koopman et al., 2012; De Backer and Miroudot, 2012, to cite only a few) or derive, from a theoretical/normative perspective, implications for trade policy options.

In particular, the paper will look into the structural and trade policy determinants of vertical specialization and the domestic content of exports, two of the most common measure of trade in value added. This study will build on on-going research being done at WTO-Statistics in two directions: (i) Trade policy and Effective Protection Rates that derive from crossing input-output coefficients with tariff databases; and (ii) The TiVA trade profile of the various economies (based on the sectoral value-added composition of their exports) in relation with a series of economic and policy variables, including the tariff schedules mentioned in (i) but also covering characteristics that reflect the comparative advantages of each country and its level of development.

The methodology used is based on Exploratory Data Analysis and Graph Theory. To our knowledge, this is one of the first attempts (if not the first one) at this kind of empirical approach in the policy space. Exploratory data analysis does not pretend to identify causalities and models but aims at helping the analysts and decision makers in organizing their empirical knowledge by pointing at underlying patterns and stylised facts. In this sense, it is a contributing factor to further research. At the time of writing the report, the process obviously suffers also from a selection bias in the choice of the relevant variables, as the TiVA database is still very much focused on OECD and emerging countries.

Economic Growth, Social Class Inequality and Poverty in Mexico: A Multisectorial Dynamic Model

Topic: Input-output analysis for policy making II
Author: Moisés Espitia
Co-Authors: Alejandro Díaz, Noé Arón Fuentes

The document presents a dynamic multisectoral model that attempts to describe the relevant connections between economic growth, dynamics of social classes, and levels of poverty in Mexico's case.The simulation model focuses on two critical aspects of economic development, such as, the sectoral composition of the product and the structure of income distribution. The model for evaluating the effects of different economic strategies of poverty reduction and the dynamics of the different social classes, introduces three crucial variables; public investment policy, distributive income policy, and the policy of external indebtedness. The combination of these three policies constitutes a strategy of economic development.

The model (based on Buzaglo y Calzadilla, 2010) evaluates the impact of three different neo-liberal economic development strategies implemented in Mexico: 1) the renegotiation of the external debt that would reduce the amount and service, would provide certainty to the economy, leading to the entry of external resources in the form of foreign direct investment and portfolio, and would have bearing directly on production growth and indirectly on the distribution of income; 2) the privatization of public enterprises that would improve public finances and raise social spending by the Government; and, 3) the trade liberalization that would allow a greater dynamism of exports and imports (trade balance), and a benefit of the labor sector. These different strategies of development produced heterogeneous effects among economic sectors, the dynamics of social classes, and levels of poverty.

Key words: Economic Growth, Poverty, Dynamic Simulation.

A pretopological analysis for amplification and absorption effects in the economical structure: a comparison of Mexico with center, center-periphery and periphery countries

Topic: Input-Output and the Network Theory
Author: José Manuel Márquez Estrada

This paper is based on pretopology analysis to study the infl uence, received and exerted, by a group of economic sectors constituted as a community. So, input -output matrix of different countries, centers (Germany and USA), center -peripheries (Canada and Korea) and peripheries (Mexico and Brazil) in two di erent years (1995 and 2009), are analyzed. The communities are conformed by the spectral method. Its results are used trow a economic historical point of view.

Network analysis of embodied water circulation using input-output model of socio-economic resource flows

Topic: Input-Output and the Network Theory
Author: Delin Fang

The circulation of embodied water, also known as virtual water, in socio-economic systems has been the center of concern in recent years. An input-output model can represent monetary flow or embodied water flow, which provides a perfect foundation for the investigation of water circulation in a socio-economic system. However, most models ignore the cycling and indirect flows, making it difficult to interpret efficiency of water utilization and sector relationships from a holistic perspective. In this research, based on input-output model of embodied water, we use a network analysis method originally applied for ecological systems to investigate a socio-economic water system, specifically, the Ganzhou region of China. Structural and throughflow analyses derived from network analysis provide a holistic perspective, to reflect its connectivity and interpret the water utilization efficiency by considering the cycling and indirect flows. Furthermore, sector analyses, using control- and utility-based methods, were conducted to further illustrate the relationship between sectors, which can provide a more in depth picture of the sectors role as donor or recipient in the system. This allows one to illustrate the economic or environmental driving force normally hidden without whole system indicators. An interpretation of this method when used for socio-economic embodied water circulation was conducted to further demonstrate their potential application to embodied resources research in socio-economic systems.

The Impact Analysis of TTIP on BRICs—based on dynamic GTAP model considering GVC

Topic:
Author: Cai Song Feng
Co-Authors: Yaxiong Zhang

Within the global value chain (GVC), the intermediate inputs of the products in one country come from various countries around the world, the imported products consumed in domestic may also

include the domestic intermediate inputs. Therefore, it is very important to reflect this GVC characteristic when Using GTAP (Global Trade Analysis Project) model to analyze the trade policy. Because of the lack of necessary data, the Armington assumption of trade linkage is implemented in two levels in the GTAP model: producers and consumers distinguish the domestic variety of a good from its imported variety without regard to the country of origin of the imported input; the sourcing of imported goods is placed at the border of an economy. In order to improve this common approach which simplifies the import decision at the border level, we introduce the WIOD（World Input-Output Database）with a micro-based determination of bilateral trade to place the sourcing of imports at the agent level. In this study, we use the improved dynamic GTAP model (we call it GTAP-GVC model) to assess the economy-wide impact of TTIP (Transatlantic Trade and Investment Partnership) on BRICs. In the simulation, we mainly do the work in two aspects. Firstly, we reduce both tariff and non-tariff barriers (NTBs) between US and EU. Because average tariff levels on both sides of the Atlantic are relatively low already, various non-tariff barriers or NTBs (often in the form of domestic regulations) on both sides of the Atlantic constitute important impediments to deepening transatlantic trade linkages. For quantification of NTBs, this study has adopted the equivalent tariff levels of NTBs from the research results of Ecorys (2009) to capture the impact of removing NTBs. Secondly, the simulations that are carried out also take into account two sets of possible spillover effects beyond bilateral liberalization. These are defined as follows. First, we have included direct spillover. It is based on the assumption that improved regulatory conditions negotiated between the EU and the US will also result in a limited fall in related trade costs for third countries exporting to the EU and US. A second indirect effect involving third countries is considered as well: the indirect spillover. It means to gauge the economic implications if third countries adopt some of the common standards agreed between the EU and the US.

THE GENERALIZED DYNAMIC INPUT-OUTPUT PRINCIPLE

Topic: Structural change and dynamics III
Author: GUANGMING FENG

THE GENERALIZED DYNAMIC INPUT-OUTPUT PRINCIPLE

Abstract
   My book, entitled as "The Generalized Dynamic Input-Output Principle " will be published in Chinese (about 280,000 words) by China Economic Publishing House http://www.economyph.com/ec/index.asp this February or later, has been advancing the Nonlinear Model of the Generalized Dynamic Input-Output System (NMGDIOS) and solving its optimal solution of Pontryagin maximum. The Generalized Dynamic Input-Output System(GDIOS), on the theoretical plane, which is going to be the result from the synthesis of the optimal control theory, the general reproduction, the productivity theory and the input-output analysis, not only includes both the NMGDIOS and the Linear Model of the Generalized Dynamic Input-Output System (LMGDIOS), but also has the comparative research of dynamic compositions and the optimum analysis of national economic models.

Facing a few of input-output tables, like the count of distinct digital map recorded around the world in a year or a certain period of the national economy. But, the input-output table of different years, however, can only indicate an isolated, static state at one time point of national economic situation, does not reveal which exists the inner and inevitable connection among different input-output tables.

Now the dynamic input-output model has been divided into closed and open, continuous and discrete type, and other forms, since 1948, when D. Hakins proposed in the form of differential equations describe dynamic input-output models. But, as so long as limiting the dynamic

input-output analysis on the basis of the nature time series, is to meet the inconsistency problem between the theoretical prediction and the actual event on the time step size or the time point etc., which does not have the inevitable reproducibility characteristics necessary to predict the future events.
   Mach believed that a measure of the time and space is associated with physical movement. Hume believes that space and extensive than anything else, but in a certain order distribution of visible object full of space, and time is always a can change the object perceptible change was found. However, the significance of historical progress about time and space concept by Mach and Hume, which is the negating and criticizing the Newton's absolute rest time space view. As a case in point is that due to Mach and Hume about time and space concepts, in 1905, Einstein using Lorentz transformation introduced a speed of light is constant and the postulate of relativity, created the Special Relativity. Thus to people's inspiration is: there is no absolute rest of reference, time of measurement is also varies with its frame of reference.
   The Production Function Structure Classification(PFSC) in my book, as the result from my research for the evolution of labor instruments in human history, is the comparison study among laborers, his tools and its functions in historical evolution, abstracts have common characteristics and generalization. Therefore, carried out classifying sectors in accordance with the PFSC, to span of time step beyond nature and to get rid of the fixed time step and its sequence, thus makes the input-output analysis based on the qualitative change of productive forces in history, and is closely related to laborers, his tools and its functions, that come into being common rhythm or developed on the basis. So I use the PFSC to classify different structures for the input-output system and to approach the evolution of the varied typal input-output systems from lower type to higher one in accordance with different typal productive forces.

The GDIOS can be regard as making the choice in the varied time point, which connects with every type or each stage of productive forces and with the process of social reproductions, based upon the dynamic structure and balance conditions of the varied productive forces, so that the GDIOS has a few of characteristics, due to the PFSC, such as speeding up the economy development, shortening the production cycle and raising productivity etc.

In book, I try using the principle of Pontryagin maximum, by constructing the Hamiltonian, forming and solving the corresponding Jacobian matrix, calculating with inhomogeneous differential equations solution and general solution form, thus constitute the Pontryagin maximum solution for the Generalized Nonlinear Dynamic Input-output Model and deduce the coexistence of diverse types.

Name: FENG, GUANGMING
Home address: Room 401, 39-32 Development Avenue,
Wuhan, Hubei 430022, P.R.of China
Tel：++86-27-83730957 ; 15327399670
E-Mail: fenggm1954@163.com
Date: January 10, 2014

The economic impact of the artisanal fishing fleet: an application of input-output analysis for the case of Asturias (Spain)

Topic:
Author: Esteban Fernandez Vazquez
Co-Authors: Carmen Ramos

Artisanal fisheries are defined as small scale fishing companies, normally owned by fishermen, developing their activity in the coastal area within a few hours from the ports where the vessels are based. At a European level it is widely accepted that artisanal vessels represent around 75–80% of the boats making up the European fishing fleet, and they are generally thought to constitute an important source of employment and income for many South European coastal communities as Asturias (northern Spain). However, there is little empirical quantification of the economic impact of this activity, due to the lack of detailed information on its output, intermediate consumptions or the primary inputs it uses.

This paper aims at quantifying the impact of artisanal fisheries in the region of Asturias by means of standard IO analysis. Taking as point of departure the symmetric IO table compiled by the regional statistical agency (SADEI) for 2010, and combining it with a recent survey conducted among the artisanal fisheries in the region, we disaggregate the IO information regarding the fishing activity distinguishing between artisanal and non-artisanal fisheries (industrial fisheries and aquaculture). This disaggregation is done by applying a standard matrix balancing technique based on the cross-entropy divergence (similar to RAS adjustment). The new IO table that differentiates the artisanal fishing industry from other types of fishing allows for estimating the impact of these fisheries in terms of output, income and employment in the region.

Empirical estimation of non linear input-output modelling: an Entropy Econometrics approach

Topic:
Author: Esteban Fernandez Vazquez

Non-linear input-output (NIO) modelling, despite the relatively rich literature that developed its theoretical basis, has been only very modestly applied to empirical analysis. The main reason for this lack of empirical estimation of NIO models is that the number of parameters to estimate is much higher than the number of available data points. In order to solve this problem, calibration techniques are usually applied (as in the case of GCE estimation).

This paper proposes an alternative approach to estimate NIO models. Taking advantage of the proliferation of IO databases in the last few years; and by applying an estimation strategy that relies on entropy econometrics, the paper suggests estimating (instead of calibrating) the parameters that characterize a non-linear relation between inputs and output. This nonlinear model is characterized by having scale dependent input coefficients, instead of fixed ones. Several types of multiplier can be calculated from this nonlinear model, allowing for calculating confidence intervals of our results. The proposed technique is developed and then illustrated by means of an empirical application where the parameters that characterize a NIO model are estimated for the Spanish economy.

Spill-over effects in the Portuguese economy: Lisbon Metropolitan Area vs. Rest of the Country

Topic: Regional input-output modeling V
Author: João Pedro Ferreira
Co-Authors: Eduardo Barata, Luís Cruz, Pedro Nogueira Ramos

A quantitative understanding of complex urban growth patterns and processes is crucial for urban development planning in cities. In the last 6 decades, the Great Lisbon metropolitan area population has increased more than 110% while the Portuguese population increased only slightly more than 20%. Additionally, the share of the Great Lisbon metropolitan area in national population (27%) is higher if considered both in terms of employment (29%) and economic weight (37% of GDP). Indeed, this area has been one of the preferable location for headquarters of Portuguese companies and is specialized in specific types of services (financial, insurances, communications, education and health) and in the production of some industrial products.
This research proposes a multi-regional input-output model approach with 3 regions (the North Lisbon Metropolitan Area, the Setubal's Peninsula and the Rest of the Country) to assess social and economic impacts of changes in exogenous final demand and to analyse how the associated output and employment flows are distributed among the Portuguese regions. This study is a development of MULTI2C approach, a general flexible procedure, developed by a group of researchers from the University of Coimbra, Portugal, that allows to adopt different geographic configurations. Accordingly, the process of deriving supply and demand for products in this region is described as well as the estimation of inter-regional trade. One important feature of this model is the distinction between the final consumption of five types of household's: the ones that live from labour income, landlords (of rented houses/offices), the ones who live from retirement benefits, from other social transfers and finally the ones whose income comes mainly from other forms of capital-income.
The main aim of this research is to assess how changes in the demand for different products, in the different regions, contribute to employment changes in these regions and, thus, to strengthen or to reverse the urbanization trend in the Lisbon metropolitan area".

Construction of Regional Input-Output Tables in Practice

Topic: Regional input-output modeling III
Author: Jakub Fischer
Co-Authors: Jaroslav Sixta, Kristyna Vltavska

The paper illustrates our methodology for construction of regional input-output tables in practice. It combines existing national input-output tables, sector accounts and regional accounts. The methodology is illustrated on the Czech example and provides a practical guide how to construct the tables from officially published input-output tables. General procedures are theoretically very well described in input-output devoted literature but there is still a long way to get useful results and construct regional tables with consistent and comprehensive data. The key approach lies in a practical compromise between regional accounts, sector accounts and input-output tables. The core of the method lies in splitting SNA 93 / ESA 95 input-output tables into directly separable and non-separable items. Then there is found a link between regional accounts and non-separable items with respect to current practise and quality of kind-of-activity unit definition. The paper illustrates the methodology from the construction of regional output matrices to the complete and balanced set of symmetric input-output tables for 14 regions of the Czech Republic. The aim of the paper was also to provide hints and explanation of obstacles found out in the construction of regional input-output tables.

Empirical Evidence on the Use of the FLQ Formula for Regionalizing National Input-Output Tables: The Case of the Province of Córdoba, Argentina

Topic: Regional Input-Output Modeling
Author: Anthony Travers Flegg
Co-Authors: Leonardo Javier Mastronardi, Carlos Adrian Romero

Regional input-output tables are a very useful tool for regional planning, yet constructing a survey-based regional table can be a complex, expensive and lengthy task. As a result, regional tables based primarily on survey data are rare. An exception is the province of Córdoba in Argentina, which is fortunate in having a detailed survey-based table for the year 2003 with 124 sectors. Our primary aim is to make full use of this rich data set in assessing the relative performance of alternative non-survey methods for constructing regional tables. Our focus is on the application of the FLQ formula for regionalizing national input-output tables.* Particular attention is paid to the problem of choosing a value for the unknown parameter δ in this formula. Along with regional size, the value of δ plays a crucial role in determining the adjustment for interregional trade in the FLQ approach. The paper seeks to add to the limited amount of empirical evidence that exists on the choice of an appropriate value for this parameter. Two alternative approaches that have been proposed in the literature are evaluated. The results indicate that one of these, which is based on a regression model that attempts to capture key regional characteristics, offers a promising way forward. A test is also carried out of differences between regional and national technology, and a way of making suitable adjustments for technological differences is examined.
* See, for example, Flegg, A.T. and T. Tohmo (2013) Regional Input-Output Tables and the FLQ Formula: A Case Study of Finland. Regional Studies, 47, 703-21, first published on 25 August 2011 (iFirst), doi:10.1080/00343404.2011.592138.

A Re-elaboration of the Strategic Planning Model for the Mexican Economy: An Application to Poverty Reduction Strategies.

Topic: Regional input-output modeling I
Author: Carlos Flores
Co-Authors: Alejandro Brugués, Noé Arón Fuentes, Germán Osorio

Buzaglo (1985) seminal dynamic multisectorial model brings focus to two critical aspects of the development and poverty reduction process, namely output structure and the structure of income distribution. In the model, the evolution over time of the multisectoral output structure is influenced by sectoral investment, which determines sectoral output growth (given the level of investment efficiency specific to the different sectors). The structure of the multisectoral distribution of incomes by size directly influences the incidence of poverty (lower income shares for low income groups imply greater poverty), and indirectly influences overall growth, trough its effect on the level of saving. A complete mathematical description is given (Buzaglo and Calzadilla, 2001, 2002, 2008, 2010). This text presents a re-elaboration of the strategic planning of the Mexican economy dynamic multisectorial model. The new version of the model involves a redefinition of three aspects.
At the empirical level, the new national input output matrix forms the basis of information (INEGI,2008). At the conceptual level, we incorporate a refinement of the behavior of the external sector, external debt and production. And, at the programming level, the computer simulation is STELLA / IThink (9.1.3). As the model application we analyze the poverty reduction strategies in México.

INDUSTRIAL SYMBIOSIS AS AN EMERGING PROCESS DRIVEN BY AN ENTERPRISE INPUT-OUTPUT MODEL

Topic: Input-Output economics and industrial ecology - LCA analysis
Author: Luca Fraccascia
Co-Authors: Vito Albino, Ilaria Giannoccaro

Industrial symbiosis concerns the cooperative exchange of resources through business networks. In the literature the mechanisms of inter-firm resource exchanges have been largely investigated (Chertow, 2000; Ehrenfeld and Gertler, 1996), whereas less attention has been devoted to study their creation and development (Chertow and Ehrenfeld, 2012). At this regard, the economic convenience is generally considered the most important driver (Chertow, 2007); however it is also recognized that trust plays an important role in sustaining cooperative relationships (Hewes and Lyons, 2008).
A critical debate in the literature concerns the extent to which such industrial symbiosis networks should be designed by adopting a top-down approach, such as the eco-industrial park model, or, conversely, should be let emerge from the bottom, as the result of a spontaneous, self-organized process undertaken by the involved firms. In the last years, literature seems to converge in considering the latter the most promising model (Chertow, 2007; Chertow and Ehrenfeld, 2012). Then, we are spurred to investigate on the self-organizing process which leads to the creation of stable industrial symbiosis relationships among business firms.
To pursue this aim, we frame industrial symbiosis networks as complex adaptive systems (Chertow and Ehrenfeld, 2012) and use agent-based simulation as research methodology (Axelrod, 1997).
We develop an agent-based simulation model consisting of N agents (firms), each of them available to create a symbiotic relationship with another agent, and characterized as an input-output process. The resulting process network is modeled as an enterprise input-output system (Albino and Yazan, 2013) having stochastic final demands, raw material purchasing costs, and waste disposal costs.
A fitness function is defined which measures the extent to which is beneficial for the agent i to build a symbiotic relationship with j. This function is defined by taking into account the economic benefits associated with the symbiosis, the benefits associated with trust, essentially in terms of reduction of transaction costs, as well as the path dependence characterizing the system evolution.
At the first step of simulation, each agent establishes a symbiotic relation with another one. In the next steps, the relationship is maintained, only if the fitness value overcomes a given threshold; otherwise, the relationship is interrupted. When the agent stops a relationship, will search another agent to connect with, and so on. Stable relations among firms may arise or not depending on the value of the fitness over time.
Using this model we carry out a simulation analysis to evaluate in which scenarios industrial symbiosis relationships arise and become stable. Alternative scenarios are designed changing the number of agents (N) and the uncertainty of final firm demand which impacts on waste production and raw material requirements. Some cases are discussed in order to provide a contribution for policy-makers.

References

Axelrod, R., (1997). Advancing the Art of Simulation in Social Sciences, in: R. Conte, R. Hegselmann and P. Terna (eds), Simulating Social Phenomena, (Springer, Berlin).
Albino, V., Yazan, D.M. (2013). Economic and environmental benefits of industrial symbiosis: an enterprise input-output analysis, 21st International Input-Output Conference, Kitakyushu, Japan, July 7-12.
Chertow, M., Ehrenfeld, J. (2012). Organizing Self-Organizing Systems. Toward a Theory of Industrial Symbiosis, Journal of Industrial Ecology, Vol. 16, pp.13-27.
Chertow, M. (2000). Industrial Symbiosis: Literature and Taxonomy, Annual Review of Energy and

Environment, Vol. 25, pp. 313-337.
Chertow, M. (2007). “Uncovering” Industrial Symbiosis, Journal of Industrial Ecology, Vol. 11, pp.11-30.
Ehrenfeld, J., Gertler, N. (1996). Industrial Ecology in Practice. The Evolution of Interdependence at Kalundborg, Journal of Industrial Ecology, Vol. 1, pp. 67-79.
Hewes, A.K., Lyons, D. (2008). The humanistic side of eco-industrial parks: champions and the role of trust, Regional Studies, Vol. 42, pp. 1329-1342.

Efficiency measures of industrial symbiosis network using enterprise input-output analysis

Topic: Productivity and Efficiency Analysis
Author: Luca Fraccascia
Co-Authors: Vito Albino, Achille Claudio Garavelli

An important challenge that firms should be able to sustain regards mitigating the environmental impact of their production processes. Industrial symbiosis is a way that allows firms to approach this goal and, at the same time, to obtain economic benefits in terms of cost reduction (Chertow, 2000).
The topic of industrial symbiosis networks (ISNs) has been addressed in the industrial ecology literature (Chertow and Ehrenfeld, 2012; Romano et al. 2012) but efficiency measures need to be more explored in order to drive the ISN design and development. Park and Behera (2014) provide some insights about the methodological aspects related to the use of eco-efficiency indicators for ISNs.
In this paper we propose a measure of efficiency at the level of each specific symbiosis relationship based on the exchange of materials and energy. Then, based on the enterprise input-output (EIO) approach, we extend the definition of efficiency at the level of the entire ISN.
We analyse several types of network in terms of topology, number of firms, and technical coefficients. In particular, ISN efficiency can be strongly affected by the network topology and technical coefficients. Then, various ways to improve efficiency of a symbiotic network have been recognized, resulting in policy recommendations.
This approach has been applied to a couple of ISN, the conversion of biomass and exhausted tyres into energy, getting information about the most efficient balance between waste production and primary input requirements.

Keywords: Industrial symbiosis, Network efficiency, Enterprise input-output

References

Chertow, M. (2000). Industrial Symbiosis: Literature and Taxonomy, Annual Review of Energy and Environment, Vol. 25, pp. 313-337.
Chertow, M., Ehrenfeld, J. (2012). Organizing Self-Organizing Systems. Toward a Theory of Industrial Symbiosis, Journal of Industrial Ecology, Vol. 16, pp.13-27.
Park, H.-S., Behera, S.K. (2014). Methodological aspects of applying eco-efficiency indicators to industrial symbiosis networks, Journal of Cleaner Production, Vol.64, pp.478-485.
Romano, V.A., Yazan, D.M., Albino, V. (2012). How far is an input-output production system from perfect industrial symbiosis?, 20th International Input-Output Conference, Bratislava, Slovakia, June 25-29.

Using supplier reported emissions information to enhance an EEIO model to estimate the GHG emissions of businesses

Topic: Environmental input-output modeling VII
Author: Robin Frost
Co-Authors: Mike Berners-Lee, Nick Hewitt

Many businesses recognise the contribution of scope 3 emissions to their Greenhouse Gas (GHG) emissions footprint and are often in a powerful position to positively influence the GHG policies of their supply chain partners. Estimates of their supply chain GHG footprint obtained by the application of environmentally extended input output (EEIO) models can form an important part of strategic decision making. In collaboration with LEC and SWC and using an EEIO model of the UK, an international telecommunications company estimated its supply chain GHG footprint for the past three financial years (April 2010-March 2013).

The existing EEIO model was found to be limited by the aggregated data it contains which typically reflects the emissions and technology of an industry sector within one economy. It had no capability to capture the emissions performance of individual suppliers. However since 2011, the company has also been actively encouraging supply chain partners to participate in the Carbon Disclosure Project's (CDP) climate change reporting programme. As a consequence, supplier reported information on recent supply chain emissions was available and the model was enhanced by incorporating scope 1 & 2 emissions intensity data. This paper reports on: 1) how supplier reported emissions intensities were integrated into an adapted EEIO model; and 2) the preliminary results arising.

While at the aggregate level only a small and non-significant difference in the estimates of the supply chain GHG footprint was found, interesting supplier level differences between high and low performing suppliers were identified. As more businesses engage in emissions reporting and methodologies for estimating footprints become standardised, it is argued that such supplier level insights could support more environmentally responsible purchasing allow businesses to predict the impact of supplier's emission reduction targets on future emissions, and support the monitoring of supplier progress towards such targets over time.

Constructing a multi-regional waste input-output framework using Australian waste data

Topic: Waste Input-Output Analysis
Author: Jacob Fry
Co-Authors: Manfred Lenzen

This research paper describes a method for constructing a multi-regional waste input-output (MRWIO) framework. This research utilises Australian waste data as a case study, however the construction method can be equally applied to data from other regions. This framework maps waste flows from generation by entity, region and waste type, to treatment method and region of treatment. The structure of the framework complies with the System of Environmental-Economic Accounting (SEEA) to allow the physical waste flows (in tonnes) to be aligned with other socio-economic data. The framework is constructed within a virtual laboratory environment that provides a number of benefi ts, including reduced construction time and cost. The collaborative nature of the virtual laboratory provides access to a range of other economic and environmental data, which allows the waste framework to align with these other indicators. The framework will be useful for testing a

range of scenarios which target waste reduction and material e fficiency.

Restructuring Regional Economic Structure to Reduce Greenhouse Gas Emissions using an Interregional Input-Output Mode

Topic: Environmental input-output modeling XI
Author: Xue Fu
Co-Authors: Kuishuang Feng, Klaus Hubacek, Michael L Lahr, Bo Meng, Yaxiong Zhang

China promises to decrease carbon intensity by 40% -45% of its 2005 level by 2020. We use an Energy-Carbon-Economy Interregional Input-Output (ECEIRIO) table to examine industry adjustment to this goal. Our model makes each region interrelated to others on production and consumption, connected to energy used and embodied as carbon emissions, within the integrated China's economy. With the aim of maximizing national GDP, an input-output table yields an optimal industry structure and assigns industry emissions tasks across regions to meet a national carbon target. Our results suggest decreasing GDP share of energy industry (i.e. production of thermal power, heat, and gas by 1.1%) and heavy industries (i.e. Nonmetal Mineral Products by 2.3%) in the North Coast, allocating carbon emissions reduction by 6.4% and 37.2% in these industries, while increasing the GDP share of high-tech in the South Coast and selected services (i.e. Real estate finance and Others services by 1%) in most regions. A slower growing economy puts ever more pressure on carbon emissions reduction and requires more industry adjustments, especially in the Central. The energy mix improvement, such as developing renewable energy, can lessen the carbon reduction pressure of heavy (half in Nonmetal Mineral Products) and energy industry in the Central.

China's Structural Adjustment of Economy and Investment for carbon emissions reduction: a turnpike in environment-input-output system

Topic: Methodological aspects of input-output analysis I
Author: Xue Fu

China promises to decrease carbon intensity by 40% -45% of its 2005 level by 2020. Effective growth path to this goal needs to restructure production and investment, to arrange reasonable consumption and accumulated ratio. Within an environment Input-Output system, a new consumption turnpike is developed with the aim of maximizing accumulated consumptions under carbon constraints; its solution requires dynamic programming resolved by reverse algorithm. Considering technology advance (i.e. the input-output and capital coefficients) and energy mix change, a turnpike gives effectively economy performance on aspect of structure adjustment in production and investment. China's economy can effective grow if adjustment of industry structure through increasing in the service 5% without penalty of manufacture growth, annual increase in the consumption by about ten point percentage than actual economy performance.

China's Regional Structure Change and Greenhouse Gas Emissions Right: a GIS-based Multi-regional Goal Programming Input-Output Model Combining with CGE Analysis

Topic: Environmental input-output modeling X
Author: Xue Fu

China promises to decrease carbon intensity by 40% -45% of its 2005 level by 2020. We use a GIS-based Multi-Regional Input-Output model combining the strength of goal programming or CGE analysis to examine industry adjustment across regions to this goal, as well as to evaluate the expected reallocations in response to environmental policies in multi-region systems. The principles of the Ricardian and Heckscher-Ohlin theories of interregional trade are applicable to environmental economics. In accordance with the composition effect, cleaner production requires technical change (i.e. direct input and capital formation coefficients) and energy mix improvement, can also be attained by better allocation of production and carbon emissions. This way the gains to free trade in products and emissions can be determined, including the case where the environmental constraints are surrounded with uncertainty. The results reveal how industry and investment structure change across regions effectively influence the national carbon emissions target, and regional carbon emissions right allocations through computation the value price of emissions.

Keyword: Multi-Regional input-output analysis, carbon emissions, structure change, carbon emissions right

The long-run performance of R&D investment in a small open regional economy

Topic: Regional Input-Output Modeling
Author: Giorgio Garau
Co-Authors: Patrizio Lecca, Giovanni Mandras

The European Structural Funds for many years have promoted the development and structural adjustment of lagging regions through investment in R&D. Direct R&D subsidies are now one of the main innovation policy tools in the European Union (EU) especially for regions under Objective 1.
In recent years the Regional Government of Sardinia has implemented policies that aim to increase the technological potential and the role of technologies through public investment in R&D. Therefore in this paper we investigate the long term-performance of R&D investment in Sardinia and the ability of R&D investment to improve regional competitiveness.
The analysis is performed by using a dynamic Computable General Equilibrium (CGE) where the public nature of knowledge as a factor of production is taken into account. R&D investments are intrinsically supply-side policies so that CGE models seem to be the appropriate modelling approach given that these models incorporate a full specification of the supply side. This allows us to discuss and investigate the hypothesis of over/under estimation of R&D public investment and the overall impact of the policy.
We compare two types of dynamic model specifications: myopic and perfect foresight models. Assuming myopic agents, results seem to suggest a very long adjustment process and, consequently, extended legacy effects. However under the perfect foresight case, the adjustment to the steady state is expected to be faster and consequently the legacy effects are estimated to be significantly less extended

International division of labour and countries' competitiveness: the case of Italy and Germany

Topic: Vertical specialization and outsourcing I
Author: Nadia Garbellini

The paper is going to use the WIOD to analyse the structure, extent and evolution of production processes outsourcing in Italy and Germany from 1995 to 2011 by means of global vertically integrated sectors, in order to single out and compare the different sources of gains/losses in competitiveness.
Secondly, global vertically integrated sectors are going to be employed to get a measure of labour productivity changes in the two countries.
By comparing the trends of these two sets of indicators, it is possible to shed light on the evolution of international competitiveness in the two countries, to assess the extent to which competitiveness gains/losses are associated to actual productivity increases/decreases and to what extent they are simply due to a different geographical allocation of production stages.

Investigating alternative approaches to harmonise MRIO data

Topic: World input-output modeling and databases II
Author: Arne Geschke
Co-Authors: Keiichiro Kanemoto, Richard Wood

Over the last years, a small number of global MRIO databases were developed as a first attempt at applying an input-output framework to the entire global economy at a high sector detail. These databases have been constructed along different philosophies. Some have been constructed to include as much detail as possible, whereas others have been constructed to principally rely on validated statistical data. In all cases, data from various sources is used to the construction of the MRIO database. In order to adhere to basic economic principles, these data must be harmonised in order to be used within the same MRIO database. We attempt to investigate the differences that alternate harmonisation procedures can have on the subsequent use of a MRIO database. This study compares two of the global MRIO database: EXIOBASE and Eora.
This comparison focuses on trying to unravel the effect of the different approaches that were taken to develop the databases by doing a number of runs with the AISHA tool, which houses the mathematical methods that were used for the generation of the Eora database. We use differing levels of commonality of input data to the AISHA tool. Both databases were analysed from a number of perspectives, including analysing distance measures across harmonised and unharmonised data, and uncertainty measures of final results using standard Leontief footprint calculations.

At the IIOA conference in 2013, the authors presented the methodology that was taken in this study. However, final results were not available at the time. This presentation will focus on the results. We conclude that the reliability and robustness of an MRIO database largely depends on the level of detail and reliability of the underlying raw data, and we make recommendations for the generations for the future development of large MRIO databases based on our findings.

MACROECONOMIC EFFECTS OF THE TRANSITION TO INFLATION TARGETING IN THE RUSSIAN ECONOMY

Topic: CGE and econometric input-output modeling III
Author: Vadim Manavirovich Gilmundinov
Co-Authors: Alexander Olegovich Baranov

In the last years, Russian economy has clearly delineated its Achilles' heel – raw-export model of economic growth almost completely exhausted its potential. But an effective alternative model supposed to come instead has not developed yet. As a result, despite on high oil prices on world markets and accelerating economic growth in developed countries, Russian economy has recently experienced a significant slowdown of growth rates in 2012-2013. The paper discusses the reasons for the slowdown of the Russian economy and the prospects for its further development, taking into account prevailing macroeconomic constraints and priorities of the state policy. One of the key reason, in our opinion, is the strengthening of monetary policy of Russian Central Bank and its re-orientation on inflation suppression instead currency regulation and economic growth support. Now the main goal of Russian Central Bank is to suppress annual inflation rates from 8.4% in 2011 to 4.0% in 2015. It raises a question about appropiate assessment of the macroeconomic effects of this policy.

For this purpose the study concerns with methodological issues of assessment of macroeconomic effects of change in monetary policy targets. Based on Clopper Almon and Leaf Johansen approaches a General Equilibrium Input-Output Model with aggregated monetary and currency markets has developed and estimated for the Russian Economy and used for the assessment of the effects of transition to inflation targeting in the Russian Economy. The model has an input-output coefficients to assume inter-branch links and econometrically estimated sectors' output elasticities with real interest rate, real wage and real exchange rate of national currency to assume links existing between aggregated markets.

According to the results of calculations the transition to inflation targeting in Russia would considerably and amplifying slow down annual growth rates of the Russian GDP approximately for 1.1% in 2013-2015. It would cause the Russian GDP losses from this policy to grow from 0.9% in 2013 to 4.0% in 2015. Machinery and construction as well as capital investments have the most negative impact from the tightening of credit conditions.

Obtained results substantiate the inconsistency of the existing model of macroeconomic policy in Russia: monetary-oriented suppression of inflation, and structural policies aimed at modernizing and stimulating innovation. So particular attention is paid in the article to the development of effective policy that ensures formation of transition to a new model of economic growth based on economic modernization and innovation.

Bibliography

1. Clopper Almon, The Craft of Economic modeling, 2nd edition, Needham Heights, MA, Ginn Press, 1989.
2. Leif Johansen, A Multi-Sectoral Study of Economic Growth, 2nd enlarged edition, Amsterdam, North Holland Publishing Company, 1974.

* The study is supported by Russian Fund of Humanities in framework of scientific project ("Influence of Macroeconomic Policy with Monetary and Currency Restrictions on Dynamics and Structure of a Raw-Export Oriented National Economy with Imperfect Markets"), project №14-02-00359.

Socio-economic Impacts of Renewable Electricity Diffusion in Rural India

Topic: Impact Analysis: Multipliers
Author: Amrita Goldar

The impacts of electricity on improving the quality of life of households as well as productivity in small industrial establishments are well documented in literature. Despite best attempts however, there still remain 44.7% of households without electricity in rural India (Census 2011). In a bid to connect increasing number of villages, the Indian government has initiated programmes such as Rajiv Gandhi Grameen Vidyutikaran Yojana (Village Electrification Programme). However, the pace of the electrification has been slow and there still remain large areas that remain unconnected. Even in areas that are connected, there are frequent problems of blackouts and brownouts that consumers complain of.

The Ministry of New and Renewable Energy is thus seeking to promote decentralized electricity generation or off-grid application of renewable processes. Decentralized application for rural areas could serve as a supplementary source of electricity to meet the unmet demand that conventional grid supply cannot meet. While it is expected that the cost of grid connected power would be comparatively much lower, these off-grid renewable energy projects would provide a source of supplementing power supply through reduced outages and load management. It can also be a viable source for those distant and inaccessible places in the rural hinterland for which extension of transmission lines and related infrastructure would prove to be very costly and inefficient.

This paper seeks to use a Social Accounting Matrix for India (base year 2007-08) to analyse the socio-economic impact of decentralized renewable electricity projects in rural India. It seeks to go beyond the purely financial lens traditionally used to look at the economics of renewable power installation. Using SAM multipliers, both forward and backward linkages of renewable electricity would be analysed. The novelty of the paper lies in its attempt to quantify not just economic, but the social dimension of this diffusion as well.

Carbon footprint for the University of Castilla-La Mancha

Topic: Environmental input-output modeling VI
Author: Nuria Gomez
Co-Authors: Maria Angeles Cadarso, Fabio Monsalve, Maria A. Tobarra-Gomez

There is an increasing concern about the environmental performance and sustainability of firms and organizations and educational institutions are also involved. Our objective in this paper is to calculate the footprint for the Universidad de Castilla-La Mancha (UCLM) in 2012 in order to measure its environmental impact. This is a fundamental first step to improve sustainability within this institution, as it can provide ways to reduce its environmental impact as well as decrease costs, increase environmental awareness and improve the university's image. We use input-output methodology instead of life cycle analysis, as input-output avoids the truncation errors that could underestimate the total environmental load. Furthermore, this methodology is completely compatible with the UCLM budget, from which we obtain a demand vector that allows us to know which products are used by the university in generating its services. The calculation of the consumer responsibility is assimilated to that of footprint, as this takes into account both direct and indirect emissions unlike the producer responsibility (that only includes direct emissions). As a novelty we include in the calculations of UCLM carbon footprint the consumption of university workers. We think that this inclusion is necessary to make comparisons with the performance of the university in the

other fields of sustainability, the economic and social one. As a matter of fact, these indirect emissions from household consumption of university workers account for two thirds of total UCLM carbon footprint. We also analyze emissions according to the industries that provide inputs to the UCLM
Keywords: Carbon footprint, Producer responsibility, Consumer responsibility, Input-output, Life cycle analysis.ding to the industries that provide inputs to the UCLM .

The role of the Electronic, Computer and Communications sectors in the Sonora economic regional structure.

Topic: Regional input-output modeling VI
Author: Pedro Gomez
Co-Authors: Rafael César Bouchain

The purpose of this paper is to analyze the role of the Electronic, Computer and Communications Technology (E&ICT) sectors in the sectoral structure of the State of Sonora, Mexico. The backwardness level of knowledge economy at national level at this stage of development, characterized by the knowledge, economy allows Sonora to generate plans that include the promotion of this sector.
In this analysis we used the input-output matrix built by the indirect methods and RAS algorithm, and through the calculation of sectoral linkages, backward linkages (BL) and forward linkages (FL) and the classification of key sectors of the input-output methodology given by A.O. Hirschman and N. P. Rasmussen, generating a discussion on the relevance of the use of Forward Linkages (FL) from Gosch model.
The results confirm that the Electronic industry is a key industry, however the interrelationships of Computer and Telecommunications sectors show a significant lag compared to its Forward Linkages and Backward Linkages, confirming the need to review the economic development plans that drive this sector.

European Commission, Directorate General of Economic and Financial Affairs

Topic: (Panel Session) European Statistics for Competitiveness in a Globally Competitive World: what is the role of Input-Output Statistics?
Author: Isabel Grilo

European Statistics for Competitiveness in a Globally Competitive World: what is the role of Input-Output Statistics?

A Hybrid Input-Output Proposal to Identify Key Sectors for the Production and Distribution of Electricity

Topic: Physical and Hybrid Input-Output Analysis
Author: Ana Isabel Guerra

This analysis explores the possibility of merging into a "hybrid" proposal two standard I-O methods that have been quite often used to identify key sectors, i.e. the Classical Multiplier Method and the Hypothetical Extraction Method. In the context of the latest revision of the European Union Energy Efficiency Plan, we use this proposal to single out key sectors that serve as tools for boosting all the

potential energy savings in the economic system and, more specifically, in the production and distribution of electricity resources. Using the main distinctions and complementarities of the two traditional I-O key sector approaches, this hybrid formulation allows us to disaggregate the backward stimuli of the electricity sector in three indicators: the total, the internal and the external backward indicators. This "hybrid" proposal provides additional insights about the structure of the industrial linkages that participate in the production and distribution of electricity. Our results reveal that the explanation for the intensity of the backward effects of the electricity sector depends not only on the rest of energy sectors but also on some of the manufacturing industries. In our view, these findings may be important for conceiving a more balanced and cost-effective design of energy efficiency policies.

A structural decomposition analysis of primary energy use in Portugal

Topic: Input-output analysis for policy making I
Author: Zeus Guevara
Co-Authors: Joao Rodrigues, Tânia Costa Sousa

The Portuguese energy mix changed dramatically in the last two decades, with the adoption of natural gas and an exponential increase in the penetration rate of wind power complementing the conventional use of hydropower and fossil fuels. During the same period, the Portuguese economy also suffered a phenomenon of de-industrialization, with a loss of manufacturing sectors and an increase in services. The combination of these two phenomena led to a decline of the primary energy intensity of the Portuguese economy after the year 2000. The goal of this paper is to identify the main driving factors of this energy transition over the period 1990-2010, during which the largest shift in primary energy intensity took place. To do so, we perform a Structural Decomposition Analysis, using both the Dietzenbacher and Los and the Mean Log Divisia Index methods. The energy data used in this study was obtained primarily from the National Energy Budget, from which a detail of 35 energy carriers and 15 energy technologies could be characterized. The economic data, obtained from INE and DPP, had differing economic detail across years, and had to be harmonized, interpolated and converted to constant prices. In this study we performed a decomposition in terms of final demand composition, production structure, final energy use, energy transformation and primary energy use. The results of this study may provide insights on the most suitable areas of policy intervention to boost energy decoupling in the Portuguese economy.

Productive Structure and Trade Relations:The Case of the Western Border Regions of Paraná State, Brazil

Topic: Regional input-output modeling V
Author: Joaquim Jose Martins Guilhoto
Co-Authors: Carlos Alberto Gonçalves

The aim of this paper is to analyze the productive structure and the trade relations, national and international, of the Western Border Regions of Paraná state in Brazil. Paraná is a state located in the southern part of Brazil, having borders on the west side with Paraguay and Argentina. To make this study, the state of Paraná was divided into five regions (three border regions, municipalities with distance from 0-50Km, 50-100Km, and 100-150Km from the border, a central region, and a seaside region). In the Brazilian case it is also important to know not only how these 5 regions are interconnected but also how they are connect to the rest of the country and the rest of the World. As so, based on the input-output database from the University of São Paulo Regional and Urban

Economics Lab – NEREUS, we have estimated: a) an interregional input-output model for 6 regions (5 in Paraná and the other being the remaining of Brazil), for 2008; and b) the external trade relations of these regions. From the analysis of the data it was possible to point out the similarities and the differences among the regions, in order to identify the relevant sectors related to output, employment, income, and value added. The results also point out the importance for the Western border regions of traditional sectors of the state economy, i.e., Processed Food and Beverage and Agriculture. However, it is noteworthy that, in some situations, the sectors that most contribute to output, income, value added, and employment generate much of these benefits outside the regions, mainly due to the spillover effects to the other 2 Paraná regions and the rest of Brazil. These findings certainly need to be considered by policy makers when designing policies for the development of the Western Border Regions of Paraná.

Input-Output Analysis of Turkish Construction Industry by using World Input-Output Database for 2002-2012 Period

Topic: Impact analysis: multiplers
Author: Zafer Barış Gül
Co-Authors: Selim Cagatay, Reyhan Ozes, Celal Tasdogan

In the academic literature the construction industry is considered to be one of main drivers of the overall economy due to its strong inter-sectoral linkages. Its backward and forward linkages are ranked to be among the first four out of twenty industries. In the demand side, the construction activity induces growth through use of large amounts of intermediate inputs from other industries while on the supply side it provides basic infrastructure that is required for production of any goods and services. On the other hand, the construction industry also has a significant impact on level of employment, particularly unskilled labour force, as it is a highly labour-intensive industry. In many of developing countries, the growth of the construction industry is used as an instrument to accelerate the overall growth in the economy. For instance, governments are inclined to implement policies that enhance and support construction investments to achieve a more stable economy.
Like in many developing countries, especially after the neoliberal transformation in 1980s, Turkish economy witnessed the growth of construction industry as well. Two main growth periods in construction industry have been observed since 1980. One of these is the 1982-1988 period. The share of construction investment in GNP rose up to 7.3 percent in 1987 from 5.2 percent in 1982. The second growth period began in 2002 and continued until 2008. The growth process was interrupted by the global economic crisis in 2008 and 2009, but growth inclination in construction industry in Turkey maintained its position in the economy. Between 2002 and 2012, on the average the growth rate of construction industry was about 11.1 percent per year, except for 2008 and 2009, which is almost twice as much of the growth rate of national economy. Furthermore, there was a high positive correlation between GDP growth and construction investment during the period. The other important feature of the construction industry for both periods is that governments support the growth of construction industry both by making investments directly and implementing policies for the development of infrastructure sector using legal arrangements. Especially for the 2002-2012 period, it can be obviously stated that basic capital accumulation strategy of the state was based on the growth of construction industry in Turkey.
The aim of this study is to explore the structure of construction industry in the input-output framework and to reveal the changing trend in construction based inter-sectoral linkages over the period of 2002-2012, in Turkey. Some common shortcomings of the construction industry based input-output studies in the academic literature in Turkey are such that input-output tables used in the analyses are not homogeneous and the most recent one belongs to the input-output table of year 2002. In this study, we are going to employ the input-output tables constructed and updated in the

WIOD Project from 2002 to 2011. We are also going to update 2011 input-output table to 2012 by using RAS technique and decompose value-added on the input-output tables into the labour and capital. We are going to calculate backward and forward linkages, input and output multipliers by using 11 input-output tables. We aim to discuss whether construction industry, which is considered as the key driver of the economy, might solve structural problems of Turkey such as current account deficit and unemployment in the near future.

Structural decomposition analysis of carbon footprint

Topic: Input-output analysis for policy making I
Author: Michal Habrman

In the paper we perform an additive structural decomposition analysis of carbon footprint in selected countries. We decompose the change in carbon footprints into the factors: emission intensity, structural change, structure of consumption and total level of consumption. All these factors are also decomposed into domestic versus imported effect.
While the total amount of GHG emissions in european countries are stable or decreasing, the carbon footprint emboddied in the european consumption is increasing. With the SDA we test the pollution haven hypothesis that greater trade openness of european countries that leads to replacing domestic goods with imports (both in final and intermediate consumption goods) leads to an increase in carbon footprint of european countries. That leads to an increase in global emissions compared to the situation if domestic goods are not replaced by imports.
We carry out the analysis for period 1995 - 2009 using data from WIOD.

Endogenous Local Government Spending and Fiscal Multipliers in a Metropolitan Input-Output System

Topic: Regional Input-Output Modeling
Author: Eduardo Amaral Haddad
Co-Authors: Michael L Lahr

This paper explores the role of endogenous fiscal stimulus in local economies originating from regional and macroeconomic performance. Endogeneity of government spending is captured in an extended inter-regional input-output framework closed not only for households but also for local governments. We look at output and consumption effects and compare the results with typical government spending multipliers computed elsewhere. This strategy reveals a different perspective on potential local responses to changes in regional and national business cycles. Moreover, by examining the interdependence of local tax revenue, income formation and output generation, we provide insights into the extent and limits of tax competition in an integrated system. We use as the case study the Sao Paulo Metropolitan Area, considering its 39 municipalities as individual regions of the model.

A CGE Analysis of Educational Opportunities, Human Capital, and Regional Income Distribution Using Regional SAM

Topic: CGE and Econometric Input-Output Modeling
Author: Iman Haqiqi
Co-Authors: Morteza Mortazavi Kakhki

INTRODUCTION
Although the level of human capital is important in economic growth, the quality and distribution of human capital is an essential element in economic development. Despite the importance of wealth and physical capital distribution is discussed in the literature, small literature exists on distribution of human capital. We are going to investigate how important is the distribution of human capital in Income equality and development? And what are the impacts of redistribution of opportunities on human capital? This paper specifies the relationship between educational opportunities, human capital, and income equality. We measure the effects of redistribution of opportunities on skilled labor supply in different regions in Iran. We also examine the changes in regional production, welfare, and regional income Gini index.

DATA
A regional SAM for Iran is estimated which includes 30 regions with 15 production sectors in each region (450 production sectors). The SAM is extended to include regional opportunity index. We also estimate “human capital” for each region. Each region has its endowment of labor, physical capital, and educational opportunities.

METHOD
We employ LMGE-MR, a Multi-Region small open economy Computable General Equilibrium model for Labor Market, to investigate the impacts of redistribution of opportunities. The model focuses on labor market interrelations and human capital formation. We show that the amount of human capital in each region is determined by its educational opportunities. In other words, when educational opportunities are available, the unskilled labor is able to promote to skilled labor, and therefore produce more commodities and generates more income.

RESULTS
The results indicate that creating equal opportunities reduces inter-regional income Gini coefficient significantly from 0.25 to 0.11. The more surprising result is that one percent decline in educational inequality will lower income equality more than one percent. Therefore, the conclusion is that redistribution of educational opportunities is an appropriate way to decline income inequality between regions in Iran.

A CGE Analysis of Welfare and Sectoral Impacts of Removing Interest Rate Subsidies: A Model Based on Financial SAM and Flow of Fund Accounts

Topic: CGE and Econometric Input-Output Modeling
Author: Iman Haqiqi
Co-Authors: Marziyeh Bahalou Horeh, Mahdi Ghaemi

INTRODUCTION
What are the sectoral impacts of removing interest rate subsidies? Which sectors may benefit from the policy and which sectors may not? How changes in interest rate in financial sector may affects real sectors? To answer these questions, this paper empirically investigates the way interest rate

affect real sector of the economy. We also measure the sectoral impacts of interest rate changes.

DATA
This paper develops an integrated financial Social Accounting Matrix (SAM) of the Iranian economy taking into account the Flow of Fund accounts. The extension of the SAM on financial side and inclusion of information on Flow of Funds is an important contribution of this study. The integrated financial SAM provides an accounting record for the financial and real economy. Financial part includes central bank, financial institutions, and different kinds of loans, deposits, equity, and bonds. Furthermore, the implicit subsidies in financial sector are estimated

METHOD
We introduce FCGE-IR, a small open economy Computable General Equilibrium (CGE) model for Iran, to capture the general equilibrium effects of the policy. To identify sectoral vulnerabilities and strengths for the economy with respect to the interest rate shocks, we introduce markets for financial assets. The demand and supply in markets are derived from optimization of utility, production costs, portfolio, and capital financing. We assume imperfect factor mobility across sectors, as well as imperfect substitution between domestic and imported commodities.

RESULTS
Findings indicate that this policy leads to net welfare gain for Iranian economy. The welfare index rises between 0.8% and 1.7% and the production level rises for all sectors in different scenarios. The results exhibit that the agriculture and construction sectors have significant linkages to the interest rate shocks and hence, their gains are lower with respect to other sectors. On the other hand, the manufacturing, mining, and services sectors have relatively weak linkages with the interest rate shocks of the Iranian economy. In addition, our results suggest that the capital moves out from agriculture and construction sectors into the manufacturing, mining, and services sectors.

APPENDIX 1: TRANSMISSION MECHANISM
Removing interest subsidies affects economy in several ways. There are two ways in which increasing interest rate may affect real sectors and households. First, rise in costs of production causes decline in production, price increase, and fall in welfare. Second, it may promote saving and income of depositors which generates a positive welfare impact. Although the economic theory suggests a net welfare gain after removing subsidies, the overall effect on welfare must be calculated empirically.
In a CGE framework, the financial sector affects producers and household directly. In other words, changes in financial sectors would change income and costs of households and also cost of production and activity levels. Then, these changes influence demand for goods and services by households and producers. They also affect supply of goods and services.
Interest rate may affect imports and exports. Export is a function of exchange rate, activity level, domestic and foreign price of commodities. If change in interest rate influences these factors, then export will change, too. Import is also a function of income, exchange rate, domestic price and the price of product in foreign world. Thus, changes in interest rate influence import too.

APPENDIX 2: FCGE-IR MODEL
FCGE-IR model is used to analyze interactions between production, consumption, foreign trade, financial markets, and public sector. Interaction of demand and supply determines production level. Theoretically, the supply of each commodity is a function of activity level, input prices, output price, and foreign prices. The demand is also a function of income, own price, price of substitute goods and foreign prices.
Production is modeled through Nested Constant Elasticity of Substitution (NCES) functions. Producers combine labor and capital with other intermediate inputs in order to produce products.

Output of each sector is produced using capital (K), labor (L), and intermediate goods (M). Intermediate goods and services are either tradable or non-tradable goods. Produced goods are also supplied into domestic supply and exports using a Constant Elasticity of Transformation (CET) function.
Households devote their income to consumption and investment goods. Investment goods are mainly construction, machinery and equipment, and jewelry. Thus, they can be tradable or non-tradable.
In this model, saving level of institutions is determined based on income level and saving rate. Institution's investment has three forms: financial portfolio, inventory formation, and fixed capital formation. Using portfolio optimization, demand and supply of financial assets will be defined.

A CGE Model for Labor Migration Analysis Using Labor Micro Consistent Matrix

Topic: CGE and econometric input-output modeling I
Author: Iman Haqiqi
Co-Authors: Marziyeh Bahalou Horeh

ABSTRACT
This paper studies the sectoral impacts of labor migration. Theoretically, labor migration increases labor supply and decreases cost of production in the host country in favor of labor-intensive sectors. Although emigrant labors will gain higher knowledge and thus may increase efficiency when come back to the origin country, migration will decrease human capital, welfare, and economic growth of the origin country. Therefore, it will diminish the activity of labor-intensive sectors in the host country. In this study, we numerically measure the impacts of different counterfactual scenarios of migration on sectoral production and welfare in Iran.

This paper employs LMGE, a multi-sector, multi-labor computable General Equilibrium model, to study the impacts of labor migration. We have distinguished between "skilled-labor" and "unskilled-labor" which may be employed in domestic labor market or abroad. Labor supply is determined endogenously by leisure decision. The Household's optimization behavior determines the demand functions for commodities and leisure. Finally, time allocation between leisure and work determines labor supply.

The model is calibrated based on 2001 Labor Micro Consistent Matrix (L-MCM). L-MCM is a modified Social Accounting Matrix (SAM) which includes 147 commodities and 99 production activities. In L-MCM, each row portrays a market balance, and each column shows either zero profit condition or income balance condition. L-MCM shows the financial flows between all economic agents through markets or transfer payments. In L-MCM, a positive number shows value of earnings, while a negative number is value of expenditures.

Our preliminary findings suggest that although outflow of skilled labor will increase its wage, it decreases skilled labor employment in all sectors and reduces the activity level for all sectors and mainly for the agriculture sector. The initial results also indicate that unskilled labor inflow will increase unskilled labor employment in all sectors except for oil and gas sector. The food and beverage, metals, and energy sectors enjoy more from labor inflow.

APPENDIX: LMGE MODEL
LMGE provides interactions between different activities, households, and agents, through numerous markets of goods, services, and factors of production. Each household has an initial endowment of labor and capital. Household's utility optimization determines demand for each commodity. On the

other hand, producers buy labor and capital from households and produce goods and services in a cost minimization or profit maximization problem. These demand and supply functions interact in different markets. In this framework, at any price, the total value of consumer expenditure equals consumer income. A set of prices and levels of production in each sector characterize equilibrium in the model, such that market demand equals supply for all commodities.

In our model, the economy is characterized by seven different sectors including oil and gas sector, food production, agriculture, energy sector, metals sector, other manufacturing, and services. Production factors consist of skilled labor, unskilled labor, and capital. Production nests of inputs include Capital (K), Labor (L), and Intermediate Goods (M). Activities mix the production inputs in a nested Constant Elasticity of Substitution functions (NCES) and produce the commodities. The representative household has an endowment of labor and capital.

According to theories of labor economics, we assume a trade-off between consumption and leisure. That means if households need to increase consumption, they had to decrease leisure in order to raise labor supply. In LMGE, the supply of skilled labor is a function of opportunity cost of leisure, price index of composite goods, potential income, share parameters, and elasticity of substitution between leisure and consumption. Similarly, the demand for consumption composite (consumption) depends mainly on potential income, relative prices, and elasticity of substitution between leisure and consumption.

Households may supply labor to different sectors. We assume that labor is not perfectly mobile across sectors. That means the economic resources would not be reallocated completely according to new equilibrium prices and wages. It also implies that factors are not sector-specific. There is an optimization behavior to find the optimal level of labor supply to each sector. Labor owner tries to maximize the revenue from labor supply considering an elasticity of transformation across sectors as well as different sectoral wages.

A Comparison of CGE and IO models in analysis of Water Scarcity and Climate Change

Topic: CGE and Econometric Input-Output Modeling
Author: Iman Haqiqi

This paper compares the results of CGE (Computable General Equilibrium) and IO (Input Output) models in analyzing the impacts of water scarcity. We measure the impacts of water shortage on sectoral production using both IO and CGE models. To control for different assumptions in models, different closure rules are applied and different scenarios of water scarcity are considered.

We employ an IO model with water accounts using standard physical IO assumptions. The WGE model, a computable General Equilibrium model for Water, is developed using the same database. The main closures in WGE model are imperfect factor mobility versus immobile factors, Leontief technology in production versus CES (constant elasticity of substitution), Leontief function in household expenditure versus CES function, and Armington assumption in trade versus no substitution between imported and domestic commodities. These closure rules will help to specify which assumptions in CGE models are more important in disagreement with IO models.

Physical water IO for Iran is the main database used in both models. This multi-region database consists of information about sectoral water use (in various sub-sectors of agriculture, manufacturing, and services sectors, as well as households), water sources (mainly raining,

underground water, and surface water), and regional ecological zones (arid, dry, sub-humid, and humid).

CGE models capture both substitution and scale effects while IO models concentrate on scale effects. Preliminary findings suggest that those results from CGE models with lower substitution parameters will be slightly different from IO results. In other words, more substitutability in CGE models generates results which are much different from IO results. Our findings indicate that the size of production loss in CGE model is lower than in IO model. This difference is occurred mainly due to changes in production technology and reallocation of resources in the economy which are not captured by IO model.

A Spatial Structural Decomposition Analysis of Carbon Footprint of Household Consumptions for Japanese Regions

Topic: Environmental input-output modeling VII
Author: Ryoji Hasegawa
Co-Authors: Shigemi Kagawa, Yasushi Kondo, Makiko Tsukui

Climate policies increasingly tend to be discussed at the regional level as well as the international or national level. When we consider developing more effective climate policies, we inevitably need regional analyses of global warming.
This study focuses on CO2 emissions influenced by consumer behavior and is concerned about spatial variations of emissions at the sub-national (regional) level. In estimating carbon footprint, which refers to consumption-based emissions indirectly generated to satisfy final demand, it is useful to apply multi-regional input-output (MRIO) approach. This study analyzes regional carbon footprint of household consumptions by using the MRIO table which consists of all 47 prefectures in Japan.
In calculating carbon footprint, we originally construct the dataset of emission coefficients in industries at the regional level corresponding to the district of our MRIO table based on regression analysis to better consider spatial variations of emission intensities. Furthermore, based on the methodology in Kagawa and Inamura (2004) and Zhou and Imura (2011), we apply structural decomposition analysis (SDA) across regions in Japan to investigate main factors generating spatial variations in carbon footprint.
The MRIO analysis reveals net exporters and net importers of emissions by quantitatively identifying carbon leakage among regions. Furthermore, the SDA demonstrates how consumer behavior at the regional level influences total emissions in Japan. Finally, we discuss regional policies to effectively reduce emissions from the point of view of consumer behavior.

GVC based Comparative Advantages in the Context of International Fragmentation Production

Topic: Global Value Chain Analysis
Author: Yoshihiro Hashiguchi
Co-Authors: Bo Meng, Norihiko Yamano

Given the increasing presence of fragmentation production and vertical specialization trade in Global Value Chains (GVC), foreign contents has been getting to account for much larger portion in many countries' exports. This means that the gross-export-based indicator of Revealed Comparative Advantage (RCA) can no longer reflect the reality of relative competitive advantage of a certain

country in international trade. This paper uses international input-output based decomposition techniques newly developed in GVC analysis to propose some alternative indicators for measuring a country's "real" RCA. The proposed GVC based RCA indicators can not only show a country's comparative advantage in value-added exports by different route of value chains, but also can reveal a country's comparative advantage in absorbing foreign value-added and providing fragmentation capacity in GVC. The OECD international input-output database is fully used in our estimation. We also use an econometric model to check how a country's real RCA in GVC contribute to its value added gain from foreign trade.

Keywords: Comparative advantage, trade in value added, input-output, global value chains

Impact of Urbanization on Economic Growth in China

Topic: CGE and econometric input-output modeling I
Author: Jianwu He
Co-Authors: Shantong Li, Sanmang WU

China's urbanization rate reached 52 percent in 2012. According to "World Urbanization Prospects" conducted by United Nations Secretariat, China's urban rate will reach 68.7% in 2030 and China's urban population will grow from 630 million in 2010 to reach 958 million in 2030. In other words, China's urban population will increase by about 300 million in the coming two decades, which is close to USA's total population. Therefore it's important to analyze how the urbanization affects China's economy.
In this paper we investigate the nature of urbanization and economic growth. In theoretical aspect, urbanization is a historical process of a gradual transformation from a traditional rural society mainly relying on agriculture to a modern urban society mainly relying on industry and service, its essence is agglomeration process of population and economic activities in space, which facilitate the mutual use of externality of technology and capital in the economic activities, increase productivity, and build a pool of capital and is benefit for the economic growth.
To evaluate the likely effects of urbanization on the Chinese economy, sectors, and households, this paper utilized a CGE model of the Chinese economy developed by the Development Research Center of the State Council of China (DRC-CGE 2010 Model) to project outcomes of different urbanization scenarios. Two scenarios is designed: BAU and Urbanization scenario. BAU reflect certain common assumptions. These assumptions are based on foreseeable changes, such as inputs to the Chinese economy that can be projected with reasonable confidence. In urbanization scenario, reform on the labor market and social security to reduce barriers to labor, and improving urban infrastructure will accelerate the process of urbanization. Based on the simulation, this paper shows speeding up the process of urbanization will mainly promote economic growth. It is projected that the annual increase of urbanization level by 1 percentage points will upgrade the annual growth of GDP by 0.6~0.7 percentage points. The paper also shows the acceleration of urbanization help narrow the income gap between urban and rural residents and promote development of service sector. According to the simulation results, if there is an increase of 4 percentage points of urbanization level, rural per capita income increased by 20 to 30% and the share of service sector will increase about 1 percentage points.

Global Value Chains and Region Economy within China

Topic: Regional input-output modeling IV
Author: Jianwu He
Co-Authors: Shantong Li, Sanmang WU

Opening up the market has played a very important role in the growth of China's economy. The accession to the WTO accelerated the integration of Chinese economy into the global economy and accelerated China's participation in global value chains (GVCs). However China has more than 30 provinces and autonomous regions and some provinces are even bigger than European countries. Most of foreign trade are concentrated the coastal areas due to geographical conditions and convenient infrastructure. However, the central and western provinces are rich in resources and serve the coastal regions with natural resource and raw materials, which will become intermediate input of export in coastal provinces. Provincial trade hierarchies and specialization enhance the inter-provincial economic linkage. In other words, inland provinces also participate global value chains via inter-provincial trade. It is important to understand how global value chains work within one China, how they affect regional economic performance within China. To answer these questions, this paper collects regional input-output tables within China. In addition, multiregional input-output model is linked with global input-output model. Based on this integrated input-output models, this paper will calculate how much regional value added is created from GVC trade. International studies shows a positive correlation between participation in GVCs and GDP per capita growth rates. This paper will explore whether this works within China. According to the empirical result, the paper will investigate how policy can help regions derive benefits from their participation in global value chains.

Employment effects of electricity generation from renewable energy technologies in the UK

Topic: CGE and Econometric Input-Output Modeling
Author: Carla Oliveira Henriques
Co-Authors: Natalie Cassidy, Dulce Coelho

In response to the need of reducing CO2 emissions, the European Union has set itself ambitious targets to increase the share of electricity generated from renewable energy sources (RES-E). Therefore, the promotion of the deployment of renewable energy technologies has come to form a crucial part of governments' strategies to prevent climate change.

Although it is difficult to refute the claim that increasing the use of RES-E will help to prevent global warming, along with adding to Europe's energy security, policy-makers and 'green growth' advocates further argue that it will lead to the creation of a large number of jobs. However, the exact number of jobs quoted by current studies varies enormously with a tendency for member states to base policy decisions on employment estimates that are arguably too optimistic.

Taking the UK as a case study, this paper provides an assessment of the impact that renewable energy targets for electricity generation will have on employment. The job creating potential of each RES-E will be made available through the use of Input-Output employment multipliers with projections for the year 2020.

The analysis indicates that the number of jobs associated with RES-E is expected to be less than anticipated by the UK government. Thus with employment benefits smaller than anticipated, and as

a consequence less able to offset any negative employment effects that are likely to transpire from the move to a low carbon economy, it is argued that current policy measures do not adequately protect or prepare the workers for this transition.

Comparing constant and current price multipliers for Belgium

Topic: Supply, Use and IO Tables: Methodology and Comparability
Author: Bart Hertveldt
Co-Authors: Caroline Hambÿe, Bernhard Michel

This paper first describes the methodology that has been followed to deflate a consistent time series of Belgian SUT and IOT for the period 1995‐2007. Based on this series, the evolution of final demand multipliers calculated on current price and constant price tables are then compared. This analysis is made at a very detailed industry level.

Global value chains and CO2-emissions: a conditional structural decomposition analysis

Topic: International Trade II
Author: Rutger Hoekstra
Co-Authors: Bernhard Michel, Sangwon Suh

International trade in goods and services influences the carbon profiles of countries through carbon emissions embodied in imports and exports. Increases in net emissions embodied in trade between Annex I and non-Annex I countries are often referred to as carbon leakage. A vast and continuously growing literature analyses carbon profiles and carbon leakage at the level of individual countries, regions and at the global level. Evidence of carbon leakage in developed countries is readily interpreted as an indication that they replace emission-intensive domestic production by imports from developing countries. The idea is that the reorganisation of global value chainscontributes to reducing carbon emissions in developed countries at the expense of emissions in developing countries.
To provide further empirical evidence on the idea that participation in global value chains matters for a country's CO2 emission levels, this paper examines the contributions to changes in countries' emission levels in greater detail. This is done by applying structural decomposition analysis (SDA) to a multi-regional input-output (MRIO) model for CO2-emissions. The data used for computing the decomposition come from the WIOD database and cover the years 1995-2007. As the spread of global value chains goes hand in hand with increased trade in intermediates, the contribution of interregional trade flows that satisfy intermediate demand is isolated in the decomposition. Moreover, flexible decomposition formulas that are dependent on the characteristics of the country and its trading partners will be applied. Using this novel decomposition methodology the underlying driving forces of various "trade vs. environment" hypotheses can be tested.

The Supply Side of Health Care

Topic: Input-Output acccounts and statistics
Author: Ronald L Horst
Co-Authors: Douglas Shannon Meade, Douglas E Nyhus, Jeffrey F Werling

There is a common assertion that health care is over one-sixth (or about 18 percent) of the economy. This conclusion, however, is based only on a measure of health care demand. It is much more difficult to identify a corresponding ratio in the supply side data of the economy, that is, in terms of value added and employment.

Our work reconciles information about the supply and demand sides of the national health sector. We use input-output techniques to link the final demand values from the National Health Expenditure Accounts (NHEA) to domestic production and imports of commodities, industry value added, and industry employment. We translate NHEA levels by spending categories (hospitals, physicians, drugs, devices, insurance, construction, investment, research, etc.) into equivalent National Income and Product (NIPA) final demand concepts and then translate these products and services expenditures into final demand by commodity. We then use input-output accounting to determine, by sector, the total output, value added, and employment levels required to satisfy health care demand. The value added and employment levels are identified not only for medical service sectors but also for medical manufacturing industries and for supporting sectors such as distribution, support services, and government production. We find that in 2012, health care production required about 15.4 percent of total value added and 18.7 percent of civilian employment. In addition, domestic health care demand required about 1.5 percent of GDP in imports.

Estimation Errors in Input-Output Tables and Prediction Errors in Computable General Equilibrium Analysis

Topic: CGE Applications to Handle Complex Data Issues
Author: Nobuhiro Hosoe

Input-output (IO) tables are one type of data essential for constructing the social accounting matrices (SAM) used in computable general equilibrium (CGE) modeling. They also give CGE models attractive features as a multi-sectoral model describing details of industrial activities useful for empirical policy analysis, such as trade, environment, and tax policies. However, the availability of IO tables is often limited, because IO tables with such details are costly to construct. Such low availability of IO tables forces CGE modelers to use IO tables that are several years old and often update IO tables themselves with simpler methods of a non-survey method and fewer data than those employed by professional statisticians. It is often concerned that the updated IO tables and therefore results of CGE studies with them might not be reliable enough for empirical studies.

We used 1995-2000-2005 linked IO tables for Japan to examine estimation errors of updated IO tables and the resulting prediction errors in CGE analysis developed with updated IO tables. As we usually have no true IO tables for the target year and therefore need to estimate them, we cannot evaluate estimation errors of updated IO tables without comparing the updated ones with true ones. However, using the linked IO tables covering three different years enables us to make this comparison.

Our experiments showed that IO tables estimated with more detailed and recent data contained smaller estimation errors and led to smaller quantitative prediction errors in CGE analysis. Despite the quantitative prediction errors, prediction was found to be qualitatively correct. As for the performance of updating techniques of IO tables, a cross-entropy method often outperformed a

least-squares method in IO estimation with only aggregate data for the target year but did not necessarily outperform the least-squares method in CGE prediction.

Optimizing Production in Greece under Particulate Pollution Constraints with cross-Regional Transfers

Topic: Environmental input-output modeling I
Author: DIMITRIOS HRISTU-VARSAKELIS
Co-Authors: STELLA KARAGIANNI, MARIA PEMPETZOGLOU, Athanasios Sfetsos

"Optimizing Production in Greece under Particulate Pollution Constraints with cross-Regional Transport Effects:

Particular matter (PM10) pollutants, generated from combustion-based processes largely attributed to economic activity, are known to cause serious adverse effects on human health, including respiratory and heart related effects. PM10 pollutants are a significant problem in Greece, and especially in the Attica region, which includes Athens and about half of the country's population. Some studies report that a PM10 increase of 10 μg/m3 could increase daily death rates by 0.6 %.

We propose an input-output model for optimizing production in Greece under constraints on the PM10 concentrations which are deposited in Attica. Production is optimized on a regional, sector-by-sector basis. Our analysis uses the Greek environmental input-output matrix and takes into account PM10 concentrations which are "deposited" in the Attica region but may have originated in any region of Greece. The percentage contributions of each region and economic activity (identified in a regional Greek NAMEA) are determined via high-resolution atmospheric simulations, taking into account weather conditions in Greece, using the WRF-inverse HYSPLIT model combo. Besides pollution constraints, we require that the resulting sectoral/regional production levels satisfy constraints on overall demand, energy use, and maximum sectoral variations over current-baseline levels.

We use our model to determine (via linear programming) economically optimal policies (sectoral production targets) that lead to desired reductions of PM10 in the Attica region, and examine whether those reductions can be achieved without worsening the PM10 concentrations in other regions. To our knowledge, this study represents the first approach to consistently integrate high resolution atmospheric models with NAMEA. This study also paves the way for extending our model to a broader setting where regional production is optimized with pollutant transfers from and to all regions being taken into account.

Keywords: PM10 emissions, input-output analysis, cross-regional pollution transport.

A General Equilibrium Assessment on a Compound Disaster in Northern Taiwan

Topic: CGE Applications to Handle Complex Data Issues
Author: Michael Chun-Yang Huang
Co-Authors: Nobuhiro Hosoe

We analyze an economic impact of a compound disaster on key sectors at seismic hazards in Taiwan. While Taiwan has high-tech export-oriented industries such as semiconductor and electronic products, four nuclear power plants are all built in the at-risk areas close to its capital city with their industrial agglomeration. We use a computable general equilibrium (CGE) model to simulate a compound disaster in Northern Taiwan. We consider the individual disaster components of (1) labor loss, (2) capital loss, (3) power crisis, and finally combine them to simulate (4) a compound disaster comprehensively. The simulation results show that Taiwan's key sectors such as semiconductor and electric equipment would be affected severely by capital and labor losses but not by power crisis. This implies that no electric power allocation would be needed for these industries although we are often tempted to do so in case of emergency.

Cross-Hauling and Regional Input-Output Tables: The Case of the Province of Hubei, China

Topic: Regional Input-Output Modeling
Author: Yongming Huang
Co-Authors: Anthony Travers Flegg, Timo Tohmo

This paper reports the results of an empirical assessment of the performance of Kronenberg's CHARM (Cross-Hauling Adjusted Regionalization Method), a relatively new non-survey technique that takes explicit account of cross-hauling when constructing regional input-output tables. Survey-based data for the central Chinese province of Hubei are used in this assessment. With CHARM, a key determinant of cross-hauling is held to be the heterogeneity of the products of individual sectors, which is estimated using national data. By making use of published national and regional data for 2007, CHARM is used to construct a detailed regional input-output table for Hubei with 42 sectors, including 17 different types of manufacturing. The CHARM-based estimates of Hubei's sectoral exports, imports, volume of trade, and sectoral supply multipliers are then compared with the official regional figures. However, contrary to the authors' earlier findings for Finland, CHARM does not generate reliable estimates of these magnitudes. This outcome is attributed to the difficulty of getting satisfactory estimates of net exports and heterogeneity for this data set. This problem is, in turn, linked to the relatively small size of the region under examination, which generates around four percent of China's GDP. The findings highlight the crucial importance, especially in relatively small regions, of adjusting any estimates generated by CHARM to allow for any known divergence between regional and national technology and heterogeneity. Various strategies are explored for implementing such adjustments. Note: This paper is currently under review (in revised form) by International Regional Science Review.

Transnational Interregional Input-Output Analysis: from the perspective of Japan

Topic: The BOK-IDE-SIC Transnational Interregional Input-Output Project
Author: Satoshi Inomata
Co-Authors: Bo Meng

This paper is presented for a convened session jointly organised by the Bank of Korea, Institute of Developing Economies, JETRO (IDE-JETRO), and the State Information Center of PRC.

IDE-JETRO's new project of constructing Transnational Interregional Input-Output Tables (TIIO) aims to link interregional input-output tables of China, Japan and Korea into a single matrix using the import/export data of the regional customs of individual countries. The table will enable us to study economic linkages across borders on a region-to-region basis, say, between Huanan region in China and Kyushu region in Japan. It is expected that the data will serve to draw a detailed mapping of cross-national production networks in East Asia, in particular of the dynamics of regional industrial structures after China's accession to the WTO in 2001.

This paper conducts a structural analysis of regional production networks from the perspective of Japan.

HOW COMPETITIVE IS CHINESE INDUSTRY? – Decomposing Skilled and Unskilled Labor Costs in an Input-Output

Topic: Productivity and Efficiency Analysis
Author: Keiko Ito
Co-Authors: Harry X Wu

Using newly available labor employment and compensation matrices for Chinese industry and matching input-output table data at detailed sector level, both constructed under the CIP (China Industry Productivity Database) Project, we conduct unit labor cost (ULC) analysis in an input-output table framework to investigate the dynamics of China's competitiveness over the period 1980-2010. Specifically, changes of skilled and unskilled labor costs per unit of real value added are accounted for individual industries and industry groups from upper stream to downstream industries, which may shed important light on the role of the state. The results are compared with ULC for industries in Japan and South Korea.

Key works: Skilled and unskilled labor costs, unit labor cost (ULC); labor productivity; labor employment and compensation matrices; input-output table
JEL classification: C82, E01, E24, E31, O47

Implications of U.S. and China trade in the Green House Gases generation, 2000-2010

Topic: Environmental Input-Output Modeling
Author: CASTAÑEDA LEÓN JAVIER
Co-Authors: José Trinidad Vivanco

Abstract

In the last two decades, two elements have shown upward growth rates, Green House Gases (GHG) emissions and trade. In a globalized environment, several countries, especially developing countries, have bought low cost inputs, which at the same time are high pollution inputs. The later allow them to increase their competitiveness in commerce and to become suppliers of certain types of goods.

In this paper we verify which are the sectors and countries that have increased their dependency of foreign inputs to export and at the same time have increased their GHG emissions to export, with the objective of identifying the higher polluting sectors due to the acquisition of foreign inputs with low levels of environmental efficiency. This is achieved through the use of value added trade matrices and GHGs for export matrices, considering the methodologies proposed by UNCTAD and De Backer and Miroudot (2012) in the first case, and an adaptation for GHGs of the proposal for employment matrices of Dominguez, et al. (2008).

References:

De Backer, K.,, Miroudot, S., 2012, "Mapping global value chains", Working Party of the Trade Committee, No. 9. OCDE.

Domínguez, A., Parra, J. y Arriagada, O., 2012, "National Economy 2008: a look from the perspective of the linkages for employment matrix size 111 * 111", European Scientific Journal, 8(19): 1-18.

UNCTAD, 2013, "World Investment Report", Cap.4. Global Value Chains: Investment and trade for development. United Nations.

Characterizing Relative Performance: The Energy Efficiency Advantage of Foreign-invested Enterprises in China

Topic: Productivity and efficiency analysis I
Author: Xuemei Jiang

China has become the world's largest energy consumer and the largest carbon emitter. The improvement of energy efficiency is one of the most effective ways to reduce the total energy consumption and subsequently the total carbon emission. According to the economic census data, the Foreign-Invested Enterprises (FIEs) had energy efficiency advantage over Domestic-Owned Enterprises (DOEs).
However, being based on data for aggregate manufacturing they fail to control for the industrial distribution of FIEs: the possibility being that FIEs are disproportionately represented in the high-tech and low energy-intensive industrial sectors, without being necessarily more energy efficient than DOEs within each sector.

The immediate purpose of this paper is to measure whether the total energy intensity of FIEs has advantage over DOEs, and if they do, to quantify the extent to which the aggregate energy intensity advantage is due to a 'better' industrial distribution (the structural effect) and how much it reflects a widespread tendency for FIEs to be more energy efficient than their DOE counterparts within each industry (the ownership effect). In order to do this, we develop a new energy occupancy input-output table characterizing FIEs and DOEs, to compare both their direct and indirect differences of energy intensities across manufacturing industrial sectors in mainland China for year 2007. With the new input-output table, not only the products flows and energy consumption in SCE are depicted at a detailed industrial level, but also the differential of production technology as well as the energy intensity in FIEs and DOEs is exhibited.
Our principal empirical findings include:
(1) The direct energy intensity underestimates the energy consumption of the industrial sectors. For the high-tech industries, such as transportation equipment manufacturing and electrical machinery manufacturing (which thought to be relatively low energy-intensive), the total energy intensities are about 5-10 times of their direct energy intensities, if we include the indirect energy consumption of downstream industries.
(2) The total energy intensity of FIEs is 4.36 ton of SCE in per 10,000 value added of exports, lower than 50% of the total energy intensity of DOEs' exports (8.81 ton SCE per 10,000 RMB). No more than quarter the FIEs advantage is due to structural factors. If DOEs has identical uniform structure of exports with FIEs across industries, the aggregate differential would fall by 10%.
(3) If DOEs were to exactly mirror the existing energy efficiency pattern of FIEs, the aggregate differential would remain as high as 30%. Further investigation shows that the energy intensity per unit of value added of FIEs is generally lower 10%-40% than their counterparts of DOEs within identical sector. Moreover, this result holds for specific kinds of energy, e.g. coal, oil, natural gas, electricity and heat.
(4) If DOEs were to exactly mirror the existing production technology of FIEs (i.e. identical input structure), the aggregate differential would fall by 50%. This implies that FIEs use relatively low energy-intensive sectors are their intermediate inputs compared with DOEs, even if they produce identical products.

Water and carbon nexus in China's Electricity Production and Distribution Sector

Topic: Input-output analysis for policy making IV
Author: YONGKAI JIANG

China's Electricity Production and Distribution Sector used half of the industrial water consumptions and discharged nearly half of the carbon dioxides directly. The central government have proposed several policies which focused on the mitigations of water consumption and carbon emission by means as changing technology shares, but policies that focused on the formers may have positive and negative effects on carbon emissions inside Electricity Sector, and vice visa. What's more, as a key sector in China's economy, changes of technology shares inside Electricity Sector would have great impacts for the whole society. In this article, with the adoption of a disaggregated IO table, we used the method of multiplier analysis to analyze water consumption and carbon emission alterations in the whole economy induced by changes of technology shares. We would set different scenarios according to different policies, then after a comparison of different results induced by scenarios, we would try to figure out an optimized scenario that can not only satisfy the final demands of the whole society but also reduce water consumption and carbon emission mostly.

Growth and Productivity in the Spanish and European economies.

Topic: Productivity and efficiency analysis II
Author: Sofía Jiménez
Co-Authors: Rosa Duarte, Raquel Langarita, Julio Sánchez Chóliz

The crisis has made us rethink growth. There is a huge variety of factors that explain the modernization and the structural change in the Spanish economy, but the improvement of productivity is likely the most important, both at the sectoral and global level. However, the decrease in productivity has also been significant in explaining the current economic crisis. Different ways exist to estimate this productivity. This paper focuses on the comparison between traditional productivity measures (multi-factor productivity) and those derived from an input-output framework (direct and vertically integrated).

Through SDA methodology, we obtain some effects that reflect the evolution of salary, work, capital and technological productivity. However, it is difficult to match them with other multi factor productivity estimations, such as those based on neoclassical production functions (EUKLEMS). Differences appear in the use of demand as a driver, in the first case, and in the different meaning of the work and capital effects used to capture technological change.

To address this problem we use different approaches. An alternative SDA is developed using final demand as a unitary measure of goods. We can therefore obtain work and capital effects that include the expansion of the economies. Moreover, we will estimate other indicators such as the potential production growth rate.

The initial data comes from a series of annual Spanish input-output tables covering the period 1980-2007. We also use EUKLEMS output, capital and labour data for Spain, particularly regarding multi-factor productivity; together with other information provided by the Spanish Statistical Institute.

The analysis is extended to other European countries in order to compare their evolution with the Spanish case.

Land Use Change and Global Adaptations to Climate Change

Topic: Addressing Resource Challenges in a Globalized Economy II
Author: Roxana Julia
Co-Authors: Faye Duchin

Abstract: This paper uses the World Trade Model with Climate Sensitive Land (WTMCL) [1] to evaluate possible future land-use changes associated with adaptations to climate change in a globalized world. In this approach changes in regional agricultural production, which are based on comparative advantage, define patterns of land use change in agriculture in all regions of the world. We evaluate four scenarios that combine assumptions about future increases in food demand and future changes in land endowments of different productivities associated with climatic conditions: each scenario generates distinct patterns of regional specialization in the production of agricultural commodities and associated land-use change. The analysis also projects future food availability under the simulated conditions and the direction of likely changes in prices of the major agricultural commodity groups.

References

1. Juliá, R.; Duchin, F. World trade as the adjustment mechanism of agriculture to climate change. Climatic Change 2007, 82, 393-409.

Key CO2 emission clusters accelerates world CO2 emissions

Topic: Input-Output Economics and Network Theory II
Author: Shigemi Kagawa
Co-Authors: Klaus Hubacek, Jan Christoph Minx, Keisuke Nansai, Sangwon Suh, Thomas Oliver Wiedmann

Key CO2 emission clusters accelerates world CO2 emissions

Authors: Shigemi Kagawa1*, Sangwon Suh2, Klaus Hubacek3, Thomas Wiedmann4, Keisuke Nansai5, and Jan Minx6

Affiliations:
1 Faculty of Economics, Kyushu University, Fukuoka, Japan
2 Bren School of Environmental Science and Management, University of California Santa Barbara, California, USA
3 Department of Geographical Sciences, University of Maryland, College Park, USA
4 Faculty of Engineering, The University of New South Wales, Sydney, Australia
5 Center for Material Cycles and Waste Management Research, National Institute for Environmental Studies, Tsukuba, Japan
6 Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany

*Corresponding author
Faculty of Economics, Kyushu University, 6-19-1 Hakozaki, Higashi-ku, Fukuoka, 812-8581, Japan, Phone and Fax: +81-92-642-2489, E-mail: kagawa@econ.kyushu-u.ac.jp

Abstract (100-150 words)
Global warming is not only one of the most important challenges that mankind is facing but also a complex one.. Greenhouse gases (GHGs) emitted from one country might have been induced by demands on its products from other countries, and understanding the structure of GHG emission inducement along the supply-chain becomes increasingly challenging as our economy is globalized supply-chain. This is a major point of debate in climate change policy and international climate negotiations. We developed a global model for supply-chain network and identified CO2 emission clusters within global supply-chain networks including more than 400 million supply-chains. We found that in 2009, U.S. construction demand has a crucial responsibility of forming huge CO2 clusters in China amounting to 200 (million tons-CO2 eq.). Our results also reveal that U.S. textile products demand induces bi-national China-India CO2 emission clusters. We suggest that a coalition between the Chinese and Indian governments would play an important role in debate in assigning emissions from production to consumption.

Enhancing Business Resilience under Power Shortage: Effective Allocation of Scarce Electricity Based on Power System Failure and CGE Models

Topic: CGE and econometric input-output modeling I
Author: Yoshio Kajitani
Co-Authors: Kazuyoshi Nakano

Effects of transition from ESA 1995 to ESA 2010 on input-output accounts: the case of Slovenia

Topic:
Author: Janja Kalin

In 2014, new European system of accounts, ESA 2010, will be implemented in national accounts data of European countries. The changes from previous system, ESA 1995, will affect different aggregates and structures within the supply-use and input-output tables. In the paper, the changes in the Slovenian input-output accounts will be described.

Resolving the international trade asymmetry in Eora multi-region input-output table

Topic: Supply, Use and IO Tables: Different approaches to reconcile world trade asymmetries (I)
Author: Keiichiro Kanemoto
Co-Authors: Arne Geschke, Manfred Lenzen, Daniel Moran

Recent developments of multi-region input-output (MRIO) analysis have focused on how environmental emissions shifted to developing countries through international trade. We find that international trade was a major driving force of environmental threats in developing nations. The volume of bilateral international trade is associated with high uncertainty in MRIO tables. Export volumes from Japan to Australia reported by Japan are not the same as import volumes from Japan reported by Australia. Here, we show the solution of this international trade asymmetry in the Eora MRIO tables. First of all, we find that the larger the bilateral trade volume, the smaller the relative difference of bilateral trade. Second, we set a standard error for each bilateral trade by product based on the first finding, a high standard error for smaller international trade volumes, and vise versa. Finally, we resolve the international trade asymmetry as an optimization problem in terms of minimizing the change in the initial estimate subject to fulfill constraints, bilateral trade statistics, with a given standard error.

Using gross and base measures of output to explore the relationship between export expansion and import substitution.

Topic: Input-Output Analysis for Policy Making
Author: David Kay
Co-Authors: Greg Alward, Stephen Cooke, Philip Watson

Two broad strategies of local economic development include export expansion and import substitution. We assume that the former causes the latter until there is an optimal level of both. The

product of a Leontief inverse closed to include households and a diagonalized vector of final demand generates both measures of export base output by sector down the columns and gross output along the rows. We assume that gross output reflect a measure, in part, of the extent of import substitution while export base output reflects the extent of export expansion. Applying a Shannon entropy index to base and gross output as measures of diversity, we determine the effect that export base diversity has on the difference between gross and base diversity. The sample includes all counties in the State of North Carolina, USA (n=100). We test for spatial dependency using a Moran's I test. Using a spatial error model, we then demonstrate a negative and non-linear relationship between these two measures of diversity. Our interpretation of these measures suggests that the optimal range of export expansion and import substitution lies between company towns (those with high import substitution diversity and low export base diversity) and self-sufficiency towns (those with high export base diversity and low import substitution diversity). An understanding of this relationship suggests that import substitution becomes a viable development strategy when tied to the price signal provided by export expansion and knowledge of the interrelationship between the two. We believe this approach may also suggest a more general relationship between export expansion and import substitution.

Estimating embodied risk within global supply chains

Topic: International Trade II
Author: Scott John Kelly

Global supply chain risk has received renewed attention in recent years in a push to improve supply chain efficiency and reduce the adverse impacts felt by companies and end consumers as a result of disrupted supply. In addition, supply chain management practices such as just-in-time, virtual inventory methods and a reduction in the number of distribution facilities has had the effect of increasing supply chain risk. Despite this, global supply chains remain opaque and still not well understood by practitioners or company management. In light of this the following question will be answered: what industries and countries have the highest levels of supply chain risk? In order to accomplish this, a new metric is developed and combined with the EORA global multi-regional input output model (GMRIO) and defined as 'embodied risk'. Several methods are adapted from important developments within environmental impact analysis which are used in the development and synthesis of an embodied risk metric for both industries and countries within EORA. The method requires the creation of a risk based vector for each country and industry within the MRIO from which total embodied risk is then estimated. Structural Path Analysis with Taylor series expansion is then used to explore risk at different tiers in the global supply chain. The introduction of a new metric for total embodied risk will provide company management and practitioners of supply chain risk management with new data on the levels of risk in different supply chains previously absent or hidden from existing supply chain risk analysis.

Decoupling and Sources of Structural Transformation of Emerging Asian Economies? An International Input-Output Decomposition Analysis

Topic: World input-output modeling and databases I
Author: Jong-Hwan Ko

This study aims to answer two questions: 1) Have emerging Asian economies decoupled? 2) What are the sources of structural changes in total outputs and value added of emerging Asian economies related to the first question? The sources of the shifts in total outputs and value added of emerging

Asian economies between 1995 and 2000, 2000 and 2005, and 2005 and 2011 can be ascribed to changes in technology in terms of input coefficients and value added coefficients, domestic final demand, and intra-regional and extra-regional final demand. We make use of input-output decomposition analysis, for which we use World Input-Output Tables for 1995, 2000, 2005 and 2011.

The main findings of the study are as follows. First, the changes in the impact of the final demand components on total output and value-added of emerging Asia show that since 1995, there has been a trend of increasing dependence on exports, indicating no sign of “decoupling”, but rather an increasing integration of emerging Asian countries into global trade. In other words, the exposure of emerging Asia to extra-regional markets has increased.

Second, even though this study does not support the decoupling thesis for emerging Asia, there is a contrasting feature in the sources of structural changes in gross output and value-added between non-China emerging Asia and China. Dependence of non-China emerging Asia on intra-regional trade has increased, in line with the strengthening of economic integration in emerging Asia, but China has disintegrated from the region.

Third, there have been differing trends in changes in the sources of extra-regional demand during 1995-2011. The contribution ratio of EU demand to changes in total output and value-added of emerging Asia increased between 1995-2000 and 2000-2011, while the shares of Japan and the US declined. As a result, the dependence of emerging Asia’s output and value-added on the G3 economies decreased. However, the higher exposure of emerging Asia to extra-regional markets during 2000-2011 than during 1995-2000 was due to stronger trade linkages with the rest of the world (ROW), with their higher share in emerging Asia’s total output and value-added.

Keywords: Emerging Asian economies, decoupling, World Input-Output Tables, input-output decomposition analysis, factors of economic growth

JEL classification: F14, C67, E23

The economic-wide consequences of large-scale floods. An application of a European interregional input-output model

Topic: Input-Output Analysis of Desasters
Author: Elco Eduard Koks

In recent history, flooding of both river and coastal systems is the most frequent and damaging natural hazard. Besides large economic losses within the flooded regions, surrounding non-flooded regions can endure economic losses as well. As a result of these extended regional linkages, a comprehensive risk assessment is required to understand which impacts flooding may cause to the economy as a whole. In this paper, we make first steps with applying a methodology consisting of a hybrid interregional input-output model to assess the economic consequences of large-scale floods for the European economy. The proposed methodology consists of multiple steps. First, a direct loss assessment is conducted in several flood-prone regions, based on simulated floods. Second, the direct losses in capital and labor are translated into the loss in production per sector. Third, the recovery of this production shock is modeled using a hybrid interregional input-output model, combining non-linear programming and input-output modelling. This combination makes it possible to find (1) the possible production losses in the affected regions and other European regions, (2) the required production in Europe to satisfy additional reconstruction demands from the affected regions

and (3) the required production in other regions that is necessary to take over lost production in the affected region. Consequently, when knowing how much production is lost (or gained) in each region, the economic consequences can be assessed. Finally, the model outcome is loss estimation expressed in terms of expected annual damage. To assess these consequences, interregional supply and use tables are used, consisting of 256 different European NUTS2 regions. This data makes it possible to model the indirect losses for both the affected region and the rest of Europe in detail. Results show that regions outside the affected area can have benefits or losses, depending on the economic relation with the affected region. Consequently, depending on the size of the flood, the overall consequences for Europe can both be positive and negative. This study shows the large potential of interregional modelling and the added value of combining different economic loss estimation approaches into an integrative framework.

The effects of a production disruption in a linear programming input-output model

Topic: Input-Output analysis of disasters II
Author: Wolfgang Koller

There exist various approaches to use input-output analysis for measuring the direct and indirect effects of a disruption to an economic system stemming from natural disasters, bottlenecks in primary factors and energy resources, strikes, and restrictions due to regulation. The present paper brings together linear programming and input-output-analysis to introduce various scenarios of linear restrictions to an economy where there is only one technology to produce each good (Leontief technology). Thus, technological adaptation is not an option. However, other forms of adaptation, e.g. changing the composition of final demand and of the trade structure are considered. The effect of the disruption is computed as the difference between the base scenario and the solution of the linear program.

The analysed models stand in a long tradition of linear-programming-input-output approaches. While in older models the production or the value added of the overall economy was employed as the objective function to be maximized, in our approach it is final demand. However, final demand must not exceed the final demand before the disruption in any of the commodities produced. A more recent contribution that has some similarity with our model uses an information theoretic measure for model solution (Oosterhaven et al, 2013) and is therefore a non-linear programming model.

The suitability and interpretation of various modelling approaches are discussed, both from a theoretical stand-point and with the help of application studies based on real world input-output tables. The applications deal with the cut-back of the production of a group of industries and with the effect of a shortage of emission allowances in a cap-and-trade system.

Visualizing Core Structure of International Carbon Network Associated with Household Consumption

Topic: Inpu-Output Economics and Network Theory I
Author: Yasushi Kondo

The structure of a production network involved in supplying a given product is generally considered as quite complex. The transformation of a network into its simplified structure, or core structure, therefore, offers an effective tool for better understanding how the environmental impact associated

with a product propagates throughout the entire economy. However, extracting a core structure from the production network, which is represented by an LCA database or an input-output table, is not straightforward because the network consists of vast information and typically contains many feedback loops. In order to deal with this, we elsewhere developed a method, called path-based matrix decomposition analysis (PMDA), to extract a core structure entangled in a production network. In this study, we applied PMDA to an environmentally extended multi-regional input-output table for understanding the international carbon network associated with household consumption. The decomposition by PMDA offers a scheme to extract a core structure from an inter-sector network and provide an input-output table which represents the core structure. The matrix representing the core structure is suitable to be visualized, for example, in a Sankey diagram. A graphical visualization of the core structure of international carbon networks associated with household consumption allows us to instantly compare the amount of "embodied" GHG emissions, from producer's and consumer's perspectives and even some intermediate perspectives.

Competitiveness and tax reform in Europe

Topic:
Author: Kurt Kratena
Co-Authors: Gerhard Streicher

Austria is a small, open economy which is very much dependent on exports for maintaining its high level of income. High labour costs are often lamented as a prime obstacle to remaining “competitive” against lower-income countries. As Austrian enterprises also face some of the highest payroll taxes (as share of total labour costs) in the world, a reduction of these costs (the largest part of which is made up by social security contributions) would, by removing some cost pressure, arguably go some way towards more “competitiveness” of the Austrian export sector. The flip side, of course, is a budgetary shortfall, which might only to a (maybe small) part be compensated by faster growth (and higher employment).
Combining FIDELIO, an econometric IO model of the EU member states plus 6 further countries (which was developed for and with the IPTS in Sevilla), with a detailed description of the Austrian tax regime (distinguishing between various instances of consumption taxes, income taxes and corporate taxes as well as social security contributions, both by employers and employees), this paper explores the possibilities of using such a model to investigate the effects of reductions in payroll taxes, on economic performance and structure as well as on the public budget. To compensate for budgetary shortfalls, we discuss various versions of tax reform, for example, the expansion of “green taxes”.

Direct and indirect effects of technology transfer through foreign direct investments: The case of Slovakia

Topic: Impact Analysis: Multipliers
Author: Jozef Kubala

In this article, we evaluate the technology flows in Slovak economy, based on augmented input-output model for foreign direct investment. Several studies suggest that FDI were the main driver of technological development in Slovakia in recent years. Thus, this analysis could provide a better picture of technology flows in Slovakia then previous studies (Šikula et al, 2010) that are based on R&D expenditure vector. Technology flows based on FDI are analyzed in standard and actual structure. We identify the most important sectors of Slovak economy which purvey new

technology to other sectors, as well as the sectors which benefit the most from diffusion of new technology. We also estimate the embodied and disembodied technology transfer when we purge FDI vector from foreign investments in Slovakia associated with privatization.

Changes in trade balances with the paradigm shift from gross to value added terms among BRICs, the USA, the EU and Japan

Topic: Trade and Value Chains
Author: Masaaki Kuboniwa

In light of growing intermediate goods trade, we further develop theoretical and empirical research on the new concept of trade in value added (TiVA) that was provided by Johnson-Noguera and WTO-IDE. Using global and local equilibrium conditions of a global input-output model, we prove the fundamental theorem on the relationship between trade balances in value added and gross terms, developed by Stehrer, Benedetto and the author. That is to say, the total sum of a country (country r)’s trade balances with many countries (countries 1, 2,…, s, …, R; s≠r) in value added equals that in gross terms, namely the total sum of differentials between country r’s trade balances with country s in value added and gross terms equals zero: (Tva,r1－Tg,r1)+…+(Tva,rs－Tg,rs)+….+(Tva,rR －Tg,rR)=0, where Tva,rs and Tg,rs denote country r’s trade balances with country s in value added and gross terms respectively. We examine this zero-sum theorem by using WIOD compiled by Groningen University. We consider an aggregated case with eight countries (BRICs, the EU, the USA, Japan and ROW) and 20 sectors for 2005 and 2010. The China-US, China-EU and China-Russia trade balances, and the China-Japan imbalance in value added for 2010 are respectively 20.8%, 35.4%, 28.3% and 22.5% smaller than those in gross terms, whereas the China-ROW imbalance in gross terms is largely improved with the paradigm shift from gross to value added terms due to large improvements in China’s weak sectors of agriculture, mining, chemicals and oil products. In this paper, we also show alternative results by using IDE-BRICs input-output data without ROW and making corrections on an underestimation of the Russian mining’s trade flow and value added ratio in WIOD.

Domestic Content of China’s Exports and its Contributing Factors: a Structural Decomposition Analysis

Topic: International Trade II
Author: ZHU Kunfu
Co-Authors: Quanrun Chen, Cuihong Yang

Abstract: Processing trade account for a very large share of China’s total exports. In production of processing exports, more imported intermediate inputs are used, which imply that measuring domestic content in China’s exports is more complicated. Based on the extended non-competitive input-occupancy-output model that captures processing trade, which proposal by Chen etl (2012), we calculate domestic content of China’s exports in 2002, 2007 and 2010, and the ratio of domestic content of exports to GDP in those years. The results show that domestic content of China’s exports had risen significantly but the domestic content share of processing exports was much lower than normal exports. However, the domestic content share of processing exports rose rapidly than normal exports, because the proportion of domestic intermediate inputs in producing processing exports has been on the rise. The rise in domestic content in China’s exports is mainly attributable to the expansion of total exports volume in 2002-2007. As the growth of China’s exports dropped in

2007-2010, the contribution of domestic content share increased.

Keywords: Processing exports; Extended non-competitive input-occupancy-output model that captures processing trade; Domestic content in exports; Structural decomposition analysis

Global Value Chains and Development

Topic: Global Value Chain Analysis
Author: Victor Kümmritz

Global Value Chains (GVCs) have become a central topic in trade and development policy but little is known about their actual impact because data availability has been limited so far. The recent release of the Trade in Value Added (TiVA) and the World Input Output (WIOD) databases has removed this issue and has made an empirical analysis of GVCs possible. In this paper I therefore look at the relationship between GVC activity and development at the industry level. I show that the relationship depends crucially on the type of GVC activity industries are engaged in. Backward linkages appear to affect development conversely to forward linkages. Across most specifications, GVC indicators measuring backward linkages exhibit a negative relationship with an industry's domestic value added while forward linkages are associated with higher value added. The effects are stable across indicators based on different novel databases, such as WIOD, TiVA, or STAN. In addition, they are mainly independent of measuring GVC activity in terms of value added or gross trade. However, the effect of overall GVC indicators, that combine both backward and forward linkages, is dependent on the terms of measurement. Finally, I show that while backward linkages are related to lower domestic value added, they are also connected to higher total output and productivity. The effect of forward linkages on these outcomes is not stable but they appear to have a positive effect on employment.

Labor productivity changes and wages: Cost-push effects

Topic: Productivity and Efficiency Analysis
Author: Martin Lábaj
Co-Authors: Mikulas Luptacik

Among the causes of current economic problems in the European Monetary Union (EMU), the increasing differences in the competitiveness among the members of EMU play an important role. The real wages e.g. in Germany grew in the last years very slowly, significantly behind the growth of the labor productivity and consequently the competitiveness of Germany was rising stronger than in the other economies. Recent studies deal mostly with aggregated models and overlook structural changes behind this phenomenon. In this paper, we analyze the changes in labor productivity and wages, and the cost-push effects, in different countries of the European Union, based on World input output tables nad Price input-output model. Using the structural decomposition we identify the impact of changes in average hourly wage and in hourly labor productivity on the prices.

Estimation of SUTs at previous year prices in Chile

Topic: Supply, Use and IO Tables: Previous Year Prices
Author: Felipe Andrés Labrín
Co-Authors: Viviana Andrea Rosales

The purpose of this paper is to present the compilation and conciliation methods used by the Central Bank of Chile in the production of Supply-Use Tables (SUTs). Since the released of the 2008 Benchmark Compilation, SUTs are compiled yearly, both at current prices and in volume terms. SUTs are presented with a breakdown of 111 economic activities and 176 products at current prices and 30 economic activities and 30 products in volume terms. Volume measures are based on previous year prices for each variables contained in the SUTs. This document reviews the compilation methods of production accounts and other variables used for the elaboration of SUTs, as well as its balancing process. In addition, the method to obtain SUTs at previous year prices is reviewed in depth, along with the main information sources and price indicators involved in the process.

Wage as rent: A classical model with some neoclassical features

Topic: Input-output analysis for policy making III
Author: Christian Lager

The classical core can be distinguished from the contemporary neoclassical type of models also by differences in the sets of data. It is demonstrated that a minor change in the data set of the classical model, i.e. substitution of given wage rates by the assumption of labour market clearing, brings about a completely different type of model with three manifestations (classical/Marxian-, neoclassical long run- and restraint inflation case) which depend on the relation between labour supply, productivity and final demand for products. Whereas the classical/Marxian case is characterized by persistent unemployment and subsistence wages the neoclassical long run case will result either in a stable position with full employment and wage rates above the subsistence level or, if the system is unstable, it will end up - like in the classical/Marxian case - with subsistence wages and persistent unemployment. A third case, restraint inflation, is characterized by permanent excess demand for labour and products.

Worldwide Spatial and Temporal Structural Decomposition Analysis of Energy Consumption

Topic: Input-Output economics and industrial ecology - LCA analysis
Author: Jun Lan

Concern for worldwide energy security has been underpinned in the process of globalization. Understanding the drivers underlying past and current energy consumption trends is vitally important for governments, security planners and international organizations. We therefore investigate the input-output tables in constant prices extended with energy consumption for a) quantifying the key long-term drivers those have led to the diversified energy consumption profiles of 187 countries around the world from 1990 to 2010, b) identifying which countries and sectors are recording an increase in energy consumption, and c) shedding light on the implications of these drivers for national economic and political policies. We undertake this empirical analysis in terms of three prevalent Structural Decomposition Analysis (SDA) methods with the data support of the

homogeneously-classed version of the Eora Multi-Region Input Output (MRIO) database. Our work provides a first, broad overview about the magnitude and distribution of these drivers across countries by showing that a) generally population affluence plays an accelerating effect on energy consumption, whereas industrial energy intensity retards energy consumption, b) the temporal trends of drivers show different typology for developed and developing countries, and c)empirical evidence on driving factors of energy consumption is sufficiently sound to foster our understanding of worldwide energy consumption pattern and energy security.

The impact of antidumping on value-added generated by trade

Topic: International Trade II
Author: Tian Kai Lan
Co-Authors: Cuihong Yang

With China's deepening engagement in global trade, there are more and more antidumping(AD) investigations and measures targeting at China's exported goods. China also launched more AD investigations into imported goods since its first case in 1997. However, as shown in the data of World Trade Organization(WTO), we can observe that foreign AD users(US, EU, Canada, Australia etc) discriminate between China and other major targets of antidumping, while data of Chinese investigations and outcomes indicate that there is much less differentiation or discrimination across targeted exporting countries. In the free trade theory, trade remedies generate lose-lose consequences, even cause negative effects on domestic economy. This paper aims at studying trade imbalance and discrimination of trade remedy in terms of domestic value added generated by exports through case study. We choose two representative cases: photovoltaic products and newsprint. The United States and European Union initiated AD investigation against photovoltaic products originated in China separately in November, 2011 and September, 2012. China initiated its first AD petition against newsprint originated in the United States, Canada and South Korea in December, 1997. We use monthly export data(quantity, price and value) of photovoltaic products and import data of newsprint from China Customs over the 1997-2012 period. Then we establish econometrical models to estimate the impact of AD investigation on trade volume. Finally, national input-output models are used for estimating the change of value-added in trade. Considering the high share of processing trade in China's trade pattern, we use the DPN model, where the processing trade is separated from the domestic production, to study the value-added in China's exports. Our preliminary results show that Chinese high-tech products such as photovoltaic products locate in the low-end links in global value chain. Trade remedies certainly will make bilateral trade imbalance increase.

EVALUATING THE SOCIOECONOMIC EFFECTS OF THE INTERNATIONAL EXPO ZARAGOZA 2008 FROM AN INPUT-OUTPUT PERSPECTIVE

Topic: Effects of Infrastructure Investments
Author: Raquel Langarita
Co-Authors: Rosa Duarte, Sofía Jiménez, Julio Sánchez Chóliz

In the summer of 2008, the International Expo Zaragoza 2008 "Water and sustainable development" was held in Zaragoza (Aragon, Spain). This project was supposed to modernize the city and transform the Aragonese economy with positive long-term effects on production and employment.

The aim of this paper is to analyze these effects from an economic and environmental perspective.

In order to do that, we have obtained yearly input-output tables for Aragon during the period 2006-2010. Thus, we have updated the last available table (2005) with the GRAS method [Junius and Oosterhaven (2003), Lenzen et al. (2007)], also using regional and national statistical information. We combine this information with investment data from Expoagua Zaragoza 2008, a company which was created in 2005, and the State Society for International Exhibitions.

Our analysis focuses on the evolution of the forward and backward linkages, in the structural changes shown by dependence graphs, and on the information regarding direct investments associated with the International Exhibition. The direct, indirect and induced impacts on the main economic and environmental variables are studied using the Leontief model (impact analysis and structural decomposition).

We want to check if the construction and service sectors, especially tourism, benefited the most, and how significant the effect was on other sectors. The persistence of these effects over time, i.e., the existence of structural transformation in the economy is evaluated together with possible negative effects of the institutional debt.

Identifying true trade patterns: correcting bilateral trade flows for re-exports

Topic: Global Value Chain Analysis
Author: Maureen Lankhuizen
Co-Authors: Mark Thissen

A substantial and increasing part of the trade in goods are re-exports. Re-exported goods are treated in the National Accounts as being imported in and exported from a ' transit country'. This country only has short-term ownership of the goods, that are traded between two other countries. Data on bilateral trade flows used to estimate models of international trade are not usually corrected for re-exports. This implies that a re-exporting country is mistakenly taken as the origin of the trade flow (on the export side). Similarly, the re-exporting country is also treated as a final destination of a trade flow (on the import side). Re-exports in trade statistics may produce the following three main consequences: (1) the distance decay of trade is wrongly estimated, (2) a country's main trading partners are wrongly identified, and (3) the volume of total world trade is overestimated. Most studies of international trade are based on the gravity model (see, e.g., Deardorff, 1998, and Anderson and van Wincoop, 2003). The gravity model postulates that bilateral trade depends on the economic size of the trade partners, which reflects market size and purchasing power, and a variety of measures of distance (or proximity) between the countries to reflect trade costs. A wrongly estimated distance decay of trade may affect the main conclusions from these studies. The misidentification of main trading partners may lead to wrongly targeted export promotion policies. The overestimation of the volume of trade may put too much (policy) emphasis on trade as an important factor in economic development. The recent literature on global value chains will also be affected, since not only the total value-added incorporated in export flows is of importance when identifying a country's important trading partners, but also the actual destination of exports.

The World Input-output database (WIOD) provides information on bilateral trade flows between countries that are consistent with the National Accounts. The data includes estimates of the size of re-exports, which makes it possible to correctly estimate the volume of world trade. However, the trade flows between origin and destination are not corrected for re-exports. This paper estimates bilateral trade flows that are cleaned from re-exports. Using a constrained non-linear optimization procedure we estimate the complete re-export matrix. Assuming that trade patterns of re-exports are the same as the average trade patterns, we adjust the WIOD trade table by changing the origin of

the re-exported imports and cleaning these re-exports from the import flows of the 'transit country'. In doing so, this paper thus addresses consequences 1) and 2) above.

We find that the change in the average trade distance of countries in the period 2000–2010 due to the correction for re-exports is 5 percent on average. We also find that on average typical re-exporting countries like The Netherlands are ranked 1.5 higher as an export destination by other countries, while other countries are ranked up to a factor 2 lower than their actual importance. The results may not seem impressive, but it should be noted that they are based on total trade flows. Further analysis at the level of product groups (59) reveals much stronger differences in the distance decay of trade and the importance of trading partners.

The impact of FDI between Japan and China: A dynamic multi-regional general equilibrium analysis

Topic: Trade, global value chains and foreign direct investment: measurement issues and impact evaluation
Author: Maria C. Latorre
Co-Authors: Nobuhiro Hosoe

This paper analyzes the impact of the foreign direct investment (FDI) evolution of Japanese multinational enterprises (MNEs) operating in China during the recent financial crisis. The study is conducted by means of a three region (Japan-China-ROW) recursive dynamic computable general equilibrium (CGE) model of MNEs. Particulary detailed data from the METI on the operations of Japanese MNEs are used. Thus, we model Japanese MNEs taking into account their export and import propensity, the value added and production they generate, as well as, their capital intensity patterns. These features stand out among the few CGEs that consider the presence of MNEs. The FDI decrease would seem to produce rather small adjustments in the aggregate variables of China and Japan. However, their bilateral trade patterns are considerably affected by the evolution of FDI. Furthermore, in the case of Japanese MNEs operating in the Chinese transport equipment sector, in which Japanese presence is the most important among all sectors accounting for 13% of overall production and 14% of overall exports in China, the fall in FDI would bring about a reduction in exports to the rest of the world region. This would suggest a potential conduit by which FDI patterns between China and Japan would also impact world trade flows.

Transnational Interregional Input-Output Analysis: from the perspective of the Republic of Korea

Topic: The BOK-IDE-SIC Transnational Interregional Input-Output Project
Author: Jihyeon LEE
Co-Authors: Wooki Lee

This paper is presented for a convened session jointly organised by the Bank of Korea, Institute of Developing Economies, JETRO (IDE-JETRO), and the State Information Center of PRC.

This paper explores economic linkages between Korea, Japan and China on a region-to-region basis. The Bank of Korea, IDE-JETRO and State Information Center of PRC have compiled Transnational Interregional Input-Output Tables 2005 (TIIO2005). The tables will be used to draw a detailed mapping of cross-national production networks in East Asia. As well known, those three countries in East Asia are closely interrelated but there has been limit of actual analysis on regional

basis. However, with the structural analysis of the table, I expect to investigate distinguishing commercial relations (such as production networks) between those endogeneous regions and Korean regions.

Creating Multiregional Input-Output Flow Tables for Scenarios about the Future from the Outcomes of World Trade Model Calculations

Topic: Addressing Resource Challenges in a Globalized Economy I
Author: Stephen Harris Levine

A new flexible, extensible model of the global economy with input-output models at its heart

Topic: World input-output modeling and databases I
Author: Rob Levy

A global model is presented that can be used as the basis for assessing the impacts of future changes in trade, migration, security and development aid. The model is based on input-output models for 40 countries, linked with trade data at the sector level.

This is made possible by the World Input-Output Database, a collection of input-output tables for 40 countries across 15 years, and by databases of commodities and services trade from the UN. The input-output stage and the international trade stage are "weakly coupled" allowing for more flexibility in the specification than in standard MRIO models.

The model is constructed using a minimum number of assumptions, and is based as far as possible on empirical observation. Some initial analysis of the model and its properties are also presented.

Analysis on China's Urban and Rural Residents' Income Based on Structure Decomposition Analysis

Topic: Input-output analysis for policy making I
Author: hui li

Income distribution problems have been the hot issues that have attracted much attention of the society. In the last dozen years, China's economy maintained a rapid growth rate, however, China's urban and rural residents' income growth rate was relatively slow, which was significantly lower than GDP growth rate. Especially the average per capita net income of rural resident growth lagged behind that of urban resident per capita disposable income for a long time, the income gap between urban and rural residents became larger. How to improve residents' income and narrow the income gap between urban and rural residents has been a focus of public attention.

2002-2007 and 2007-2010 China's residents' income increase presented different stage characteristics. Which factors influenced the income growth differently during the two stages? This paper compiled China's 2002、2007 and 2010 urban and rural income input-output table. Using this table, based on the input-output technology of structure decomposition analysis, this paper analyzed the inner reasons of China's urban and rural residents' income growth of 2002-2007 and 2007-2010, the changes of residents' income were decomposed into the factors such as

technology, final demand structure and GDP etc. By comparing the urban and rural residents' income changes of the two phases, this paper tried to find out the key factors which promoted and weakened them and explored the causes of the income gap between urban and rural areas.

The structure of global virtual water trade network

Topic: Input-Output Economics and Network Theory II
Author: Sai Liang
Co-Authors: Ming Xu

International trade has caused global "virtual" transfers of water resources embodied in products and services, which can be treated as a virtual water trade network. This study aims to uncover structural characteristics of this network to provide policy suggestions on global water conservation.
We integrate complex network analysis and input-output analysis to identify "hot spot" industries within the global virtual water trade network. In particular, primary suppliers are major industries directly withdrawing water resources. Primary demanders are major industries both directly and indirectly inducing water usage throughout global supply chains. Primary centers are major industries acting as transfer hubs of embodied water resources. We use the concepts of demand-driven and supply-constrained strongest paths (SPs) to identify those hot spots based on the direct requirement matrix and direct supply matrix of a hybrid water-multi-regional input-output (HW-MRIO) model. The HW-MRIO model is constructed based on the Eora MRIO model and its water satellite account. Industries with direct water withdrawals are expressed in cubic meters of virtual water in the HW-MRIO model, while the other industries without direct water withdrawals are expressed in US dollars to maintain the completion of global supply chains. Important nodes and links in this network are identified to represent industries and inter-industry trade flows that are critical and relevant to decision making on global water conservation.

Analyzing the iron flow of China by using WIO-MFA

Topic: Physical and Hybrid Input-Output Analysis
Author: Chen Lin
Co-Authors: Ming Liu, Makiko Tsukui

This paper analyzes the iron flow of China by compiling an input output table of iron (FeIO) based on the methodology of WIO-MFA. The FeIO shows the iron flows across sectors of virgin resources, materials, products, and secondary resources. Since it is based on currently available IO table, the FeIO inherently has high degree of resolution. The FeIO table of China with 122 sectors is compiled. To demonstrate the material flow embodied in the FeIO, a new approach called main route analysis is proposed to draw a Sankey diagram for the most relevant route of iron flow for any given start point and end point. Meanwhile, the main route analysis is expected to reveal the degree of fabrication.

Estimating the Economy-wide Impacts of Energy Shocks in Taiwan under a Social Accounting Matrix Framework

Topic: Environmental input-output modeling VII
Author: Shih-Mo Lin
Co-Authors: Jin-Xu Lin

This study aims to examine the potential effects of exogenous energy shocks on the economy of Taiwan under an economy-wide framework. The social accounting matrix (SAM) framework has been served as the basis of the analysis. SAM multiplier decomposition, structural path analysis, and price model analysis are then used to analyze the effects of oil, electricity and other energy shocks may have on the Taiwanese economy. In addition to the above, this study also uses the constrained fixed-price model to explore the differential effects of two policies: restricting energy use and improving energy efficiency.
The SAMs for 1996, 2001 and 2006 are compiled by integrating input-output tables with national accounts for the corresponding years. There are 49 industrial sectors in the matrices, which has enabled us to explore a wide variety of sectoral results. The results of the analysis indicate that exogenous energy shocks will have significant effects on the industrial outputs and prices of sectors. Moreover, to reduce energy use, improving energy efficiency as compared to limit energy use directly seems to be a better policy action, as the latter will generate much bigger negative effects to the economy.

Measuring the Embeddedness of China's Manufacturing in Global Value Chain

Topic: Vertical specialization and outsourcing I
Author: Weilin Liu

In this paper we develop a framework to measure the embeddedness of China's manufacturing products in the global value chain(GVC). Instead of traditional definition of GVC as a chain of functions such as R&D, design, assembly, marketing, etc., we redefine the embeddedness in two dimensions as supply chain and functional chain. To measure the depth of embeddedness in the two dimensions, we first adjust the conventional I-O tables to detach the freight and insurance services from imported C.I.F. products to services industries, then based on an input-output analysis about vertical specialization, we propose a method to compute the foreign product and service contents (FPVA and FSVA) in China's manufactured export. In the model, the potential distinctions between process and normal trade are considered and the I-O tables for processing exports and domestic & normal exports are constructed separately. The different preference of FDI and domestic enterprises about offshore service outsourcing are also included to improve the formula for estimating the coefficient matrixes. Combining the trade statistics, conventional I-O tables and above information, a quadratic programming model is used to estimate the new I-O tables. We find that the FPVA is much higher than FSVA in 1997~2007, which implies that supply chain is more important than tradition function chain for China to upgrade in the GVC. There are also interesting variations across trade modes, observed years and sectors with different technological sophistication.

The Euro Area north-south structural economic divide: an input-output perspective

Topic: Structural change and dynamics III
Author: João Carlos Lopes
Co-Authors: João Ferreira do Amaral

The great recession of 2008/2009 and the subsequent sovereign debt crises highlighted the existence of deep structural imbalances in the Euro Area: the large differences of competitiveness and growth potential between its northern and southern countries. In this paper, an input-output approach is used to study and quantify a facet of this phenomenon, namely the external dependency and value added generation capacity of the productive sectors of these economies, based on a new treatment of inter-industry output multipliers, which follows closely Amaral et al (2011). The (gross) output growth potential given by the column sums of the Leontief inverse matrix (backward linkage indicators) results from three terms: inter-industry flows, value added and imported inputs. After a convenient arrangement of these terms, the evolution of backward linkage indicators can be used to detect structural changes, particularly quantifying a (net) growth effect (more value-added generation) and an external dependency effect (more imported inputs), and to classify the productive sectors accordingly. A comparison is made for a northern (Germany, the Netherlands and Finland) and a southern group of countries (Spain, Portugal and Greece), using several national input-output tables over the period 1995-2011, available in the WIOD database.

The energy consumption and the CO2 emissions in different income class in Sao Paulo state and rest of Brazil: The IRIO approach

Topic: Environmental Input-Output Modeling
Author: Ricardo Luis Lopes
Co-Authors: Joaquim Jose Martins Guilhoto

The main propose of this study is to analyze the consumption of different types of energies and the level of CO2-eq emission per different income class in Sao Paulo State and the Rest of Brazil. We distinguish household in twelve classes of income for year of 2008, with estimated levels of energy consumption and emissions through the construction of interregional input–output model reconciliation of the National Energy Balance. We found that classes with higher income tend to consume more of the sectors that have the highest rate of efficiency of energy and carbon emission. The Household in Sao Paulo state have the major impact in the energy demand and CO2-eq emission. But the energy demand and the CO2-eq emissions by monetary unit are biggest in the smaller income class.

Financial crisis and consumption patterns effects on carbon and material footprint

Topic: Environmental input-output modeling III
Author: Luis A. Lopez
Co-Authors: Guadalupe Arce, Manuel Morenate, Jorge Enrique Zafrilla

This paper develops a Multi-Regional Input-Output (MRIO) model to assess the impact of the economic and financial crisis on Spanish households' carbon and material footprint. The deep economic standstill and the subsequent strong jobs destruction experienced by the Spanish

economy between 2009 and 2013 not only have reduced households' consumption levels, but have also changed the consumption patterns according to different income levels. Thus, energy, material and environmental pressure of this consumption has changed, bringing new paths of growth and production more sustainable in terms of use of natural resources and equivalent CO2 emissions. The MRIO model developed takes into account international trade between Spain and the rest of the World aggregated in six major regions, using data provided by the World Input-Output Database (WIOD). By doing so, we can evaluate which part of Spanish households' carbon and material footprint leaks to other countries through internationally traded imports of final and intermediate goods. Information about Spanish households' consumption made public by the Spanish National Statistics Institute's Family Budget Survey, combined with data published by WIOD, allow us to calculate households' consumption patterns depending on the socio-economic context (rural or urban) and on different income levels (low, mid and high incomes).

Strategies for Sustainable Management of Water Resources in Mexico

Topic: Addressing Resource Challenges in a Globalized Economy II
Author: Carlos A Lopez-Morales

The economic challenges surrounding water resources include not only attention to the growing competition over water for food, energy, manufactured goods, and domestic uses but also ensuring that the appropriation of water for human uses is environmentally sustainable. With pressures from population growth, improved material standards of living, and climate change, these challenges will only intensify. This paper synthesizes the results of several empirical studies of water scarcity in the Mexican economy to identify and quantify the roles of four adjustment mechanisms instrumental for water sustainability: tradeoffs between appropriation from surface and groundwater sources; tradeoffs regarding two types of technological alternatives, namely rainfed vs. irrigated agriculture and, in the latter case, irrigation technologies of varying efficiencies; and modifications in patterns of inter-regional trade in food products. From a methodological perspective we conclude, first, that the modeling framework must impose numerically realistic estimates of water endowments. Second, the competition for water among distinct economic activities must be explicitly represented. Third, the choices among alternative technologies for water-intensive activities, in particular the production of food or the generation of electric power, must be endogenous. Fourth, the economic model needs to be conceptualized as a transparent combination of theory-based relationships, an explicit logic for parameterization, and exogenous scenario assumptions. The paper draws on, and augments, several studies of 13 hydro-economic regions comprising the Mexican economy, each characterized by the availability of water (and other factors of production), environmental constraints, production technologies, and consumption demand.

The Death of the Distance Puzzle

Topic: Global Value Chain Analysis
Author: Bart Los
Co-Authors: Pieter IJtsma

The longstanding "distance puzzle" in international trade relates to the finding that the trade-hampering effects of distance as found in a gravity equation framework do not decrease over time, despite the widespread notion that international trade has become more attractive due to improvements in ICT, reduced transportation costs and lowered trade barriers. This study shows that the distance puzzle vanishes as soon as not only international trade flows but also domestic

trade flows are considered. Such an analysis is suggested by the focus on the extensive trade margin ("Why does a firm sell abroad or not"?) in the micro-economic trade literature (Melitz, 2003; Chaney, 2008). Until recently, the required data were not available, but the recently constructed World Input-Output Database (WIOD) allows for inclusion of domestic trade flows in an analysis covering the pre-crisis period 1995-2008. The global input-output tables in WIOD also allow for an improved specification of the mass variables in product-specific gravity equations. We find that the elasticity of trade to distance has significantly decreased over 1995-2008, which implies the death of the distance puzzle.

Calculating comprehensive material use and productivity indicators: a review of MRIO-MFA and other methodological approaches (for special session on MFA & IO modelling)

Topic: Material Flow/Stock Analysis and Input-Output Modelling I
Author: F. Stephan Lutter
Co-Authors: Stefan Giljum

The scientific discussion on the further development of material use and efficiency indicators has to be seen against the background of increasing political demand for comprehensive and robust indicators – especially in the context of the “Roadmap to a resource efficient Europe” by DG Environment or the German resource efficiency programme ProgRess. But also in the context of international discussions around the topic of a “green economy”, as pursued by UNEP, OECD and other international organisations, this demand further increases.
This paper presents the results of a comprehensive review of currently applied approaches to calculate material use and productivity indicators. The review was carried out in the course of a project which aims at supporting the German government in the further development of comprehensive material use and efficiency indicators on the national and European level. Focus is put on indicators, which consider indirect material flows related to international trade (Raw Material Input and Consumption: RMI/RMC) as well as unused material extraction (Total Material Requirement and Consumption: TMR/TMC).
The review covers the three main approaches to calculate such indicators: input-output analysis extended by MFA data (in particular various MRIO-MFA models), coefficient approaches based on process analysis, and hybrid approaches. For each approach the main existing models were identified, for each of them all major scientific publications of the last six years reviewed, and for each publication the applied methodologies as well as the data sources in use analysed in detail. As a result, the study identifies main areas of strengths and limitations of each of the methodological approaches and derives needs for methodological and data harmonisation and the main areas for improvement. Increased harmonization levels as well as more robust methodologies will help increase confidence of policy makers and civil society with the indicators in use to design goal-oriented resource use policies.

Calculating comprehensive material footprint indicators with a global MRIO-MFA model. The case of EXIOBASE 2.0 (for special session on CREEA)

Topic: The EXIOBASE Global MRIO database – new insights developed in the projects CREEA and DESIRE (Compiling and Refining Environmental Accounts / Development of a System of Indicators for a Resource Efficient Europe)
Author: F. Stephan Lutter
Co-Authors: Stefan Giljum

Issues related to resource use and resource efficiency have gained significant importance in the policy agendas of the European Union, the EU Member States and in the international policy arena. This paper contributes to the development of robust and comprehensive material footprint indicators, which take into account the supply-chain wide extraction of raw materials (i.e. Raw Material Consumption / RMC and Total Material Consumption / TMC) through assessing the global material resource use related to final consumption of the EU. We will for the first time apply the EXIOBASE multi-regional input-output (MRIO) system version 2.0, with the base year 2007. We will illustrate the potentials for disaggregating results generated with a global MRIO-MFA model such as EXIOBASE, e.g. with regard to products of final consumption, countries of origin of raw materials as well as a large number of different material categories. The results generated with the MRIO-MFA system will also be compared both with the results from other groups applying MRIO-based approaches (based on MRIO systems such as GTAP, EORA, WIOD and OECD) as well as with results generated from bottom-up, product-oriented coefficient approaches, developed by Eurostat and by the Wuppertal Institute. The comparative analysis will reveal the advantages and limitations of the different methodological options to calculate material footprint indicators and will allow deriving suggestions on how different options might be integrated in a “hybrid” approach, applying MRIO-based calculations for some products and product groups, and coefficient-based calculations for others depending on the specific advantages of each approach.

Calculating comprehensive water footprint indicators with a global MRIO model. The case of EXIOBASE 2.0 (for special session on CREEA)

Topic: The EXIOBASE Global MRIO database – new insights developed in the projects CREEA and DESIRE (Compiling and Refining Environmental Accounts / Development of a System of Indicators for a Resource Efficient Europe)
Author: F. Stephan Lutter
Co-Authors: Stephan Pfister

Issues related to the availability and use of water, such as water scarcity or over exploitation, are often localized phenomena to be dealt with not only on the national but rather on the watershed level, as aimed at, for instance, by the Water Framework Directive of the European Commission. However, local water depletion is often closely tied to consumption in other countries and world regions, as water used to produce exported products is 'embodied' in traded commodities.
The agricultural sector is by far the biggest water user worldwide, followed by the energy sector. Hence, with increasing trade in cereals as well as food and feed products also the volumes of traded embodied water is getting larger. Various attempts exist to quantify the water quantities necessary to grow a certain crop and to produce specific agricultural products respectively. Among these, two of the most important datasets are published by the Water Footprint Network and by ETH Zurich.
In this paper we will for the first time apply the EXIOBASE multi-regional input-output (MRIO) system version 2.0, with the base year 2007, extended with the two different data sets on water consumption. We will illustrate the potentials for using a MRIO model extended with water data to

calculate the amounts of water embodied in final consumption. The results of the calculations with both data sets will be compared (1) to evaluate differences in the two datasets in use and (2) with other methods to analyse water use and consumption, such as the Water Footprint methodology (UTwente) and life-cycle assessment methodologies (ETH Zürich) which focus on evaluating the environmental impacts of water appropriation. This comparison sheds light on the strengths and weaknesses of the different methodologies, and helps identifying main areas of methodological improvements.

Module Material Flow Analysis: Session 4

Topic: Material Flow Analysis
Author: Stephan Lutter

Material Flow Analysis

Module Material Flow Analysis: Session 1

Topic: Material Flow Analysis
Author: Stephan Lutter

Material Flow Analysis

Module Material Flow Analysis: Session 2

Topic: Material Flow Analysis
Author: Stephan Lutter

Material Flow Analysis

Module Material Flow Analysis: Session 3

Topic: Material Flow Analysis
Author: Stephan Lutter

Material Flow Analysis

Economic evaluation of climate protection measures in Germany

Topic: Input-Output Analysis for Policy Making
Author: Christian Lutz

The paper builds on a study on the „Economic evaluation of climate protection measures and instruments for different policy scenarios“ for the German Environmental Agency. “Policy Scenarios for Climate Protection VI” are the basis for the model analysis of economic impacts of climate protection measures: In the Current Policy Scenario (CPS) all measures which have been implemented by July 8 2011 are considered. In the Energy Transformation Scenario (ETS)

additional measures are taken into account to reach the climate targets of the German government until 2030. For the economic valuation of measures ETS and CPS are compared.
The two policy scenarios build on the same socio-economic assumptions and just differ by climate protection measures. Investment in climate protection will reduce energy consumption in the long term and shift it towards low or zero carbon energy carriers. In ETS annual additional investment in climate protection, especially in insulation of buildings, will reach 25 to almost 40 billion Euro.
Scenarios are implemented in the model PANTA RHEI. PANTA RHEI is an environmentally extended version of the econometric simulation and forecasting model INFORGE, which includes a time series of Input-Output tables for Germany. In PANTA RHEI IO data, energy accounts and SNA data are consistently linked for prices and volumes.
Results of more ambitious climate protection measures are positive: GDP will be 25 to 30 billion Euros higher in the ETS compared to the CPS. Positive employment impacts are in the range of 200 thousand additional jobs. Energy efficiency improvements increasingly contribute via reduced energy imports in the long term. The positive macroeconomic effects of the considered climate mitigation measures are robust with respect to major assumptions.

Future Challenges and changes in the new SNA 2008 and ESA 2010

Topic: Supply, Use and IO Tables: Future challenges in the SNA 2008/ESA 2010 (I)
Author: Sanjiv Mahajan

Future Challenges and changes in the new SNA 2008 and ESA 2010

Growth, employment and public spending in the Social Accounting Matrix of the Spanish economy for 2008

Topic: Impact analysis: multiplers
Author: Alfredo José Mainar Causapé
Co-Authors: Patricia D. Fuentes Saguar

The aim of this paper is twofold: first to present the Social Accounting Matrix for the Spanish economy in 2008, with a high level of sectoral disaggregation. This is followed by an identification of those sectors with greater potential of the economy from different approaches that complement each other. The first of these approaches is a description of the economic structure of the country through multiplier analysis and identification of key sectors, to describe the behaviour of the Spanish economy activities. The second approach classifies industries according to their capacity to generate employment, both overall and disaggregated by different occupational categories or types of workers, seeking to discern where are the main sources of employment among the groups with the greatest difficulty accessing labour market.
Finally, this analysis is completed by evaluating for each branch of the Spanish economy the net impact of public spending with the idea of identifying those areas where it has a higher rate of return as well as those where reductions can have less impact . To do this, we discount the effect of the need to maintain a balanced budget (exogenous shocks with zero-sum expense) due to current economic policy aimed at reducing the deficit.
In this way, it extends and complements the traditional concept of key sector, empirically adapted to the needs of analysis in the current economic situation.
This work is a first step in a more detailed analysis of these and other related aspects that allows define and quantify the Spanish economic structure through multisectoral models.

Triple bottom line study of a biofuel feedstock industry

Topic: Input-Output economics and industrial ecology - LCA analysis
Author: Arunima Malik
Co-Authors: Arne Geschke, Manfred Lenzen

Research into alternative fuel sources is gaining worldwide attention due to growing concerns about environmental degradation and resource depletion. Australia's oil self-sufficiency is rapidly declining, with the country importing over 30% of the oil products. This is projected to increase to 76% by 2030. Consequently, there is a world-wide urge for the expansion and use of energy obtained from renewable sources such as biofuels. Australia has the potential to sustain a biofuel industry to increase the country's oil self-sufficiency. This paper presents the results of a sustainability analysis of a promising biofuel feedstock producing region in Australia. The region chosen for this study is the Green Triangle, an area of south-east South Australia and south-west Victoria. The Green Triangle features an established forestry industry, well-connected by land and sea, abundant land and feedstock making it ideal for sustaining a biofuel industry.

In this study, we aim to evaluate the triple-bottom line (environmental, economic and social) consequences of a biofuel feedstock industry in the Green Triangle region of South-Australia by employing multi-region input-output (MRIO) based life-cycle assessment (LCA), also known as hybrid LCA. To this end, we augment a sub-national IO table of Australia with process data on different feedstock operations. The analysis was the first one conducted on the Australian Industrial Ecology Virtual Laboratory hosted on a cloud computing environment administered under the NeCTAR scheme. In particular, we assess the employment, economic stimulus and energy consumption to determine the proportion of both on-site and indirect impacts throughout the supply chain. Our results reveal that the biofuel feedstock industry will create new job opportunities and facilitate the development of other industries in the economy. This would constitute a positive step forward towards a sustainable bio-economy.

Economy-wide rebound effects from an increase in efficiency in the use of energy: the Italian case

Topic: CGE and Econometric Input-Output Modeling
Author: Giovanni Mandras
Co-Authors: Giorgio Garau, Patrizio Lecca

The International Energy Agency (IEA, 2009) suggests the importance of efficiency improvement to reduce energy use and, within the European Union, one of the targets for member states is to reduce energy consumption by 20% through increased energy efficiency (European Commission, 2009). Energy efficiency improvement has the unquestionable benefits to reduce the price of energy services. However, it is still under debate the extent to which, improvement in the productivity of energy, is effective in terms of reducing the consumption of energy and thus the associated negative externalities (e.g., carbon dioxide emissions, CO2, see e.g. Allan et al, (2007) and Turner (2009)). Thus policy makers are particularly interested to determine the size of the energy rebound effect.
In this paper we attempt to quantify the magnitude of the general equilibrium rebound effects from an increase in energy efficiency in the industrial use of energy in Italy. To this end, we use a large scale numerical dynamic general equilibrium model calibrated using the Italian Social Accounting Matrix for the year 2006.
A number of authors have examined the impacts of increased energy efficiency within the demand and the production side of the economy using CGE models (Semboja, 1994; Grepperud and

Rasmussen, 2004; Glomsrød and Taojuan, 2005; Hanley et al, 2006 and 2009; Allan et al, 2007; Turner, 2009). For instance, the works of Allan et al, (2007) and Turner (2009) for the UK, and Anson and Turner (2009) and Hanley et al, (2006; 2009) for Scotland evaluate the impact of an increase in energy efficiency in the industrial use of energy. From this literature, rebound effects are the more common finding.
While there is an increasing interest in US and UK to identify and quantify the rebound effects, it seems there is still a little interest in the rest of Europe and especially in Italy. To the best of our knowledge, do not exist in the energy economic literature estimates of energy rebound related to Italy. We then propose to fill the gap and take Italy as a case study. We believe it would be useful to compare rebound estimates with those of the existing literature. Furthermore the estimation of the rebound would eventually provide a useful indicator to policymakers that are compelled to reduce carbon emission and transform the Country in a highly energy-efficient, low-carbon economy through policy aimed to increase energy efficiency (European Commission, 2009).

Richard Stone's Contributions to Input-Output Analysis

Topic: Methodological aspects of input-output analysis IV
Author: GianDemetrio Marangoni
Co-Authors: Domenico Rossignoli

This paper aims to highlight Richard Stone's contribution to input-output analysis.
The relevance, originality and effectiveness of Richard Stone's contribution to the development of input-output analysis is closely tied to the international and national positions he held during his fruitful professional life: internationally, by contributing to the United Nations programme for developing a standard system of national accounts; and nationally, through being Director of the Department of Applied Economics and of the Programme for Growth at Cambridge University.
Richard Stone's contributions to input-output analysis - as well as to economics in general - originates from his profound belief that economic analysis needs to be firmly based on quantitative foundations in order to make theory relate effectively to empirical data. 'My interest in economics' says Stone 'was from the beginning in its applications. I thought that the economics I was taught was insufficiently quantitative and that theory and facts were too widely separated. … The real difficulty is to combine the two so that theory can be used to interpret facts and facts can show what has to be interpreted' [R. Stone and M. Hashem Pesaran, The ET interview: Professor Sir Richard Stone, Econometric Theory, Vol. 7, No. 1, 1991, pp. 89]. This methodological approach characterized all Stone's academic research and professional career.
The paper provides an overview of both the major theoretical and empirical contributions of Richard Stone to input-output analysis, as well as of those less known.
Among the former we may mention Stone's studies on the integration of input-output tables within the Social National Accounts (SNA), his researches on the Social Accounting Matrices (SAM), the adjustment and updating of the technical coefficients (RAS method). Among the latter may be mentioned the attempt to apply the methods of input-output at the micro level.
In his later years Richard Stone became more interested in topics related to the social aspects of economic life, such as demography, health, education, and environment. In these fields also, his favourite approach was the application of input-output analysis.
For the convenience of researchers, a complete list of Richard Stone's works pertaining to input-output analysis is attached to the present paper

Keywords: Richard Stone, input-output analysis, econometrics history,
JEL Codes: A11, B31, B41, C67

Compilation of use tables at basic prices and split to domestic production and imports in Hungary

Topic: Supply, Use and IO Tables: Methodology and Comparability
Author: Forgon Mária
Co-Authors: Eva Varga

22nd International Input-Output Conference
Lisbon, Portugal, July 14 – 18, 2014

Compilation of use tables at basic prices and split to domestic production and imports in Hungary

Mária Forgon and Éva Varga
maria.forgon@ksh.hu, eva.varga2@ksh.hu

Hungarian Central Statistical Office

Abstract

Hungary has been working on the integration of the SUT compilation into the National Accounts for several years. In the frame of this improvement special attention is made to the compilation of Use table for Imports as well. The aim at this paper is to describe the most recent improvement in this field. That is an integrated approach to constructing the Use table for imported goods and services using the data from different and incomplete sources. The main used data sources are the databases of the import flows of goods at the most detailed level of Combined Nomenclature (CN) and of services by EBOPS nomenclature cross classified with the importing industry and with the different type of transaction (normal flows, subcontracting, re-imports). This basic data comes from the foreign trade statistics.
The first part of this paper gives an overview on the methodological aspects and the data sources.
The second part of this paper focuses on the solutions of problems raised during the allocation of imports by use categories.
As a result of this improvement our Use table at basic prices can be split up into two parts: from domestic production and from Imports. This distinguish is important to compile the SUT/IOT for EU aggregates.

Economic Crisis and Labour Market Turbulence: Greek economy and its Trading Partners (2008-2013)

Topic: Input-output analysis for policy making II
Author: Maria Markaki
Co-Authors: Athena Belegri-Roboli

In January 2014, the European Parliament announced that, during the last four years, the Memorandum countries (Greece, Portugal, Ireland and Cyprus) lost 15% of their existing employment positions. During the period 2009-2013, in Greece, unemployment rate increased from 7.3% to 27.1%, the cumulative decline of GDP is around 25% and the decline in average nominal wages amounted to 23.8%. In this context, the aim of this paper is to investigate the structural effects of unemployment in: i) the households' consumption, ii) the domestic production and iii) the production among Greece's trading partners. To this end, we propose a methodology to combine

and evaluate an aggregated set of data involving different aspects of the economic crisis effects, such as: Labour market turbulence and significant changes in consumption patterns. More analytical, firstly, we estimate the lost income of the former employees, secondly, the resulting reduction of their expenditure and the economy's final demand (demand for domestically produced products and demand for imports), and, finally, in the last step, the impact on the domestic production and on the production of the Greece's trading partners. The specific methodology suggests the estimation of "invisible" impact multiplier, which depends on the structure of the examined economy and is considered as a factor that intensifies the crisis.
For the first step we use data from the Greek Labour Force Survey (Hellenic Statistical Authority), for the second step we use a combination of data from the Greek Household Budget Survey (Hellenic Statistical Authority) and the Greek Input-Output Tables (WIOD) and for the third step, the database of WIOD.
The preliminary results suggest that, in 2013, the estimated final demand decline reaches 4.05% of GDP, while the reduction of domestic production is 5.77% of GDP. On the other hand, we found that the intensity of the indirect impacts is lower in Greece compared with the other countries. This finding is the result of i) the difference in the sectoral mixture of demand between domestic production and imports and ii) the relatively weak intersectoral linkages of the Greek economy.

Keywords: Greek economic crisis, labour market turbulence, input-output analysis

Production Linkages and Network Analysis Approaches: Creative Industries of Scottish Economy

Topic: Input-Output and the Network Theory
Author: Maria Markaki
Co-Authors: Athena Belegri-Roboli, CHRYSANTHI CHATZIDIMITROGLOU

In recent years, the notion of the creative economic sectors has capture the interest of researchers and created an extend literature related, mainly, with the significance of the creative economy as a positive force of economic growth. As a result of their association with the "economy of knowledge" and high R&D investments, creative economy and creative industries (the core of creative economy according to Howkins; 2001) are highly related with the adoption and diffusion of new technology and innovations. The specific role of creative industries generates interest about diffusion's intensity and extent, as it is expressed by the intersectoral linkages of an economy. According to recent data, creative industries represent 11% of GDP in U.S.A, 4.5% in EU-27, 2.5% in China, and almost 5% in Scotland. The aim of this paper is to investigate the importance of creative sectors in the Scottish Economy (following the UK DCMS model to define creative sectors) using two alternative approaches: Input-Output Analysis and (Social) Network Analysis (or Graph Theory). For capturing the complexity of an economy but, also, for emphasizing to the strength of the existing relations, we use two different matrices of intermediate transactions, an extended form including 100 sectors of economic activity and an aggregated form of 11 sectors. Furthermore, it is essential to note that, the investigation of an economic system with alternative approaches, is possible to emerge similarities among the results or/and to emerge the same leader sectors. In this case-study and according to the preliminary results, the creative sector "Architectural and Engineering Services" emerges as significant for both methods, namely, as a sector of high backward and forward linkages from the side of Input-Output Analysis and as a sector of high centrality from the side of Network Analysis.
Key words: Creative Economy, Network Analysis, Input-Output Analysis

Biodiversity in input-output analysis

Topic:
Author: Alexandra Penedo de Sousa Marques
Co-Authors: Henrique Pereira

In 2010, the European Union established its growth strategy for the ten years ahead, the EU 2020 Strategy. The strategy states that Europe should seek a smart, sustainable and inclusive growth. The Resource-Effi cient Europe is one of the flagship initiatives of the EU 2020 Strategy, framed under
the principle of sustainable growth. It seeks to support the transition to a resource-effi cient and low carbon economy by boosting economic performance while reducing resource use, ensuring the security
of supply of essential resources as well as fighting climate change and limiting the environmental impacts of resource use. The Roadmap for a resource-efficient Europe identi fied the need for robust
and easily understandable indicators to provide signals and measure progress in improving resource effi ciency. One area of resource use that still lacks robust indicators is biodiversity and ecosystem services. Input-output analysis has been widely used to link carbon emissions and consumption patterns, thus providing information on the carbon effi ciency of diff erent economies not only at the European level but also at the global level. In this work, we review the applications of input-output analysis to study how consumption depends on and asp ects ecosystems and biodiversity. We end by provide suggestions of future research in the development of biodiversity and ecosystem services indicators that can be used to measure progress towards resource e fficient economies, within an input-output framework.

Developing a CGE model to Portugal: an example of application to assess the impact of green taxes

Topic:
Author: Marta Marques
Co-Authors: José Manuel Martins, Pedro Nogueira Ramos

A group of Portuguese researchers has developed a set of input-output models to assess policy measures, estimating their economic and environmental impacts. The MULTI2C (Multi-sectoral and Multi-regional Coimbra model) approach is one of the most outstanding and recent examples resulting of these studies. Drawing from these researches, a computable general equilibrium model is now being built with a similar structure and goal, namely to perform an integrated assessment of policy measures, producing relevant indicators in the economic, social and environmental dimensions.

In this paper, a static computable general equilibrium model is presented, with a similar rectangular configuration of the input-output models from which it derives from. It is based on the assumption that labor is a scarce resource and, as such, wages react to production variations, which in turn results in changes in the prices of domestic products. Import and export volumes are affected by varying domestic prices. On the other hand, industries that produce goods with a high openness to trade reduce their profit margins in order to decrease the impact of increasing domestic prices in their sales.

The brief exposition of main features of the model is followed by the presentation of a simple

example of its potential: an increase in green taxes in energy products (fossil fuel and electricity) is simulated, and its impact on the main economic variables is debated. Finally, some ongoing developments of the model are also presented, explaining how the CGE model will generate a relevant set of environmental and social indicators.

Vertical specialization: the comparison of Mexico and China economies from the Input-Output perspective

Topic: Vertical specialization and outsourcing II
Author: Cinthia Márquez-Moranchel
Co-Authors: Roberto Carlos Orozco-Morales

The objective of this work is to perform a comparison between the economic structures of Mexico and China, through their Vertical Specialization (VS) patterns. The analysis is for years 1995, 2003 and 2011.

In order to make the comparison of the economic structures it used the Coefficient of Le Masne (a measurement of similarity through distances). To compare vertical especialization matrices it used the Coefficients Kendall and Spearman (coefficients that measure the rank correlation amongst variables).

Also, to identify to the most influential sectors of each country, we employed the theory of graphs in order to assess each one of the VS matrices.
The results indicate a tendency through time that increases the difference of the economic structure between Mexico and China. In the same period of time, China undergoes more changes than Mexico.

The Vertical Specialization has grown for Mexico, that is to say, depends more on the imports compared with the economy of China. The level of VS is higher for Mexico than China. In 2011, for every dollar Mexico exported, imported 30 cents, while China imported 23 cents.

For the case of Mexico, graphical representation shows that in 2011 the size of the economic clusters decreased compared to 1995. In the case of China, the size of the economic clusters increased, there are more defined clusters and it has a more linked economic situation compared to Mexico.

Resource logistics analysis of agricultural nutrients focusing on phosphorus and nitrogen flows (for special session on MFA & IO modelling)

Topic: Material Flow/Stock Analysis and Input-Output Modelling I
Author: Kazuyo Matsubae
Co-Authors: Tetsuya Nagasaka, Kenichi NAKAJIMA, Keisuke Nansai

The global population is predicted to exceed 9 billion by 2050, and in addition, bioethanol production has increased by about three times over the past ten years. As a result, the resources for agricultural production including water, land and fertilizer will be of increasing importance in next few decades. There are growing concerns over supply strategies for essential resources because of environmental problems, such as eutrophication(N,P), acidification (N), resource depletion and price increases(P).

This paper incorporates the agricultural nutrient flows into the 2005 input-output model of the Japanese economy, and integrates international trade statistics on the basis of Global Linkage Input Output (GLIO) model. This paper revealed a complex set of patterns, with some countries relying heavily on just one or two countries to meet their commodity needs, and others drawing from a wide range of sources. In many cases, a strong dependency was noted on a country which itself was heavily dependent on another source for its commodity needs directly and indirectly. Considering the economic structure and geopolitical problems, it was found that special attention should be paid to maintaining a stable supply of agricultural nutrients resources to ensure stability in agricultural production as well as in the many industries which use phosphoric acid(P) and ammonia(N) as an essential chemical materials.

Application of dynamically calculated total requirements coefficients to CGE simulation analysis

Topic: CGE and econometric input-output modeling II
Author: Robert Andrew McDougall
Co-Authors: Badri G Narayanan

Total requirements coefficients are applicable to analysis of results from computable general equilibrium models. For example, a carbon tax may operate to abate emissions in part by encouraging consumers to switch from more carbon-intensive to less carbon-intensive products. To measure the size of that effect, we need estimates of carbon intensity, which we can obtain as total requirements coefficients; but since the carbon intensities themselves change in response to the carbon tax, these coefficients should be calculated dynamically through the simulation. We develop a method for doing that, and illustrate its application to analysis of the simulated imposition of a carbon tax in an extended version of the GTAP model (GTAP-E).

China's Domestic Value Chains and CO2 Emissions

Topic: Trade and Value Chains
Author: Bo Meng
Co-Authors: Lin Guo, Jinjun XUE

This paper aims to reveal the creation and distribution pattern of CO2 emissions in China's domestic-interregional value chains. We use input-output based spatial decomposition technique to measure how regional CO2 emissions are transferred and outsourced by different routes, such as inner-region route, interregional spillover route and feedback route across domestic regions. We also apply the KWW decomposition technique to measure how a region's export and outflow of goods and services impact on other regions' CO2 emissions by different value chain route. When combining the value added and CO2 emissions related estimation results together, using China's interregional environmental Input-Output tables, this paper shows the opportunity cost of environment when a specific region wants to have value added gain in domestic supply chains in detail. This can not only help us know the relationship between value chains and CO2 emissions, but also provide better reference about how to understand the responsibility of CO2 emissions between consumers and producers and how to consider the Common but Different Responsibility inside China across regions who are at very different economic development stages.

Cross-border Allocation of Employment in Global Value Chains: A Measurement Using International IO Decomposition Techniques

Topic: Global Value Chain Analysis
Author: Bo Meng
Co-Authors: Jiemin Guo

This paper aims to trace the creation and distribution of employment in relation to Global Value Chains (GVCs). Incorporating the recently developed concept of "Trade in Value Added" in GVCs related context, we propose a similar concept "Trade in Employment" to measure how a country's employment allocation could be traced by both domestic and foreign final demand through different routes in GVCs. We also apply recently developed decomposition techniques to the World Input-Output Database (WIOD) to show how a country's exports can induce job opportunities by different routes both for domestic and foreign labor markets. In addition, applying derived the Trade in Employment results, the paper further attempt to estimate the labor based Revealed Comparative Advantage for 41 countries.

THE CONSTRUCTION OF A SOCIAL ACCOUNTING MATRIX TIME SERIES FOR GTAP-BASED MODEL

Topic: World input-output modeling and databases III
Author: Raymond Mi

Global Trade Analysis Project (GTAP) is a global network of more than 9000 researchers who share a common interest of applying Computable General Equilibrium (CGE) framework and Social Accounting Matrix (SAM) to policy issues and business problems. The standard GTAP model developed by this network is one of the most well-known CGE models and has been modified to numerous extensions (e.g. GTEM, BAEGEM) to help analyse domestic and international issues on agriculture, resources, energy, trade and environment. The latest GTAP 8.1 global database, with a base year of 2007, is derived from individual country input-output databases supplemented by rigorous estimation processes covering 57 sectors and 131 countries or regions. While the GTAP database is capable to serve the needs of most economic analysis, there are growing demands for more recent data sets that may provide better insights into the latest dynamics of the world economy.

The purpose of this paper is to present some of the concepts involved with the transformation of the World Input-Output Database (WIOD) into a global SAM time-series compatible with GTAP-based models. The World Input-Output Database (WIOD), released in November 2013, provides time-series of world input-output tables for forty countries worldwide plus the rest-of-the-world, covering the period from 1995 to 2011. Some of the key issues arising from the transformation include: price reconciliation over market and agent prices in GTAP versus basic and purchaser prices in WIOD; indirect taxes are either aggregated or unavailable in WIOD; value-added disaggregation; and balancing income and expenditure for each SAM agent.

Combining Input-Output (IO) analysis with Global Vector Autoregressive modeling (GVAR): Evidence from the USA

Topic: CGE and econometric input-output modeling III
Author: Panayotis G. Michaelides
Co-Authors: Konstantinos N. Konstantakis

The purpose of this paper is to assess the interdependencies among the fourteen (14) main sectors of economic activity in the US economy, using quarterly data on output and R&D for the time period (1992-2006), just before the first signs of the global recession made their appearance. In this context, we set up a novel methodological framework which combines Input-Output (IO) analysis with state of the art Global Vector Autoregressive (GVAR) modeling. The GVAR is an advanced econometric technique suitable for assessing relationships between economic entities which provides a general, yet practical, global modeling framework for the quantitative analysis of the relative importance of different shocks and channels of transmission mechanisms. In the core of the GVAR methodology is the trade weight matrix that relates the endogenous to the exogenous variables of the model. In this work, in a novel approach, we use the GVAR methodology at the sectoral level. To this end, we suggest using the IO matrices of the US economy to serve as the trade weight matrix. In addition, we use the IO matrices to examine the stability and existence of dominant sector(s) in the USA. Next, using relevant econometric tools, we identify the dominant sector(s) and we estimate a GVAR model with dominant sector(s) and the exogenous variables of Finance and Trade acting as the transmission chanells, pictured through the Generalized Impulse Response Functions (GIRF). Also, a comparison of impact analysis based on the results by the two methodologies takes place. Our results imply that a combination of IO and GVAR is highly desirable because it is capable of providing very useful insights.

Downstream Offshoring and Firm-level Employment - Evidence for Belgian Manufacturing Firms

Topic: Global Value Chain Analysis
Author: Bernhard Michel
Co-Authors: Bruno Merlevede

Over the last couple of decades, there has been a large scale reorganisation of manufacturing production processes within global value chains. This has been achieved through fragmentation and offshoring. Fostered by the fall in coordination costs due to information and communication technology developments, offshoring implies that firms increasingly source intermediates from abroad. In developed economies, this has raised fears of massive job losses. Most academic work, in contrast, fails to find evidence that offshoring contributes to lowering employment.
In this paper, we investigate a channel through which offshoring may nonetheless affect employment, but which so far has been neglected by the literature. The basic idea is that offshoring may have important consequences not only for the firm that engages into offshoring but also for other domestic firms that are part of the same value chain. Indeed, when they engage into offshoring, firms import either intermediates they previously produced domestically in-house, or intermediates they previously sourced from domestic suppliers beyond the boundaries of the firm. While the former channel has received ample attention as a channel for potential decreases in employment, the latter channel has not yet been considered by the literature. A switch from domestic to foreign suppliers by firms in downstream industries clearly leads to a negative demand shock for domestic suppliers in upstream industries and may thereby depress domestic employment. We label this demand shock ‘downstream offshoring’ and develop a measure to

capture its extent for a firm in a given upstream industry. The measure takes into account the relative size of purchases by downstream industries of the goods produced by the firm as well as the intensity of offshoring in downstream industries. It is computed based on supply-and-use tables.
We estimate the employment effect of downstream offshoring using a representative sample of Belgian manufacturing firms over the period 1997-2007. For this purpose, we introduce the measure into a standard labour demand framework. According to the results, downstream offshoring has a highly significant negative impact on firm level employment. We calculate that increases in downstream offshoring directly account for a loss of almost 7000 jobs over the sample period, which corresponds to 2.4% of in-sample employment in 1997. The negative employment effect of downstream offshoring is robust to the use of alternative estimation techniques and we are able to show that it is not driven by exit. It holds in various subperiods of the sample period. Sample splits by firm size class reveal that the effect is strongest for medium-sized firms followed by small firms, while large firms are not affected by downstream offshoring. This finding is consistent with an industry structure where a smaller number of large firms is surrounded by a set of small and medium-sized suppliers that are influenced by sourcing decisions of large firms.

Made in the Region, Sold in the World. New Evidence on the Internationalization of Supply Chains

Topic: Global Value Chain Analysis
Author: Sebastien Miroudot
Co-Authors: Olle Grünewald, Hakan Sten Nordstrom

This paper combines some information on geographic distance between countries with the WIOD set of international input-output tables to analyse the average distance traveled by inputs and final products along the value chain. New evidence on the internationalization of supply chains between 1995 and 2011 is analysed, looking at goods and services industries and using input-output based indicators such as the average geographic distance to final demand, the average geographic distance covered by inputs and the average number of border crossings, both backward and forward. The paper also proposes alternative measures of the length of international supply chains. The results emphasize that most supply chains are regional when it comes to inputs but more global in terms of final consumption.

Eurostat's regular estimations of CO2 emissions from final use of products in the EU

Topic: Supply, Use and IO Tables: Global value chains, economic growth and environment
Author: Stephan Moll

Eurostat produces and publishes on a regular basis Air Emissions Accounts (AEA) and monetary Supply and Use, and Input-Output Tables (SUIOT). Both are connected and used for Leontief type IO modelling to estimate 'carbon footprints' associated to final use of products in the EU economy. The paper describes in detail the data sources and the methodology applied and presents results.

The use of centre-coefficients in io-modeling

Topic: Impact Analysis: Multipliers
Author: Karim Monem
Co-Authors: Christian Lager

The purpose of this paper is to describing and implementing a time-discrete quantity model with a uniform growth rate. This particular model is able to reflect a real economy with fixed capital of finite life and recognizes that production takes time. The most significant instrument of this model is the concept of center coefficient that was derived by Schefold (1989). Given the life time of fixed capital items as well as gestation and production lags of processes the depreciation rate of fixed capital used in production can be determined endogenously. The benignity of the well defined empirical quantity model will be shown by using Austrian input-output tables. One of our results by prevailing growth rates changes is that estimated fixed capital reacts more sensitive in the long run than intermediate product.

Multiregional Input-Output Analysis of the EAFRD effectiveness: Economic, social and environmental performance

Topic: Input-Output Analysis for Policy Making
Author: Fabio Monsalve
Co-Authors: Maria Angeles Cadarso, Maria A. Tobarra-Gomez, Jorge Enrique Zafrilla

The new European Agricultural Fund for Rural Development (EAFDR) was purposely set to “contribute to the promotion of sustainable rural development throughout the community” and, specifically, to improve the competitiveness of the primary sector, the environment and the countryside and, finally, the quality of life in rural areas. To achieve that, the European Union endowed the Fund with nearly 80 M€uros. Once the first implementation period (2007-2013) is over, it is time to evaluate the effectiveness of the new Fund. The “common monitoring and evaluation framework” set by the Fund deals with that accomplishment in the target regions; but considering the globalization process and the subsequent commercial openness, it makes sense to consider that some impacts will be spread through regions different from the target ones. This paper will, first, try to analyse the impact of spatial distribution of the new Fund and the leakage effects to others territories.
Secondly, it could also be interesting to evaluate the effectiveness impact of the EAFRD not only from a rural-development perspective but also from a wider one which takes into account the social, economic and environmental impacts in the target regions as well as at a multiregional level. The paper will focus on an impact analysis from a triple bottom line perspective (TBL) or triple P: people, planet, profit.
The methodological approach will be a multiregional input-output (MRIO) model. This model will allow us to research into the trade relations of target regions in order to set the losses or gains of multiplier effects from the TBL perspective (employment, emissions and M€uros) due to the increasing trade globalization. Main data come from WIOD database and the Fund’s office.

Convergence between the Eora, WIOD, EXIOBASE, and OpenEU’s consumption-based carbon accounts

Topic: Material Flow/Stock Analysis and Input-Output Modelling I
Author: Daniel Moran
Co-Authors: Edgar G. Hertwich, Richard Wood

Multi region input-output (MRIO) accounts provide a map of the global economic structure. But no map is perfect. Each MRIO implementation can be understood as an imperfect observation of the correct global MRIO account. How divergent are these observations? What is the reliability of each observation? How much divergence is due to conceptual differences and how much is due to implementation particularities and stochastic error? Can we establish an error budget prioritizing steps toward MRIO convergence, and can we even assume that the different observations are converging on the true value? This paper compares the results of four global MRIOs: Eora, WIOD, EXIOPOL, and the GTAP-based OpenEU. We use Monte Carlo analysis to estimate the robustness of each models’ results and we conditionally exogenize the environmental satellite account to see how much this factor, rather than the economic structure itself, causes divergence in carbon footprint results between models. The aim is to arrive at some estimates of how much confidence may be placed in each model’s estimate of carbon footprints. Confidence estimates are necessary if MRIO methods and consumption-based accounting are to be used in setting multinational environmental policy.

Effects of demand shocks in the Brazilian economy: new production and value added multipliers

Topic: Effects of Infrastructure Investments
Author: Antonio Carlos Moretto
Co-Authors: João Dias, João Carlos Lopes, Rossana Lott Rodrigues

Abstract: Assuming that the traditional input-output multipliers lead to a misinterpretation of macroeconomic concepts for multisectoral analysis of a given economy, the aim of this article is to calculate the new multipliers of variation in the final demand on the production and value added by the sectors of the Brazilian economy in the period between 1995 and 2009. Using the Euclidean distance method proposed in Amaral et al (2012) and data from input-output tables, the main results showed that: a) the structural change effect was more important than the scale effect, both for the production and for the value added, although it was less important for the latter; b) Brazil is still a major exporter of unprocessed products which will generate jobs, income and taxes abroad, depriving the country of this important benefit; c) the main key sectors were Agricultural (1), Mining (2), Steel industry (4), Chemistry (11), Food industry (16) and some service sectors, such as Public Utilities (18), Trade, (20) Transportation (21), Communication (22), Public administration (24) and Other services (25), revealing the gain in importance of these activities in the national economy.

The Effects of Sectoral and Regional Partial Participation of Global Warming Mitigation Coalitions based on Multiregional and Multisectoral Dynamic Energy Economic Model THERESIA

Topic: Environmental Input-Output Modeling
Author: Shunsuke Mori

It is well known that the global warming mitigation policy agreement is still far from the international consensus while the scientific community such as IPCC report has cautioned the need for the action. Thus, the short-term policy actions for the global warming mitigation such as carbon emission trading or voluntary actions will not include all world regions or economic activity sectors.

When carbon control policy covers only limited countries, so called "carbon leakage" issue, where the high carbon intensity industries in these regions move to the countries with no carbon policy and export the products, would arise. Although this behavior is rational for the economic reasons, it could, however, increase the global GHG emission when the energy efficiency in the developing regions is lower than that that in the developed countries. Therefore the demand-side based emission accounting has been focused on and assessed based on the international input-output tables.

However, this method still fails to represent the emission responsibility sharing of the electric power generation between producers and consumers. When the consumers are responsible for all of the GHG emission of electric power generation, the effort of power generators who implement the low carbon emission technology is not explicitly evaluated. Furthermore, the outcome of the above partial participation with respect to the sector and/or the region is not assessed.

This paper aims at the assessment of the sectoral/regional partial participation in the global warming coalition as well as the above responsibility sharing between consumers and generators. The author applies the multiregional and multisectoral dynamic energy economic model THERESIA for the assessment. This model developed by the author deals with 15 world regions, 12 non-energy industry sectors and 7 energy sectors to assess the middle-to-long term global warming policies based on GTAP and Energy Balance Tables.

This study consists of the following three steps: firstly, the carbon emission of power generation sector is distributed between the consumer and the generator according to the conversion efficiency, i.e. the generator is responsible for (1.0-efficiency)*(total carbon emission) and the consumer is for (efficiency)*(total carbon emission) . Secondly, the carbon emission is embodied in the products by industry sector. Thus indirect carbon trading embodied in the commodities can be calculated. Finally, THERESIA simulations compare the outcomes of regional/sectoral participation where (1) a case when only iron and steel industry, chemical industry and power generation industry participate in the warming coalition, (2) a case only ANNEX-I regions in Kyoto protocol participate in the warming coalition, and (3) other various participation scenarios. The comparison between the conventional accounting based on the primary energy consumption and the above accounting is also established under various carbon control policies and participation scenarios.

The simulation results suggest that (1)this method clearly shows the indirect carbon emission embodied in the production structure reflecting the difference in the energy supply structure, (2) the carbon emission accounting method influences the international industry structure and GDP losses under the global carbon emission policies, and (3)when carbon emission is embodied in the products, indirect "carbon export" often exceeds the "carbon import" embodied in the commodities in the OECD regions.

Evaluation of Tottori economic growth strategies based on a forecasted input-output table of the year 2020

Topic: Regional Input-Output Modeling
Author: Ryoko Morioka
Co-Authors: Koji Tsuda

Input-output analysis has a practical problem that data of years out of date make its results ineffective especially for evaluation of policies at the present and the future. In this study, we proposed an estimation method of future input-output tables based on information-geometric decomposition. Our method consists of two parts, one is decomposition of the table into terms of marginal sums and interaction, and the other one is reconstruction using updated terms based on past statistics and original industrial survey. We applied it with an experimental study with Tottori prefectural government and made an original input-output table of the year 2020. Using the table, we evaluated economical ripple effect of Tottori economic growth strategies. As a result, an industrial sector of environmental energy was found that it had more economic impact than expected, since it had many links with other industrial sectors. This study realizes cost saving for making the tables and secure a real-time property of the tables. Obtaining this new table enables local government to simulate economic effect of their candidate policies, and it shows our data prediction makes a difference in local administration by aggressive application of numerical simulation.

Matrix Homothety and GLS-based Extension of RAS Method

Topic: Structural change and dynamics III
Author: Vladimir Motorin

RAS method is based on parametrical multiplicative model of updating matrix element to provide a similarity (or closeness etc.) between target and initial matrices. In general it implicates that initial matrix homothety with its center in null matrix and some scalar ratio is considered according to RAS logic as an etalon for target matrix. Unfortunately, homothetic transformation does not allow to obtain target matrix with both (row and column) marginal totals given, but there is unique possibility to use matrix homothety concept for constructing the weakened version of target matrix with given sum of all elements. In accepting RAS multiplicative pattern of similarity one may suppose the initial matrix multiplied by proper homothety ratio estimate to be the best approximation of required target matrix.
The basic idea of this paper is to introduce a matrix of unknown (and independent) factors and to consider its Hadamard product with weakened version of target matrix in the framework of generalized multiplicative model. Rather natural way to satisfy row and column total constraints is to disturb a factor matrix in some minimalistic manner, e.g. in accordance with GLS principles. The result is a mathematical programming problem with quadratic goal function and two sets of linear constraints. In contrast to seemingly similar Harthoorn and van Dalen method (1987), the proposed goal function summarizes the squares of relative factor deviations from a priori unknown constant level.
The developed optimization model is fully represented in matrix notation, and its analytical solution is obtained in form suitable for sensitivity analysis implementation in the cases when the constraints are assumed non-binding. Therefore the paper contains a variety of mathematical details including algorithmic scheme for updating partitioned matrices with very large dimensions. In practice the proposed GLS-based method generates much more compact factor distributions in comparison with RAS method.

The effect of cash subsidies removal of three household deciles on income distribution and production in Iran

Topic: Input-Output Analysis for Policy Making
Author: Hadi Mousavi-Nik
Co-Authors: Mohamadreza Abdolahi, Fatemeh Azizkhani, Sholeh Bagheri Pormehr

In December 2010, Iran launched a five-year program to reform its price subsidies system. In the first step, energy subsidies were partially cut by raising prices of fuel products and some other goods and services, in most cases several-fold. The net proceeds are partly earmarked to finance a compensatory cash transfer program that pays every Iranian residing in the country the equivalent of $40-45 a month, unconditionally. But now, Iran's government has lots of problems in financing the cash subsidies.
In this paper using social accounting matrix approach we have investigated Effects of Implementing the first phase of "Targeted Subsidies" Act on income distribution in Iran. We also examined production effect of removing cash subsidies of three income deciles and expend it in selected economic sectors. Results showed that current form of subsidy will not help to improve income distribution and it can make it even worse. Also comparing other scenarios, results showed that removing cash subsidies of three income deciles and expending it in agriculture sector can lead to better income distribution and higher production level.

Full Integration of the Industry Accounts for the United States

Topic: Input-Output Accounts and Statistics
Author: Carol Elizabeth Moylan

With the release of the results of the 2014 comprehensive revision of the industry accounts, the Bureau of Economic Analysis has completed "full integration" of the industry accounts—that is, the integration of the benchmark and annual input-output accounts and Gross Domestic Product by industry accounts with the national income and product accounts. This full integration was first suggested in a March 2004 article in the Survey of Current Business and was more fully described by Lawson, Moyer, Okubo, and Planting (2006) in A New Architecture for the U.S. National Accounts. In this paper, we review the benefits of full integration of the industry accounts and describe the initial results of this integration, which include the incorporation of changes in definition, such as expanded investments in intellectual property products, as well as other changes in definition, classification, and statistics methods. We also summarize the steps involved and methods to achieve full integration, and include an appendix on the methods used to balance the accounts.

Water pollution and Green GDP in India

Topic: Environmental input-output modeling II
Author: Kakali Mukhopadhyay
Co-Authors: Debesh Chakraborty

Traditionally, India has been well endowed with large freshwater reserves, but the increasing population and overexploitation of surface and groundwater over the past few decades has resulted in water scarcity in some regions. Wastewater is increasing significantly and in the absence of proper measures for treatment and management, the existing freshwater reserves are being polluted. Furthermore, India has an inadequate treatment of infrastructure. Only 26.8% of domestic

and 60% of industrial wastewater is treated in India. Environmental deterioration due to water pollution generation has adverse effect on human welfare of a country. The need to account for the environment and the economy in an integrated way arises because of the crucial functions of the environment in economic performance and in the generation of human welfare. In order to cope with this, the UN Statistical Division published a System of National Accounts Handbook in 1993 to provide a conceptual basis for the implementation of a System for Integrated Environmental and Economic Accounting (SEEA) and Environmentally Adjusted Domestic Product shortly EDP (Green GDP) that illustrates the interrelationships between the natural environment and the economy. Very recently a Report prepared by an expert group convened by the National Statistical organisation, ministry of statistics and programme implementation, Government of India (2013) provide an outline of what would ideally be needed for a comprehensive set of national accounts. Towards that end, an attempt has been made in this paper to measures the EDP as well as welfare loss for India due to water pollution using SEEA framework for the year 2006-7. The Input-output table of 2006-7 has been used to prepare the SEEA framework. Three categories of adjustments to the national accounts have been proposed to reflect the cost and benefits of human activity on the environment- a) depletion of natural capital b) environmental degradation, and c) defensive expenditure. The defensive expenditure in the current study is the cost of waste water treatment while damages to crops are the loss of agricultural output due to soil erosion and land degradation (replacement of soil nutrient cost and sedimentation cost). Health data used to estimate the health impacts of inadequate water supply, sanitation and hygiene. The loss in terms of NDP ranges from 3.56% to 3.91% respectively according to different estimates. These NDP losses are calculated only for water resource, if other natural resources are accounted for then the situation is expected to be worse. Hence there is a need for further research in this field.

Economic and Environmental Impacts of Biofuel Policy in Canada

Topic: Environmental input-output modeling I
Author: Kakali Mukhopadhyay
Co-Authors: PAUL J. THOMASSIN

Economic and Environmental Impacts of Biofuel Policy in Canada

Kakali Mukhopadhyay, Paul J.Thomassin, Howard Gumilang and Xi Chen
Department of Agricultural Economics
McGill University, Macdonald Campus,
21,111 Lakeshore Road,
SteAnne de Bellevue,
Montreal, Quebec, Canada-H9X3V9

Abstract
The Government of Canada has committed that Canada's total GHG emissions be reduced by 17 per cent from 2005 levels by 2020. To achieve this, the Federal government has introduced several initiatives by setting new emissions standards for 2011–2016 model-year vehicles; restrict emissions from heavy-duty vehicles, in alignment with similar regulations being developed in the United States; and phase in regulations to reduce emissions from the generation of electricity from coal, beginning in 2015. In order to curb the GHG emission, new Renewable Fuels Regulations (RFR) was also proposed. These regulations required two per cent renewable content in diesel fuel and heating distillate oil already effective July 1, 2011 with the first compliance period ending on December 31, 2012. In addition, renewable content standards for gasoline were targeted at five percent starting on September 1, 2010.

Based on the RFR, the two per cent renewable mandate would require 500 million litres per year of renewable diesel use (Farm Credit Canada 2012). The federal government is committed to ensuring a minimum renewable content of two per cent in diesel and heating oil by 2012, for a total production of approximately 600 million litres of biodiesel per year). On the other hand, the Canadian renewable content standards targeted at five per cent for gasoline starting on September 1, 2010, represents approximately 2.1 billion litres of ethanol per year according to the Canadian Renewable Fuels Association. This level of renewable content would reduce GHG emissions by more than four million tonnes.
The above mandates of 600 million litres of biodiesel and 2.1 billion litres of ethanol requirement per year will have some impact on the Canadian economy. In this backdrop, the paper aims at estimating the macroeconomic impact of the ethanol and biodiesel sectors in Canada. Furthermore, the study estimates the impact for Canada's trading partners of the proposed biofuel target. As noted, Canada exports 30% of its gross domestic product of which almost 70% of Canadian exports are to the US. On the other hand, more than 60% of Canadian imports are from the US which is about 10% of the total US exports. Apart from USA, some of the Latin American countries are also significant trading partner of Canada.
An input-output model of the Canadian economy is developed to estimate the macroeconomic impact of the ethanol and biodiesel production in Canada. Simulation exercises have been attempted to reach the mandates announced by the Federal government on ethanol and biodiesel use in the transportation sector using modified Leontief model. From these simulation exercises the reduction in GHG emissions has also been measured.
The rectangular input-output model of Canada has been taken for consideration. The input-output transaction matrix of 2009 for Canada which basically describes the flow of commodities from one sector to another has been used while several modifications have also been made to the Use and Make matrix of Canada, 2009.
To consider biofuel sector- ethanol and biodiesel in the 2009 Make and Use table of Canada we have included four new industries – Ethanol, biodiesel, E10 and B5. Eight new commodities have been entered in the list as ethanol, biodiesel, E10, B5, DDG, canola meal (reformed DDG) CO2 and Glycerin. DDG and CO2 are a byproduct of the ethanol sector while canola meal and glycerin comes from biodiesel. The impact matrix is estimated from an input-output model that computes the direct plus indirect impacts on the Canadian economy in 2009. It will also provide us some insights on other sectors of the economy particularly agriculture and agri-food sector. Wheat and corn are used as a feedstock in the ethanol industry, while animal fats, tallow and canola are utilized in the biodiesel industry.
The study estimates the macroeconomic impact-GDP, employment and output on the Canadian economy in 2009, due to the introduction of four new biofuel industries and eight new biofuel and by product commodities. It also explores the detailed impact on industries such as how far the Ethanol, biodiesel, E10 and B5 are linked with rest of the industries in the economy and whether new biofuel commodities have direct impact on agricultural industries or manufacturing or services. It further investigates the impact of the mandates on the Canadian economy to see the additional growth of GDP, employment and output using rectangular Input-output model for Canada.
Preliminary results show that agriculture sector is affected because corn and wheat, canola, fats and oil used as feedstock. Among other industries, mining and manufacturing indus

Application of MRIO model on a small economy: case study of the Czech Republic

Topic: Regional input-output modeling I
Author: Petr Musil
Co-Authors: Jana Kramulova

Examination of inter-sector relations in national Input-Output tables is very important and popular. It helps us to predict and model changes in the economy when particular “shock” occurs. In the last decades such models also helped to monitor e.g. environmental damage. Very often multi-regional models are used to evaluate this (e.g. EORA, EXIOBASE, GTAP, IDE-JETRO or WIOD), however, in most cases regions cover whole countries.

This paper is aimed at the construction of multi-regional Input-Output (MRIO) model in terms of a small and very open economy. The model is based on our estimates of regional Input-Output Tables for 14 regions within the Czech Republic (NUTS 3 digit level). It is therefore clear that shares of interregional and international transactions on total transactions in the regions are highly significant. These regions are small; moreover, they vary quite a lot, especially from the point of view of economic performance or sector specialization. For example capital city Prague forms a separate region (actually a city region) and it is obvious that its economy substantially differs from the surrounding region, which has more or less the function of its suburb, or some other more rural regions.

Creation of our model consists of several phases. All the components of expenditure approach to GDP in commodity breakdown have to be estimated and balance for each product in each region is found. Various estimation techniques of regional coefficients are discussed. They are based on expert opinion, interregional transportation figures etc., because no surveyed data on interregional trade are available.

The paper describes benefits and difficulties connected with MRIO model specification for very small regions of one country. The main obstacles are limited data sources and strong regional relations. Our model improves current regional analyses that are based on national Input-Output tables and fully ignore differences in the structure of regional economies.

High-skilled Labour Force - Impediment to Growth?

Topic: Structural change and dynamics II
Author: Anke Michaela Mönnig

In Germany, the debate about too many academics entering the labour force has recently reached new input: The VET data report (BIBB 2013: 10) diclosed a raising number of first-year students, whilst the number of newly negotiated apprenticeship contracts has declined and that the number of non-occupied apprenticeship posts has further increased. This development has been commented by some as a “delusion of academization” (FAZ 2013) that implies a trend towards overeducation. Looking at mere data, this is not (yet?) a topic. The demand for high-skilled workers is still prominent: among academics the unemployment rate is 2.5% - close to full employment (IAB 2013: 2). Academics do still earn in average 36% more than others (DIW 2013: 2). And looking across the border, Germany even lags behind his OECD partner countries: in 2011, only 28% of 25-34 year olds attained a tertiary education degree while the OECD-average is at 39%.
Economic theory suggests that education in general is positively linked to economic growth, but

overeducation in particularly is likely to impute growth losses. Although, persons with a university degree have better options on the labour market than persons without, the question remains how many academics can be absorbed from the economy? The matching of the “right skills for the jobs of today and tomorrow” are essential not only with respect to the dynamics on the labour market but also with respect to structural changes within the economy.
The methodology rests on a dynamic macro-economic input-output model for Germany that captures the labour market in detail. Driven by the economic model, labour demand is broken down by economic sectors, occupational fields and qualification levels. Labour supply is capped by demographic change. The stock of working population is determined via the educational system and its output of students, graduates or trainees that enter the labour market and via the dropouts of the labour market due to pension, sickness or else. The labour force participation rate varies depending on age, sex and qualification level. A trend forecast dynamises the rate. The matching process of both parts of the labour market is conducted on the level of occupation: labour supply and labour demand are confronted by 54 different occupational fields. Skill mismatches are subsequent results of the matching process. Drawbacks to the economic model are implemented in the wage function. It explicitly captures labour shortage by occupation with a negative sign: the more (less) employees are available on the labour market, the lower (higher) the wages in that specific profession.
The model solves until 2030 in order to capture longterm adjustment processes. The baseline scenario presented in this paper assumes a constant share of student entries. This leads to a growing number of persons with a certificate for university entry, to an increase in first-year students and, finally, to an increasing number of high-skilled labour supply. Labour demand by occupational fields and skill requirements is driven by the economic model in the baseline scenario. A second scenario assumes a stronger path towards higher education by changing the labour participation rates of high-skilled persons. The results will be compared with those of the baseline scenario.
The results will give an approximate answer to the question whether overeducation leads to a slower growth path of the economy. The comparison of two scenarios with different rates of high-skilled labour force allows drawing a first conclusion. It is expected that overeducation leads to a lower growth path than compared to the baseline scenario. Oversupply of high-skilled workers is likely to lower wages in many professions, leading the economy to a lower growth path in total. At the same time, the oversupply of academics might lead to an undersupply in other qualification levels. Hence, wages are likely to increase in other areas. The overall effect on the economy is still to be assessed.

DYNAMISING TRADE IN A DOMESTIC INPUT-OUTPUT MODEL – TINFORGE

Topic: International Trade
Author: Anke Michaela Mönnig
Co-Authors: Kirsten Svenja Wiebe, Marc Ingo Wolter

Although Germany has a relatively moderate degree of openness (47%) compared to other European economies, its growth dependence on the trade channel is high: the growth impact of exports exceeds in general those of other GDP components and the export share of nominal GDP amounts to over 50%. Major industrial sectors like the car industry, the machinery and equipment industry or the chemical industry depend highly on foreign demand and, at the same time, are important employers and growth vehicles for the Germany economy. Although Germany is highly integrated in the European economy, the European crisis has shifted the export flow constantly towards other world regions. Especially China has turned into an important and vital trading partner.
In such an environment, changing trade patterns and its impact on the domestic economy are important features for scientific-based policy analysis. World models that capture first and second round trade affects have been developed and applied. Nowadays, these models also include sophisticate country models that often incorporate input-output relations and price models. The

advantages of these models are clear. Nevertheless, they demand time, data and work capacity.
World trade in general is an exogenous given variable in national models such as INFORGE (Interindustry Forecasting Germany). In earlier versions, world trade was derived from the INFORUM model system (http://www.inforum.umd.edu), later, world trade was taken from the world model GINFORS. Currently, the trade module of INFORGE rests on third party projections that are integrated in a bilateral trade system. Each previous approach has proven to be less suitable for the purpose at hand: the INFORUM and GINFORS approach relied both on a complex world trade systems that lagged behind in their updating procedure. Current developments were not possible to integrate quickly. The current version, then again, does not encounter first and second round effects of world trade. The goal was to replace the import projection of third party institutions by a dynamic world trade model (TINFORGE) that could be easily updated and integrated into the national input-output model INFORGE.
TINFORGE connects 70 countries and regions by trade. Each country is price taker for imports and offers export goods on the world market. The bilateral trade matrix from the OECD determines the trade shares between all countries. The model solves its regression functions until 2030. Trade shares are estimated with a time trend, allowing changing trade shares in time. As a result, TINFORGE produces estimated growth paths for 70 countries and regions. They replace the previously used third party import projections that have been implemented in INFORGE. The trade module of INFORGE and its derivation of export demand by 63 economic activities remain unchanged.
In this paper, TINFORGE will be applied in order to test its advantages: a baseline scenario will be calculated that will be used as a reference to two further simulations: first a recession assumption in China will be implemented in TINFORGE. The effects of China’s import demand will then be integrated in INFORGE as single effect. The second simulation uses the same assumption about China’s growth path. But all effects of China’s recession path will be integrated in INFORGE: the first and second round effects on other trading economies are additional inputs to INFORGE.
The results will show that the consideration of first and second round effects of world trade significantly alters the input factor for export simulations. Simulation 2 is likely to show greater negative effects on the German economy than simulation 1. The explicit consideration of first and second round effects of trade is significant.

Dynamic industrial change by the popularization of the front-end ICT.

Topic: Structural change and dynamics
Author: Yukinori Nakano

(i) What is the scientific question to be answered by your paper?
Focusing on the diffusion process of technological knowledge and skill, this paper attempts to analyze the popularization process of the front-end ICT, such as individual informatics and wireless technologies, from 1980 to 2005 in Japan.
(ii) What is the method used?
Various hypotheses are formulated on this subject in social science and economics; the Diffusion of Innovations by Everett M. Rogers (1962), the populist technology theory provided by Susan J. Douglas (1987), the Endogenous Technological Change theory by Paul Romer (1990), the social role of amateurs by Patrice Flichy (2010) and the social role theory of unofficial sector for achieving science and technology literacy by Yuzo Takahashi (2011).
Time-series I-O data were extracted from Employment Matrix Tables (101 x 269) in the Linked Input-Output Tables (1980-1985-1990, 1985-1990-1995, 1990-1995-2000 and 1995-2000-2005; 514 x 412). These data were analyzed for our empirical research on the above mentioned hypotheses.
(iii) What is, or will be, the result of the study?

A part of our results show us a drastic employment-occupation structure change in several production activities, such as (1) an institutional decrease of telegraphists in water and land transport activities in 1980s, despite the increase of wireless operators and technicians, (2) the inverse U-curve change in the number of system engineers (SEs) employed in commerce, finance and insurance activities in last quarter of 20th century, despite the linear progress of the SEs in information service or research activities, (3) the rise of self-employed workers or amateurs in information service or multimedia contents service activities.
The cause and the results of this type of dynamic I-O structural change will be the focus of our presentation. One of the causes would be interpreted as an emergence of informal collective knowledge and skills in advanced ICT society.

Determinants of Trade in Value-added: Market Size, Geography and Technological gaps

Topic: Global Value Chain Analysis
Author: Eiichi Nakazawa
Co-Authors: Colin Webb, Norihiko Yamano

Using productivity by industry databases developed by various KLEMS projects worldwide and Trade in Value Added (TiVA) indicators derived from the latest version of OECD's Inter-Country Input-Output (ICIO) system, this paper examines reasons why participation in global value chains (GVCs) varies across economies. For selected economies, we focus on factors that may influence the share of domestic value added in exports and in foreign final demand. In particular (1) home market effects; (2) geographical location; and (3) technology gaps between economies. We present the methodology used, based on typical New Economy Geographical (NEG) models, to analyse possible determinants that separate "headquarter economies" and "factory economies", after controlling for market size and spatial proximity. Identifying such determinants, requires the combination of a "knowledge capital model", often used to explain organisation of multinationals, together with certain gravity equations.

Supply security footprints on critical metals with a global link input-output model (for special session on MFA & IO modelling)

Topic: Material flow/stock analysis in input-output modelling II
Author: Keisuke Nansai
Co-Authors: Shigemi Kagawa, Yasushi Kondo, Kenichi NAKAJIMA, Yosuke Shigetomi, Sangwon Suh

The decoupling of GHG emissions and energy consumption for economic growth in the future will necessitate the further spread of low carbon technologies. Low carbon technologies as PV, fuel cell and hybrid car use particular quantities of minor metals including rare-earth metal for important applications. In other words, without a stable supply of such critical materials, it will become impossible to spread green technologies reliably and smoothly throughout our society. Some critical metals have already been used widely in many products, and some are located eccentrically in deposits in various corners of our world. These circumstances lead us to question whether additional demand for the metals for use in low carbon technologies can be satisfied stably or not. For designing the strategic management of the procurement and use and recycle of the metals in the future, it is essential to understand the relation between a product and its dependence on such critical metal considering international trade.

Against this background, this study quantifies supply security footprints on critical metals of a Japanese product with a global link input-output model (GLIO). The GLIO is designed to reduce the labour required for data compilation by employing a simple accounting framework that differs from that of conventional multiregional input-output models. The accounting framework of GLIO enables the definition of about 400 sectors of the Japanese products, the inclusion of more than 200 nations and regions. This means those footprints is estimated based on the complete global system boundary. Our emphasized critical metals are neodymium (Nd), which is used for motors associated with wind power and EV, cobalt (Co), for electrodes in EV batteries and platinum (Pt) for catalysts in fuel cells. The data of the year of 2005 are used here. We show major Japanese products with the largest supply risk and their characteristics from the view point of relation to international trade of the metals. In addition, the difference from carbon footprint of those products is identified.

INPUT OUTPUT MODELING OF UTILIZATION OF ENERGY RESOURCES AS BASE OF GROWTH OF INDIAN ECONOMY

Topic: Input-output analysis for policy making
Author: GAUTAM NEGI
Co-Authors: Shri Prakash

Energy resources are the pivot of modern development for emerging markets and developing economies. Both consumption and production revolves around use of energy resources. Whereas consumption expenditure on energy resources operationalizes consumption multiplier process of growth, use of energy resources for production activates investment multiplier on the one hand and linkage effect on growth of output on the other. Energy resources in India comprises of coal, mineral oil and oil products, gas and electricity. Whereas oil and oil products and coal are available in adequate quantity, gas and electricity are generated in short supply relative to demand. Availability of both these factors constitutes a bottleneck to growth. Whereas oil and oil products and gas are partly produced domestically but are largely imported, coal is abundantly produced in the country, but electricity is produced largely domestically and is imported partially from adjoining countries. But supply of electricity is perennially scarce relative to demand / requirement which lead to the use of alternative sources of in-house supplies both by households and business/commercial enterprises. The alternative sources of electricity supply are costlier than the public supplies. This enhances cost of production and hence price of goods and disrupts the comfortable living of households. Household budgets are also adversely affected.
In view of the above, this paper focuses on utilization of energy resources. The following research questions i) what is the current level of utilization of energy resources; ii) what is the broad and sector specific pattern of utilization of energy resources for consumption and production; iii) what is the growth effect of consumption multiplier of energy resources on Indian economy; iv) what is the growth effect of production and investment multiplier of energy resources; constitute the base of analysis. An Input Output model of consumption multiplier of energy resources is formulated and applied to Indian data. Model of a production and investment multiplier in Input Output framework is also formulated. The results of analysis are expected to highlight the more or less energy intensive sectors of the economy. In case some or more sectors are not in the rapid growth category, less priority to the growth of such sectors may be assigned in future development programmes and appropriate policies may be devised. The study will also highlight the more or less growth promoting sectors in the economy which may also lead to the evolving of the policies of incentives and disincentives for promotion of such sectors/activities. The following four Input Output tables shall be used (1993-94, 1998-99, 2003-04, and 2007-08). For purpose of comparison, the results of analysis will be adjusted for inflation, so that appropriate inter temporal comparisons can be made. The continuous time series data will also be subjected to application of econometric modeling.

Impacts of R&D Expenditure on Economic Growth and Structure Based on Beijing Dynamic CGE Model

Topic: CGE and econometric input-output modeling I
Author: Hongfu Ni
Co-Authors: Dongmei Li, Zhang Shiyun

R & D (Research and development) Expenditure is not only a reflection of regional scientific and technological strength, but also important to technical progress and technology innovation. Therefore, R&D will affect the entire economy through technology innovation. Beijing as the scientific and technological centre in China, The scientific advance and technological innovation from R&D will decide the future development. Beijing R&D expenditure in 2012 is 103.11 billion Yuan. The ration of R&D expenditure to regional GDP(R&D investment intensity) is about 5.79%. How to evaluate the effect of Beijing R&D expenditure on economic growth and structure is an important issue? In the literature, It is usually assumed that R&D investment would increase TFP(total factor productivity) and then promote the economic growth. However, in this paper, we will divide the capital into tangible capital and R&D capital, which is accumulated through R&D spending. Moreover, the labor will divide into R&D labor and Non-R&D labor. Then we construct the related SAM(Social account Matrix). Lastly, this paper will use dynamic CGE(Computable General Equilibrium) model to evaluate the impact of R&D expenditure on Beijing's economic growth and structure, and can provide a reference for Science and Technology Policy.

The Analysis of Relationship among Producer Service, Manufacture and Trade——Based on Chinese the provincial input-output tables of China.

Topic: Input-output analysis for policy making III
Author: Hongfu Ni
Co-Authors: SHiyun Zhang, YI Zheng

Since the 1980s, the world economy has entered the service economy, and producer services have become an important driver of economic growth. The proportion of the service industry increased significantly and , developeding faster than the speed of manufacturing industry. Communications, financial services, logistics, transportation and other services in a number of many developed countries have accounted for over 50% of all service sector (the United States 54.8%, EU 53.3%, Japan 54%). Recently, studies on the relationship between producer services，manufacture and trade have been a hot issue. Working with a mix of panel data on goods and services trade for OECD , combined with social accounts data from GTAP, Francois and Woerz（2006）examines the role of services as inputs in manufacturing, with a special focus on the embodied producer service from manufacture exports. With increasing per capita income, it finds an increasing demand for producer service as inputs in manufacturing production at high income levels. As to the trade, they observe strong indirect exports of producer services as inputs in manufacturing. Using input-output tables of China, Singapore, Malaysia, Japan, Indonesia, Philippines, Thailand, South Korea, Se-Hark Park(1990) finds that producer services support the development of manufacturing industry. Guerrieri and Meliciani (2003) show that producer services contribute to enhance the competitiveness of manufacturing sector, by studying of input-output tables of six OECD. However, all the above researches are empirical analysis based on national level and use the cross-country data. There isn't any research on little evidence that the relationship between producer service and manufacture in sub-national level. With the fast development of China economy, the service industry has entered a rapid development period. Due to the imbalance in regional development, there are great differences in the development of service

industry in China's provinces.
Therefore, this paper will use China's provincial input-output table of 2002, 2005 and 2007, and study the relationship between producer services and manufacturing competiveness. It is a supplement to the existing empirical studies in the sub-national levels. The main contents include: First, We cCalculate the direct and indirect demand of manufactures for service. Second, We implement empirical studies about the relationship of direct and indirect demand for service and income levels based on provincial panel data. Third, We compute the embodied producer service in manufacture exports. And tThen analyze the impact of embodied producer service on manufacturing exports is analyzed.

Gravity Based Estimation of Interregional Transactions with Monte Carlo RAS Proportioning

Topic: Regional input-output modeling V
Author: Kazuhiko Nishimura
Co-Authors: Satoshi Nakano

This paper describes an alternative nonsurvey method for estimating interregional (Isard type) transactions.
Domestic outflows are assigned by delivering biregional transactions on the basis of the gravity ratio between the origin and the destinations, with parameters estimated from an earlier survey on interregional transactions.
The estimated gravity parameters are further perturbed in order to meet the aggregate transactions that are given for other regions to be investigated.
The methodology is applied to the interregional table for China 2007, first estimating the gravity ratio, and then to re-calculate the interregional transactions with the perturbation and shifting of the gravity parameters with respect to their means and variances.

The Role of Services for Competitiveness in Manufacturing

Topic: Trade, global value chains and foreign direct investment: measurement issues and impact evaluation
Author: Hildegunn Kyvik Nordas
Co-Authors: Yunhee KIM

This study analyses the relationships between competitiveness in manufacturing and the quality of key supporting services. Three indicators of competitiveness are considered: the degree of product differentiation, unit prices obtained in export markets and the duration of trade. The density of telecoms networks and the reliability of electricity supply stand out as the most crucial for competitive manufacturing. In addition the ease at which contracts can be enforced and the time it takes to export and import goods are strongly related to competitiveness. Our methodology allows us to go beyond a one size fits all policy analysis. Interestingly, we find that in low-income countries, the impact of services quality and policy on competitiveness is highest in low-technology industries; in middle-income countries it is highest in medium-technology sectors and in high-income countries the impact is highest in medium-high and high-technology industries. This suggests that better services contribute to moving up the value chain in industries where a country already has technological capacity and comparative advantage, but better services alone may not stimulate product differentiation in sectors where a country is far from the competitive edge – at least not in the short run. Policy reforms needed are to simplify procedures for contract enforcement,

liberalisation of FDI, strengthen pro-competitive regulation of network services, and eliminate tariffs. It is concluded that new ways of doing business where manufacturers build relationships with customers and compete on the basis of products they are willing to pay a premium for has the potential to become an important driving force for growth after the great recession, provided that adequate support from competitive services markets is in place.

The impact of production and infrastructure shocks to the Japanese inter-regional economy: A non-linear input-output programming approach

Topic: Input-Output analysis of disasters II
Author: Michiya Nozaki
Co-Authors: Jan Oosterhaven

The impact of production and infrastructure shocks to the Japanese inter-regional economy: A non-linear input-output programming approach
Michiya Nozaki (Visiting Researcher, Chuo University) & Jan Oosterhaven (University of Groningen)

Abstract
This paper develops a methodology to predict and to thus possibly mitigate the economic impacts of major catastrophes, such as earthquakes and tsunamis. The short-run impacts are assumed to be determined by the attempts of economic actors to return to the pre-catastrophe economic situation as closely and as quickly as possible. We propose to model these behavioural reactions by a non-linear program that minimizes the weighted sum of the logarithms of the deviations between the post- and the pre-catastrophe size of all economic transactions in the economy at hand, subject to a Walras-Leontief production function per regional industry, a minimal size of regional final demand by product and a positive trade balance. The non-linear program is considered to be representative of the short-run equilibrium of the economy at hand, when its base scenario solution closely resembles the base year interregional input-output table of the country at hand.
The methodology will be tested by means of the comparison of the base scenario with a series of scenarios with regional production shocks and interregional infrastructure shocks to the Japanese interregional, interindustry economy of 2005. The impacts of these shocks will be evaluated by means of the changes in, respectively, regional value added and the output price by regional industry.
Keywords: catastrophe analysis, non-linear programming, input-output analysis, infrastructure shocks, Japan

The Impact of Connectivity Infrastructure Development in Indonesia

Topic: CGE and Econometric Input-Output Modeling
Author: Anda Nugroho
Co-Authors: Hidayat Amir

Infrastructure lacking has been the bottleneck of the economic development for Indonesia. The government has launched Masterplan for Acceleration and Expansion on Indonesia Economic Development (MP3EI) to address the problem. The masterplan including a large-scale investment plan in the infrastructure development to strengthening the national connectivity. It aims to expand economic development in the surrounding areas, especially in underdeveloped and remote area. The masterplan includes infrastructure investment in six economic corridors, worth of 450 billion US

dollars. However, it is hard to fund the large investment required with the limited government budget. The government has to decide the financing source and encourage collaboration with the private sector to bring in the investment. Despite the large scale of the project, quantitative research supporting the benefit of the project is still lacking. Moreover, research concerning the linking between the investment expenditures with the funding choice is surprisingly rare.
The purpose of this paper is to analyze the economic effect of the development of some priority project in the masterplan of connectivity infratructure. We employ integrated Financial Computable General Equilibrium - Transportation Network approach to analyze the problem. The model is composed of three components: (i) transportation network/accessibility component, (ii) real side market component, and (iii) financial side market (money flow) component. First, the transport network model measures improvement in the interregional minimum distances and acces¬sibility from the project. Next, the financial CGE model analyzes the economic effect on the real and financial side market. On the real side, the model analyzes the outcome of the project from the commodity flow, while on the financial side the model explore various financing method (tax financing, debt financing, and/or private fund financing) and its intertemporal effects regarding to the funding choice. We take seriously the analysis of funding choice into project outcomes since it will affect fiscal sustainability and also imply obligation for current/future taxpayer to pay the debt. By linking the investment expenditures with specific financial resource the analysis of the outcome would be more realistic. The analysis will confirm the development of priority project investment and strenghten the masterplan.

IO-MFA-based linear programming for the quality-oriented End-of-Life vehicle scrap recycling (for special session on MFA & IO modelling)

Topic: Material flow/stock analysis in input-output modelling II
Author: Hajime Ohno
Co-Authors: Yasushi Kondo, Kazuyo Matsubae, Tetsuya Nagasaka, Kenichi NAKAJIMA, Shinichiro Nakamura

Steel is the most commonly used metal material. Accordingly, studies on material flow analysis (MFA) of steel abound. These studies are concerned with the quantity-based flow and cycle of iron and steel, and the importance and necessity of steel recycling are pointed out based on concerns about the depletion of high-grade iron ore and the requirement for CO2 reduction. Some studies have correctly pointed out the need for paying due diligence to quality-related issues for achieving a sound material cycle for steel. During the recycling phase of steel, various other elements are likely to intrude and contaminate because of the combinational use of various materials. Besides, steel originally contain other elements as alloying elements to get special properties. Consequently, steel recycling is complicated process from the view point of quality control.
For the achievement of quality-oriented steel recycling, exogenous contamination should be avoided by the removal of contaminant before re-melting. Although alloying elements should also be removed, they cannot be separated mechanically because they are alloyed with iron matrix. Therefore contents of alloying elements in recycled steel must be controlled within requirement and/or regulation during re-melting process to save not only the quality of steel but also precious alloying elements.
In this background, this study clarifies optimal scrap recycling conditions focusing on the End of Life vehicle derived steel scrap which contains a lot of alloying elements by means of IO-MFA-based linear programming (LP). By applying LP to IO-MFA, repercussion effects of the optimization can be estimated in addition to the optimal recycling condition. Using this method, the most efficient recycling of ELV derived scrap for alloying elements saving and environment are figured out.

Analyzing Instability of Industrial Clustering Techniques

Topic: Input-Output Economics and Network Theory II
Author: Shunsuke Okamoto
Co-Authors: Shigemi Kagawa, Keisuke Nansai

Analyzing Instability of Industrial Clustering Techniques

Shunsuke OKAMOTO†*, Shigemi KAGAWA† & Keisuke NANSAI‡

†Faculty of Economics, Kyushu University, Fukuoka, Japan
‡Research Center for Material Cycles and Waste Management, National Institute for Environmental Studies of Japan, Tsukuba, Japan

*To whom correspondence should be addressed; E-mail: solitario_halcon_azul@yahoo.co.jp

Abstract
The process and hybrid LCA methods have a crucial problem such that the LCA system boundary is freely decided by LCA practitioners, which consequently leads to truncation error and underestimation of life-cycle emission. This paper focuses on clustering methods (eigenvalue decomposition of the normalized Laplacian matrix and nonnegative matrix factorization of the normalized affinity matrix) which are useful in determining the LCA system boundary and investigates the instability of the clustering methods. The results indicate that, in cases involving a relatively small number of K-means repetitions (approximately 10), choosing the nonnegative matrix factorization method over the eigenvalue decomposition method yields smaller values of “normalized cut” value Ncut (an indicator showing the goodness of network partitions), the benchmark indicating optimal cluster assignment. On the other hand, for a larger number of K-means repetitions (100 or more), neither method is universally superior to the other.

Keywords: LCA system boundary, CO2 intensive clusters, clustering analysis, input-output analysis, discrete optimization.

Disaster and Structural Change: Case Study on the 1995 Kobe Earthquake

Topic: Input-Output analysis of disasters I
Author: Yasuhide Okuyama

Okuyama (2014) found that the long-run effects of the Kobe Earthquake, occurred in 1995, appear to be significant, lasting for several years in an increasing manner, based on the time-series of input-output tables for the City of Kobe. It also suggested that a large part of the economic effects be resulted from structural changes of the Kobe economy resulting from the damages of and reconstruction activities after the earthquake. In order to investigate the disaster effects further, this paper aims to analyze the extent and composition of the structural change, based on the input-output framework. The structural changes are measured based on a time-series of custom-built input-output tables for the damaged region (Ahiya-Jinushi, 2001). Based on these tables, the region specific structural change of the Kobe economy is decomposed using the combination of structural decomposition technique and shift-share analysis.

Module Disasters Analysis: Session 1

Topic: Disasters Analysis
Author: Yasuhide Okuyama

Disasters Analysis

Module Disasters Analysis: Session 2

Topic: Disaster Analysis
Author: Yasuhide Okuyama

Disasters Analysis

Module Disasters Analysis: Session 3

Topic: Disaster Analysis
Author: Yasuhide Okuyama

Disasters Analysis

Module Disasters Analysis: Session 4

Topic: Disasters Analysis
Author: Yasuhide Okuyama

Disasters Analysis

University of Groningen (Netherlands)

Topic: (Panel Session) European Statistics for Competitiveness in a Globally Competitive World: what is the role of Input-Output Statistics?
Author: Jan Oosterhaven

European Statistics for Competitiveness in a Globally Competitive World: what is the role of Input-Output Statistics?

VISUALIZATION OF INFORMATION ANALYSIS AS A TOOL FOR CLUSTER’S IDENTIFICATION OF THE GLOBAL PRODUCTION NETWORKS

Topic: World input-output modeling and databases III
Author: LUIS ORTEGA

VISUALIZATION OF INFORMATION ANALYSIS AS A TOOL FOR CLUSTER’S IDENTIFICATION OF THE GLOBAL PRODUCTION NETWORKS.

SOLIS, Valentín
ORTEGA, Luis
GAYTÁN, Mariel

Abstract

The so-called ICIO (Inter-Country Input Output) models, properly defined, allow to reach a more accurate indicators on the interdependency in the production structure of different countries. Until now, this framework has been applicated to analyze groups of selected countries and few years. One of the reasons is the huge mass of information needed and the difficult to handle with.

This paper aims to visualize the global production process from the WIOD (World Input-Output Data Base). This data base provides disaggregated input-output matrices for 40 countries and 35 economic sectors, equivalent to more than 2 million data for each year.

In this paper the authors evaluated a visual information analysis technique associated with the network theory which is able to mapping and clustering this big data without drop out any information. This is a new tool alternative and/or complementary to Multidimensional Scaling models or the Graph Layouts, in order to lead to the identification of the main Global Production Networks and, most importantly, allow to the identification of Global Value Chains, thereby opening a way of a relevant analytical procedure.

Key words: Visualization of Information Analysis; ICIO Models; Global Production Networks; Global Value Chains.

Flow Analysis on Products of Agriculture, Forestry, Fisheries Industry using Structural Path Analysis

Topic: Sustainable production and consumption I
Author: Yuko Oshita
Co-Authors: Yasunori Kikuchi

Agriculture, forestry, fisheries industry of Japan is facing many critical problems seeking solutions for them, e.g., aging of workers and free trade of the products. To build robust domestic-supply chains, we need innovation in consideration of process of agriculture, forestry, fisheries industry, social system and supply and demand structure. As well as main products (foods and wood material etc.), by-products (biomass) have become important products as biomass renewable resources, regarding agriculture, forestry, fisheries industry. This paper analyze flows of products of agriculture, forestry, fisheries industry and characterize present structure of them, then we propose to design robust supply chains by introduction of biomass conversion technology etc.
We apply technique of structural path analysis (Defourny and Thorbecke, 1984; Lenzen, 2002) to extract the flows of them. In this study, we analyze the flows of 6 products, rice, potatoes and sweet potatoes, vegetables, fruits, sugar crops, logs, and they cover 90% of their domestic total output.
From the results, it became clear that the most part of rice, potatoes and sweet potatoes, vegetables and fruits are supplied to final consumers directly (without processing) or via one step (sector). On the other hand, sugar crops and logs are supplied to final consumers via many steps and sectors. Flow diagrams of rice, vegetables and fruits are relatively simple, because transit points (sectors) of their supply chain are a few. However it is a noteworthy that rice supplied to livestock sector and vegetables. It is thought that by-product of rice, rice straw and chaff, are used by such sectors as fermentation feed and compost. Potatoes and sweet potatoes is used for not only food, but also

industrial starch. Therefore the flow diagram is relatively complex and has many industrial sectors. Sugar crops has also relatively complex flow. The ratio of sugar which is supplied to household directly is 9.5% of total output of sugar crops and unexpectedly small. The most of them are supplied to eating and drinking place and food industry. By-products of sugar crops, bagasse and filter cake etc., also supplied to livestock sector and vegetables. Flow of logs is most complex, and their by-products are used by many agriculture and livestock sectors and power generation. Logs are supplied to final consumers via many transit points (sectors).
For building the robust and comprehensive supply chains, as well as main products or high value-added products, by-products and transit sectors in flow diagrams which became clear in this study are important as consideration factor of system design.

Reference
Defourny, J. and Thorbecke, E. (1984), Economic Journal, vol.94, no.373, pp.111-136.
Lenzen, M. (2002), Journal of Cleaner Production, vol.10, no.6, pp.545-572.

Matrix difference statistics and their use in comparing input-output databases

Topic: Methodological aspects of input-output analysis III
Author: Anne Owen
Co-Authors: John Barrett, Kjartan Steen-Olsen

The last five years has seen the development of a number of multi-regional input-output (MRIO) databases and there is growing interest in both the variation in data used and construction methods employed by the models. Understanding the differences in the results at a regional and sector level choice is important to users of MRIO systems as they are increasingly applied to important policy questions. This paper applies matrix difference statistics to calculate variations between multi-regional input-output databases. There is no single statistical test that can be used to determine the accuracy with which one matrix corresponds to another (Butterfield and Mules, 1980). This paper describes and evaluates a suite of statistical tests including those that measure ‘distances’ and ‘goodness of fit’ as well as ‘information based statistics’. To enable meaningful comparison between the Eora, EXIOBASE, GTAP and WIOD MRIO databases, each is aggregated to a common classification system of sectors and regions. Matrix difference statistics are employed to calculate the similarity of the results from aggregated versions of MRIO databases. The matrix difference statistics can also indicate which sectors and regions within each system contribute most to model differences. Matrix difference statistics can give insight into the variation in outcome that can be expected if different models are used and aid transparency within the field of MRIO modelling.

Assessing the Impacts of Water Prioritization Strategies Using Dynamic Input-Output Modeling

Topic: Environmental Input-Output Modeling
Author: Sheree Ann Pagsuyoin
Co-Authors: Joost Reyes Santos

Water reallocation during drought events can have significant but varying impacts on the operation and productivity of sectors within an economy. In this paper, we develop a dynamic input-output model extension to estimate the inoperability and economic losses that are incurred across interdependent sectors over time during prolonged periods of drought. This extension features

versatile functions that allow the evaluation of intervention strategies implemented during the drought timeline that can either degrade or enhance sector recovery as water supply conditions evolve. It was applied to a study of the impacts of water distribution strategies in four monitoring basins in the Commonwealth Virginia, USA. Five categories of drought severity based on the Virginia Drought Classification System were simulated. Simulation results identify the critical economic sectors that are sensitive to slight changes in water reallocation strategies, and highlight the interconnected effects of these strategies across sectors. Observed data trends also provide valuable insights for decision makers in formulating drought preparedness policies, long-term water conservation programs and short-term responses aimed to reduce water consumption in cases of emergency. The dynamic water reallocation I-O model developed in this study can be applied to other drought-prone regions, and be used to generate insights on the economic consequences of drought, ecosystem thresholds, and water reallocation strategies that minimize the economic impacts of prolonged drought events and their ripple effects across sectors.

Supply and Use Tables at the Municipal Level for Prospecting Electricity Markets

Topic: Regional input-output modeling VI
Author: Paulo de Tarso Gaeta Paixao
Co-Authors: Carlos R Azzoni, Joaquim Jose Martins Guilhoto

The present paper is a report on the results of a research carried out in partnership between a Brazilian company of electricity generation and distribution, CPFL, and the Department of Economics at the University of São Paulo (FEA/USP) in Brazil. The project was financed by ANEEL, the Brazilian regulatory agency for electricity generation and distribution, and had as a result an input-output model which improves the impact assessment of structural economic changes on the consumption of electricity by taking into due account the diversities of regional development. By tailoring the supply and use tables and the results in function of the regional boundaries of the CPFL area of operation, and of its “geoelectrical sub-regions”, the identification of direct and indirect changes on electricity consumption accruing from alternative regional development scenarios was made possible, including the effects of changes outside the Company area into its electricity market. An account of the model theoretical structure, which involved the construction of supply and use tables at the Brazilian municipal level, is provided. The model is already part of the market prospecting methodology of the utility company, and some practical examples of its applicability are given in the text.

Identifying key sectors for Green Growth in India: An Environmental Social Accounting Matrix multiplier analysis

Topic: Environmental Input-Output Modeling
Author: Barun Deb Pal

The recently released 12th Five Year Plan document of India has talked at length on achieving economic growth concomitant with conservation of natural resources, minimising environmental pollution, promotion of clean source of energy and improvement in energy efficiency in all sectors. It has budgeted substantial fund for improving environment. However, the plan document has been silent regarding the quantification of the environmental impact of various sectoral investment goals. Nor it has been attempted to justify whether the target growth rate (9% during the period 2012-17) would be achieved with minimum environmental damage.

Given the importance of green growth, many countries nowadays produce environmentally extended social accounting matrix (ESAM) so that one can quantify the environmental effect of desired sectoral investment or growth. Since ESAM is an extension of a Social Accounting Matrix (SAM), the multiplier derived from ESAM will produce direct and indirect induced impact of the policies on economic growth and environment, which may be used for understanding sectoral impact of investment/growth on environment. To our best knowledge, no attempt has been made to construct ESAM for India.
Therefore the first objective of paper is to construct an ESAM for India. Secondly, to estimate green growth index based on sector specific multiplier effects on GDP growth, growth in employment, income growth, GHG emissions and energy use. Index reveals that the cereal productions other than rice and wheat can be given higher priority to promote green economic growth. Meanwhile the hydro electricity production will be in high priority followed by other industrial activities. Finally this study finds that, the existing pattern of government expenditure is sub-optimal as its reallocation based on their green growth index increases GDP by 1%, reduces GHG emission by 1.57% and increase employment by 2.57%.

Key words: SAM, Environment and growth, GHG,
JEL Classification: E16, Q44, Q54,

Technology transfer, economic development and carbon emissions – an Input-Output analysis for India

Topic: Input-Output Analysis for Policy Making
Author: Barun Deb Pal

Controlling carbon emissions without restricting economic development is common but differentiated responsibility of all the countries across the world. In this context, debates are also going on at international level and India has been participating in such debate since 1992 after signing keyoto protocol. As a part of this, India has taken several steps to improve energy efficiency in domestic industries. However, the implications of technologies on economic growth are not clear till date. Moreover, the type of technologies and their sources are not known to us.

On the other hand, in the recently held climate change negotiation in Warsaw, the issue of technology transfer among the countries was supposed to be discussed but no such consensus had come yet. However, from the India’s perspective, before taking any decision on that a detail study is required to understand implication of various technologies originating from various countries for various sectors on Indian economy. As no such study is available on this issue, this proposed study is an attempt to address the implication of various technologies on key economic and environmental indicators of Indian economy like, employment; GDP; households income; and carbon emissions, for Indian economy. Since, the Input-Output coefficients describe the technology pattern of an economy; this method will be power full for such analysis. Again, the input output multiplier model helps to understand economy wide impact of any exogenous changes in the economy. Therefore, in this proposed study we will collect latest Input-Output tables from some selected developed and developing countries and a cross country comparison will be performed to understand technological pattern and carbon emission for various economies. Finally, the sector specific input output coefficients will be used for simulating input output model to see the impact of on key economic indicators of India. Results of this analysis will help policy makers to understand economic implication of various technologies and can open an option for green technology trade among various countries.

A bi-regional Input-Output model for Portugal: Centro Region and Rest of the Country

Topic: Regional input-output modeling I
Author: André da Cruz Parreiral
Co-Authors: Eduardo Barata, Luís Cruz, João Pedro Ferreira, Pedro Nogueira Ramos

Regional Input-Output models aim to quantify the impacts on industry's outputs, and other economic indicators, of different final demand vectors for goods and services produced in the same or in different regions. These models are well suited for regional economic analysis as they combine intra-industrial and interregional economic interdependencies. MULTI2C is a general flexible procedure, developed by a group of researchers from the University of Coimbra, Portugal, that allows for the construction of that kind of models for different geographic configurations.

This work describes the construction of a bi-regional input-output model for Portugal, based on the MULTI2C approach, considering two regions: the NUT II Centro of Portugal and the Rest of the Country. This model considers rectangular matrixes with 431 products and 125 industries. Furthermore, we distinguish between 5 types of households according to their main source of income, i.e., labor earnings, capital incomes, property housing incomes, pensions and other social transfers. This modeling framework may be closed with respect to the consumption of different types of household, but this paper only considers as endogenous the labor earnings type. Besides the presentation of the model structure and a brief account about the methodological choices made in its construction, this work focuses on estimating interregional trade.

Finally, this model is used to assess the impacts in the Centro of Portugal region, and in the Rest of Country, derived from a shift in the distribution of income in the Centro region, consisting in a reduction of the labor share, compensated by an increase in business investment, which however do not confine to the NUT II Centro of Portugal but may into some extent spillover to the Rest of the Country.

Production- vs. consumption-based CO2 accounting: A GVCs and EKC perspective

Topic: Vertical specialization and outsourcing II
Author: Jiansuo Pei

Recent studies show that over one-fifth of greenhouse gas (GHGs) emissions are due to production for exports and imports (Peters et al., 2011). Dietzenbacher et al. (2012) argues that the international production fragmentation complicates the estimates of consumption-based accounting. A natural question is that, whether increasing degrees of the global value chains (GVCs) contributes to the reduction of global emissions?
Given the nature of global emissions, it is not clear in theory why would some countries relocate production overseas at the first place. In this study, we aim to extend the Andreoni & Levinson (2001) model, allowing for international trade.
We expect that the GVCs perspective will add insights to the story of environmental Kuznets Curve (EKC). Empirically, a novel dataset will be employed for empirical test. The dataset incorporates China's special input-output table capturing processing trade into the World Input-Output Database (WIOD).
This study is relevant to policy discussions regarding increasing fragmentation and growing GHGs emissions.

The electronic, computer and telecommunication sector in the input-output matrix for 2003, 2008. A network approach.

Topic: Input-Output and the Network Theory
Author: Raul Peon
Co-Authors: Rafael César Bouchain

This text analyzes the Mexican economy with information from 2003 and 2008 using the input-output matrix from the perspective of network theory to find properties that are hidden in the traditional analysis of Leontief ´s matrix. In this way, we identified all sectors with great effect on the demand and supply system and therefore, they constitute the basis for the economic growth and development. In particular we will find how the electronic, computer, and telecommunication sector in Mexico is positioned and the role they play in relation to other sectors and themselves within 2003 and 2008 whether in a relationship of domestic and total market, using indexes, measures and other network analysis tools. Some of the measures assessed by these systems are: InDegree, OutDegree, Betweenes, InCloseness, OutClouseness, OutDegree, Eigenvectorcentrality, Shortest path, Centrality and Influence. With these tools we make an approximation to understand the performance and Interconnection of these sectors in the economy of Mexico and see if this paradigm shift has changed the role of these sectors in Mexico. Centrality measures, or at least popular interpretations of these measures, make implicit assumptions about the manner in which traffic flows through a network.

Climate Change in the Mexican Regions: Integration of the Direct, Indirect and Dynamic Effects in a Simulation Input Output Model

Topic: Environmental input-output modeling VII
Author: Rafael Perez Peña
Co-Authors: Carlos Flores, Noé Arón Fuentes, Gilberto Martínez, Lucero Moreno, Lourdes Morones, Jorge Muñán, Germán Osorio, Leidy Suárez

In the framework of the set of projects called "State Programs of Action for Climate Change in Mexico" (PEAC) sponsored by the Ministry of Natural resources and Environment (SEMARNAT), a series of sectorial studies have been developed to each one of the Mexican States on the impacts of climate change (a rise in temperature, rainfall and sea level). Among sectorial studies in these programs include the impacts on water resources; in biodiversity, energy, agriculture and cattle, urban settlements, physical infrastructure, tourism, health and economy.

However, all these programs do not consider the indirect and dynamic effects that will arise because of the direct sectorial effects. The purpose of this document is to demonstrate how the direct effects of climate change can be integrated in a Simulation Input-Output Model (using Stella/Ithink) to analyze the dynamic and indirect effects, and thus reach to get more insight about the real impact that this phenomenon could have on regional economies in four times higher than the direct effects, which shows the importance of developing tools that allow its estimate and inclusion in studies on the impacts of climate change on the Mexican regions.

Construction subsystem and carbon dioxide emissions

Topic: Environmental input-output modeling V
Author: Matías Piaggio
Co-Authors: Thomas Oliver Wiedmann

Global construction sector activities expanded exponentially during the last decades. This led to a steep increase in the sector's contribution to global warming as construction processes are greenhouse gas intensive, both through the extraction and production of materials as well as through construction activities.
We analyse the total, i.e. direct and indirect, carbon dioxide emissions of the construction sector in 186 countries, using a global multiregional input-output framework and introducing the concept of emissions embodied in final demand (EEFD). The results show that the total emissions of the global construction subsystem are three times higher than its direct emissions, and that 19% of these emissions are embodied in imported inputs. China, USA, Japan, India, and Russia together make up two thirds of the total global CO2 emissions of the construction sector. On a per-capita basis, small countries where the construction sector has developed considerably dominate the picture, and many of their emissions are embodied in inputs imported from outside of their economy.
We discuss the concept of EEFD and compare it to the concept of emissions embodied in consumption (EEC). The significance of the construction sector is demonstrated by comparing it to the total national carbon footprint from both perspectives.

Looking for virtuous structural change in Uruguay: Linkages of medium and high technological sectors

Topic: Emerging Developing Countries
Author: Matías Piaggio
Co-Authors: Erik Dietzenbacher

Structural change has been suggested as a tool for reaching equity. To this end, increasing the export shares of more knowledge-intensive sectors has been put forward as a policy. However, structural change through these sectors induces genuine welfare improvements only if they are strongly linked with the rest of the economy (in terms of output, value added, and labor) while also their total environmental impact should be considered. This study analyzes whether the development of medium and high tech (MHT) sectors can lead to a virtuous structural change in Uruguay.

We consider three areas of analysis: (i) the characterization of direct and indirect linkages of MHT sectors, (ii) the domestic value added content of Uruguayan MHT exports, and (iii) the total impact of MHT sectors in terms of greenhouse gas emissions. The results show that a final demand increase for MHT products affects very few sectors in the rest of the economy, MHT sectors are linked upstream mainly to transport activities. From a downstream perspective, however, is a significant share of the MHT outputs employed as input by the rest of the economy, suggesting the possibility of a virtuous development through MHT's downstream linkages. Also, MHT sectors depend heavily on imported inputs. This means that any value chain in which MHT sectors participate generates a considerable amount of foreign value added and jobs. As a consequence, Uruguay is sensitive to variations in import prices, which may affect its competitiveness and the effects of exchange rate policies.

Structural changes in the Polish economy in the perspective of extracting of shale gas

Topic: Structural change and dynamics III
Author: Mariusz Plich

(i)There are some indications that the Polish unconventional gas resources may have significant importance for national and even European balance of energy. If these predictions were confirmed, unconventional gas would open up new opportunities and cause structural changes in the Polish economy. Main purpose of the paper is to present possible scenarios for Poland, regarding shale gas extraction, and results of analysis concerning structural changes resulting from these scenarios.
(ii) An econometric input-output modeling approach will be used to simulate the future of the Polish economy. The model will base on an input-output matrix extended by one row and column representing a new sector (shale gas extraction) and will encompass econometric equations reflecting, inter alia, changes in input-output coefficients.
(iii) Results of the simulations will be transformed and presented in a form of special graphs representing structural changes. The directions and strength of future structural changes will be analysed confronted with what is known form the past for the Polish economy.

International Comparisons of Structural Changes in National Economies in the Light of WIOD Database

Topic:
Author: Mariusz Plich

Tasks and Occupations in Global Production Networks

Topic:
Author: Maria Cecilia Plottier

Fostered by rapidly falling communication and coordination costs, production processes fragment across borders as the various stages of production need not be performed near to each other anymore. A large literature has documented how this production process has fragmented in and outside Europe (see e.g. Marin, 2006; Baldwin and Lopez-Gonzalez, 2013; Los et al., 2013). In addition, Timmer et al. (2013) document that income increasingly accrues to capital and high-skilled workers within these production networks. So far, researchers have studied jobs by skill type. What is less well understood and analyzed is the changing occupational structure within international production networks.
In this proposal we apply a new metric introduced in Timmer et al. (2013) that allows us to analyze the activities that are added in various stages of production. We identify the emergence of global production networks by tracing the flow of goods and services across industries and countries in world input-output tables for 35 industries and 41 countries for the period from 1995 to 2011. We decompose the production of final manufacturing goods into activities in any country that are directly and indirectly needed for the production of these goods.
We aim to shed new light on the relative performance of countries in global value chains. In contrast to the previous literature that has focused on jobs by skill type (notably Timmer et al., 2013), a major contribution of this paper is the development and use of internationally comparable occupations data by detailed industries. The new International Standard Classification of Occupations 2008 (ISCO-08,

see ILO 2012) allows us to obtain much more detailed information on knowledge-based activities as the classification has been updated and extended from the old ISCO-1988 classification to allow for the identification of professional occupations in Information and Communication Technology (ICT) and those related to the provision of information and services to clients. This allows us to address the link between fragmentation and the creation of income and (knowledge-based) occupations.

References

Baldwin, Richard and Javier Lopez-Gonzalez (2013) “Supply-Chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses”. NBER Working Paper 18957, NBER, Cambridge MA.
Los, B., M. P. Timmer, and G. J. de Vries (2013) Globalization or Regionalization? A New Approach to Measure International Fragmentation of Value Chains. GGDC Research Memorandum 138, University of Groningen
Marin, Dalia (2006) “A New International Division of Labor in Europe: Outsourcing and Offshoring to Eastern Europe”. Journal of the European Economic Association, 4(2-3), 612-622.
Timmer, M. P., A. A. Erumban, B. Los, R. Stehrer and G. J. de Vries (2013) ”Slicing Up Global Value Chains”. GGDC Research Memorandum 135, University of Groningen.

Bayesian Updating of Input-Output Tables

Topic: Methodological aspects of input-output analysis I
Author: Andrey Polbin
Co-Authors: Oleg Lugovoy, Vladimir Potashnikov

The paper continues efforts on developing Bayesian method of updating IO tables, presented by the authors on the 21th IIOA conference, and extends the methodology and results in several ways. Previously we concentrated on the Monte Carlo experiments to analyze competiveness of proposed method with classical methods and updating IO tables for Russia. In the first part of the current paper we test our methodology on the “long” survey based IRIOS tables. We treat the last table for each country as unknown and estimate it with the Bayesian method using all previously available matrixes for constructing prior distribution. When specifying prior distribution we argue that Beta distribution for IO coefficients is more appropriate than Normal distribution and fit it for the each coefficient on previously available matrixes. We consider two point estimates of “unknown” IO table: posterior mode and posterior mean. To find posterior mode we use nonlinear optimization techniques, to explore posterior distribution we use modern MCMC methods. Posterior mode robustly outperforms competitive methods, popular in the literature, according to different closeness statistics. Posterior mean perform slightly worse than posterior mode. We conclude that point estimate of Bayesian method at least is compatible with the other methods on real data examples.
But the main contribution of our method is that it provide probabilistic estimate of IO coefficients consistent with all available aggregate data constraints. This property is very useful for analyzing uncertainty about IO coefficients and results of the models that calibrated to IO tables. In the second part of the paper we concentrate on the constructing creditable set for IO coefficients. We provide arguments that standard symmetric creditable interval for input-output coefficient is inappropriate and induce significant bias. We argue for using higher posterior credible set for characterization of the uncertainty. We construct credible sets for estimates of IRIOS tables and for the results of some simple IO models. We also perform Monte Carlo experiments were we show that posterior higher posterior credible set have better coverage properties.
In the third part of the paper we upgrade and extend estimates of SUT tables for Russia.

The construction of regional SAMs for the RHOMOLO model

Topic: Regional input-output modeling VI
Author: Lesley Potters
Co-Authors: Francesco Di Comite, d'Artis Kancs, Mark Thissen

RHOMOLO is a regional CGE model used for ex-ante impact assessment of policy instruments such as the Cohesion Policy. The model covers 267 EU27 NUTS2 regions in the EU, inhabited by households, firms and governments. Each region’s economy is split into 6 sectors (agriculture, manufacturing, construction, transport, financial services and public services) and the exchanges between regions incur iceberg trade costs.

Since there is no external dataset available on the 267 regional SAMs for the calibration of the model, we have developed an in-house methodology for regionalising the SAMs. First, national SAMs consistent with the model have been constructed based on the Supply and Use Tables (as available from WIOD, base year 2007) and expanded with Eurostat National Account data. Then, the different items of the SAMs have been regionalised in the model code following a cell-specific approach.

Where no reliable information was available for most of the regions, e.g. on taxes and transfers, cells of the national SAMs have been regionalised proportionally to GDP. For regionalising the Supply and Use part of the SAMs, we assumed national technology. We also estimated inter-regional trade flows. In a first step, the trade flows estimation is based on prior information derived from the PBL dataset (2012), available for most EU countries. For those countries where no prior information on inter-regional trade was available, we combined a gravity model of trade, with available national import and export data as macro-constraints. In a second step, the prior inter-regional trade flows were made consistent with other RHOMOLO data by solving an optimisation problem minimising the error of estimated and actual trade given the available national consumption and production constraints.

INPUT OUTPUT MODELING OF UTILIZATION OF ENERGY RESOURCES AS BASE OF GROWTH OF EMERGING MARKET ECONOMY OFINDIA

Topic: Emerging Developing Countries
Author: Shri Prakash
Co-Authors: GAUTAM NEGI

Abstract

Input Output Modeling of Utilization of Energy Resources
As Base of Growth of Emerging Market Economy of India

Shri Prakash, Professor of Eminence, BIMTECH and Gautam Negi, Asst Professor, Manav Rachna International University

Energy resources are the pivot of modern developed, emerging market and developing economies. Both consumption and production revolves around use of energy resources. Whereas consumption expenditure on energy resources operationalizes consumption multiplier process of growth, use of energy resources for production activates investment multiplier on the one hand, and linkage effect on growth of output on the other. Energy resources in India comprise coal, mineral oil and oil

products, gas and electricity. Whereas oil and oil products and coal are available in adequate quantity, gas and electricity are in short supply relative to their demand. Availability of both these factors constitutes a bottleneck to growth. Oil and oil products and gas are partly produced domestically and are largely imported, coal is abundantly produced in the country, but electricity is produced largely domestically and is imported partially from adjoining countries. But supply of electricity is perennially scarce relative to demand /requirement, which leads to the use of alternative sources of in-house supplies both by households and business/commercial enterprises. The alternative sources of electricity supply are costlier than the public supplies. This enhances cost of production, and hence, prices of goods; but disrupts the comfortable living of households. Household budgets are also adversely affected by the use of alternative sources of electricity supply.
In view of the above, this paper focuses on utilization of energy resources. The following research questions constitute the base of analysis: (i) what is the current level of utilization of energy resources? (ii) what is the broad and sector specific pattern of utilization of energy resources for consumption and production? (iii) what is the growth effect of consumption multiplier of energy resources on Indian economy? and (iv) what is the growth effect of production and investment multiplier of energy resources?
An Input Output model of consumption multiplier of energy resources is formulated and applied to Indian data. Model of production and investment multiplier in Input Output framework is also formulated. The continuous time series data will also be subjected to application of econometric modeling, including application of RWM for the evaluation of whether series are stationary.
The results of analysis are expected to highlight the more and less energy intensive sectors of the economy. In case, some or more energy intensive sectors are not in the rapid growth category, less priority to the growth of more energy intensive sectors may be assigned in future development programmes and appropriate policies may be devised to mitigate adverse growth effects of electricity shortage. The study will also highlight the more or less energy intensive sectors of growth in the Indian economy, which may also lead to the evolving of the policies of incentives and disincentives for promotion of such sectors/activities.
The Input Output tables for the following four years 1993-94, 1998-99, 2003-04, and 2007-08 shall be used. Results of analysis will be adjusted for inflation so that appropriate inter temporal comparisons can be made. Other data shall be taken from publications of CSO, RBI and Economic Survey.

The Economic Gains and Environmental Losses of US Consumption: A Social Network and Input-Output Approach

Topic: Input-Output Economics and Network Theory II
Author: Christina Prell
Co-Authors: Kuishuang Feng, Klaus Hubacek, Laixiang Sun

In this article, we show how consumption in the U.S., a core country, triggers distributions of value-added and sulfur dioxide throughout the global economy. We track these distributions for all commodities and services consumed in the U.S. (our macro level), then for six commodity groupings (our meso level), and lastly for two case studies (our sector level), these being ‘Motor Vehicles’ and ‘Wearing Apparel’. We use a mixture of social network analysis and MRIO. Our findings show how the production of commodities for U.S. consumption tends to reify inequalities in the world-system: larger shares of value-added (in comparison to shares of pollution) are generally prompted within the core, whereas the opposite effect tends to be experienced in the non-core. We also discuss interesting exceptions to these general trends occurring at different levels of analysis. Finally, we draw special attention to China, the elephant in the room that exhibits both core and peripheral

characteristics.

Estimating the economic impact of tourism industry through the MM approach

Topic: Input-Output Analysis of Tourism
Author: Rosita Pretaroli
Co-Authors: Yousaf Ali, Maurizio Ciaschini, Francesca Severini, Claudio Socci

Tourism is one of the fastest growing industry in Italy. It has proven a valuable financial part of the Italian economy. Businesses, public and private organizations are strongly interested in the economic impacts of tourism at national and regional level. The main problem which arises when measuring the impact of tourism is that tourism is not only a single industry but it's an amalgamation of different industries. In order to solve this problem we will identify the relationship among the synthetic tourism industry (cluster of tourism). The synthetic tourism industry has three primary components which are Transport, Hotel and Restaurants and Natural Resources.

Our attempt is to present an input output analysis for Italy to investigate the interrelations existing among all industries (including tourism) and to examine the economic costs and benefits associated with tourism in Italy. Further we will apply a backward and forward dispersion approach, starting from the original Rasmussen definition, which can give further insight into the interactions between synthetic tourism industry and other industries. The method is based on identification of the Macro Multipliers and the related impact components of a multisectoral model based on the Input-Output table for Italian economy in year 2005. Further the strength of these techniques is evaluated in terms of correlation of the impact components within the sectors and cross correlation between clusters of tourism and the rest of the sectors. This study will further give a full picture of policies that aid policy makers in improving the country's tourism industry through identifying the key sectors that are interrelated with cluster of tourism.

keywords; Tourism industry, Multisectoral analysis, Macro Multiplier approach.

JEL classification: L83, C67, D31, D57, R15.

On the importance of manufacturing sectors for economic development – Indications from a refined Product Space

Topic: Input-Output and the Network Theory
Author: Alexander Radebach
Co-Authors: Hauke Schult, Jan Christoph Steckel

Previous studies introduced the concept of the “Product Space”, which was claimed to condition the development of nations (Hidalgo et al., 2007). The Product Space is a weighted network, consisting of nodes which represent economic sectors and links reflecting these sectors’ pairwise statistical similarities.

Sharing the conceptual idea, we adapt and extend the methodology substantially (1) by the use of output data deduced from multi-regional input-output databases, (2) by revising the statistical estimation of the similarities, (3) by constructing a meaningful directionality of the links, and (4) by

providing necessary significance levels for the links.

In contrast to previous studies showing a core-periphery structure our approach uncovers a particulary strong community structure of the Product Space. The communities reflect major economic fields as resource extracting sectors (A), agricultural/food and textile industries (B), light manufacturing (C) and advanced and heavy manufacturing plus services (D).

While the entire (multi-regional) input-output information reveals that communities A and B (regionally) exhibit the highest value added per unit input, the (globally) highest absolute value added can be found in community D, especially in the services sectors. Interestingly, some of the light manufacturing sectors are situated in community B (textile-related ones), some in D (metal-related ones), and some in neither of them. Yet they are closely interlinked, thus, forming a bridge between both banks. Most strikingly, we can show that all bridging links point from B over C toward community D. The prominent position in between and the directionality together emphasize the crucial role of manufacturing sectors in economic development. Finally, we find the resource extraction community to be very weakly connected to all other communities, depicting a specifically different role of such sectors in development processes. The global, qualitative picture remains persistent over time and across different MRIO data sets.

Mechanisms of distributing national income: a comparative SAM analysis of Canada, Germany, and Portugal

Topic: SAM applications
Author: Utz Peter Reich

Modern income studies are firmly rooted in, and restricted to, the micro-approach. Following economic theory of the household they begin by defining a concept of “personal income” observable in household surveys, and end by correlating this variable to other variables of the same households. Households are thus the one, and only, object of inquiry.
While such focussing on one specific type of economic institution may be sensible for certain purposes it also has its short-comings for others. It seems, for example, that the current trend of income distribution towards social polarisation cannot be explained by looking at households alone, but that other institutional units, by their participation in the distribution process, also exert an important influence. As a consequence, it may be warranted to enlarge the scope of research to including all institutional units of an economy, thus adding a macro-economic perspective to the micro approach.
The means for carrying out such endeavour is being provided by social accounting matrices (SAMs), in that they follow through each type of income from its source to its use through the whole economic circuit. Based on the assumption of constant column coefficients the effect of different mechanisms of distributing and redistributing national income to households may then be studied. The paper compares three countries, namely, Canada, Germany, and Portugal in this respect.

Trade asymmetries reconciliation in European supply, use and input-output tables

Topic: Supply, Use and IO Tables: Different approaches to reconcile world trade asymmetries (II)
Author: Isabelle Rémond-Tiedrez
Co-Authors: José Manuel Rueda-Cantuche, Antonio F. Amores, Anne Foltete

Eurostat, Statistical Office of the European Union, has been publishing for the last three years European supply, use and input-output tables in NACE Rev 2 (activities' classification based on ISIC 4). The compilation is based on 27 national datasets that need to be consolidated. In the process Eurostat has to reconcile the asymmetries of trade (exports and imports) between Member States at the European level. The paper will present the assumptions behind the reconciliation and the results, by comparing the consolidated table and the pure sum of the 27 Member States and illustrating the asymmetries at the product level. The analysis is based on 2008 , 209 and 2010 data.

LIDAR-Based Framework for Integrating Local-specific Vulnerability Conditions in Deriving Perturbations to the Dynamic Inoperability Input-Output Model

Topic: Input-Output Analysis of Desasters
Author: Joanna Zomil Resurreccion
Co-Authors: Enrico C Paringit, Joost Reyes Santos

The prevalent adverse impacts of disastrous events intensified by the alarming threats of climate change have underscored the urgency to develop new strategies to enhance preparedness and resilience within an economy. Consequently, more reliable models to estimate the associated direct and indirect economic losses resulting from these disruptive events have been formulated. However, recent techniques and technologies that may be potentially capable of increasing the precision of these risk estimates have not yet been fully integrated into existing disaster loss estimation models. Further, though the prioritization of key sectors in resilience enhancement planning requires a holistic approach from the regional and national levels, the degree of vulnerability varies based on local-specific conditions. Hence, this research explores the relative novelty of the use of flood hazard maps in economic input-output analysis. It proposes a framework to integrate the spatial dimension in evaluating the associated macroeconomic losses from local-specific vulnerability conditions. The research will demonstrate the framework through an adaptation of the Light Detection and Ranging or LIDAR-based 3D flood hazard map data developed by the Philippine government agencies in collaboration with various research institutions to derive perturbations to the Dynamic Inoperability Input-output Model. The research will investigate the impact on regional economic losses and recovery behavior from having a heterogeneous sector distribution across identified local areas of high vulnerability. The resulting methodology will have flexibility and scalability over flood hazard maps of different return periods and other hazard maps for other regions and disasters.

Demand decomposition and input-output subsystems analysis of the Philippine CO2 emissions

Topic: Environmental input-output modeling VII
Author: Rachel Custodio Reyes

The paper is an extension of the subsystems input-output model applied to carbon dioxide emissions through demand decomposition. Input-output analysis of variables with adverse environmental consequences, like carbon dioxide, presents useful information on their links with the productive structure of the different sectors of the economy. Particularly, subsystems model offers more details by decomposing emissions of a group of sectors into demand volume, feed-back, internal and spill over components. This study proposes a further decomposition of the subsystems model by demand components so that the impact of changes in domestic consumption and trade are also accounted for, recognizing the importance of trade in the economy and its corresponding trade policies. It utilizes the most recent Philippine input-output accounts for year 2000 and computes for sectoral carbon dioxide emissions from combustion of petroleum, coal and natural gas. The results obtained shall provide insights on the impact of the different demand components on emission generation of the services and manufacturing subsystems from which to draw policy implications for the Philippine carbon dioxide mitigation program, although the country only contributes around 0.3% of world emissions. Even marginal carbon dioxide reduction remains relevant for this economy that is identified as one of the most vulnerable to the detriments of climate change.

Assessing the effects of trade on employment in the Philippines: A SAM-based multiplier and structural path analysis

Topic: Impact analysis: multiplers
Author: Rachel Custodio Reyes

The study investigates the impact of trade liberalization on employment in the agricultural sector of the Philippines. The literature provides inconclusive results on such effects. One side of the fence argues that domestic employment is sacrificed with increased trade, while the other side gives merit to the employment generating capacity of trade liberalization. In the presence of these conflicting arguments on the effect of trade and employment, it is important to provide a quantitative assessment to dispel the ambiguity in the case of the Philippines. The agricultural sector is particularly interesting. In 2011, it employed 33.4% of the labor force wile accounted only for 12.8% of the GDP, thus exhibiting its relative significance as an employer but, at the same time, it's vulnerability in terms of share in the economy's output. By using multiplier and structural path analysis, the paper traces the effects of tariff reduction/elimination on agricultural employment. The study utilizes the latest 2000 social accounting matrix (SAM), trade simulations from the World Integrated Solution (WITS) of the World Bank and labor statistics from the Philippine Labor Force Survey (LFS). The results of this analysis shall provide invaluable insights to various stakeholders and policy makers and shall emphasize the essential role of input-output analysis in informing the public and aiding policy making.

The economic value and environmental impacts of food waste in Australia

Topic: Waste Input-Output Analysis
Author: Christian John Reynolds
Co-Authors: John Boland, Steven Kenway, Julia Piantadosi, Beatriz Reutter

Waste is produced by all parts of the Australian economy, yet both the economic and environmental impact of waste are misrepresented, undervalued, and misunderstood by the media and the general public. This paper addresses this lack of understanding, giving a definitive economic valuation of Australia's food waste and the associated environmental impacts including embodied energy, water and greenhouse gas emissions.

Method
We expanded Reynolds' Australian waste estimate for the 2008 time period, classifying 61 distinct food waste categories. We then used WRAP's metrics for avoidable, possibly avoidable and unavoidable wastage to calculate the relative economic value of Australia's food waste in 2008. From this valuation we then calculate embodied energy, water and greenhouse gas emissions from Australian food waste using the extended WIO-LCA methodology proposed by Nakamura and Kondo (2008) and the environmental extensions from the EORA MRIO database. We also use Lenzen and Reynolds (2013) WSUT framework to examine the economic impacts of the various food waste treatment methods.
Significance
This is the first paper to use both physical and monetary national accounts to place a monetary valuation upon food waste at a national level (along with its associated environmental impacts).

Keywords: Waste Input Output, Life Cycle Assessment, Sustainability, Australia

** In organized session, Waste Input-Output Analysis**

Price and Volume Measurement for R&D in German National Accounts

Topic: Supply, Use and IO Tables: Previous Year Prices
Author: Liane Ritter

For scientific research and development services (R&D) price measurement is difficult, because these services are unique by nature. Therefore an input-method can be used for price and volume measurement of R&D. This means, that deflators of inputs (intermediate consumption, compensation of employees and consumption of fixed capital) are calculated and weighted to derive deflators for output of R&D.

In German national accounts use tables are a main source for calculating deflators of intermediate consumption in different R&D producing industries. Deflators for compensation of employees are based on data about gross hourly earnings differentiated by occupational skills.

The deflators for R&D are used to calculate output and gross fixed capital formation of R&D at previous year's prices.

An Input-Output Model of Extended Producer Responsibility: A study of the used tire management system in Portugal

Topic: Waste Input-Output Analysis
Author: Joao Rodrigues
Co-Authors: Antonio Miguel Amaral, Ines Santos Costa, António Lorena, Miguel Preto, Paulo Trigo Ribeiro

Under an Extended Producer Responsibility (EPR) system, when a producer delivers a product to the market it must also pay a fee, which is used to cover the costs of end-of-life disposal. EPR systems exist for many countries and types of products. In this work we develop an Input-Output (IO) model of an EPR system and study the environmental, economic and social impacts of the used tire management system in Portugal. The EPRIO model is based on the Waste Input-Output (WIO) model of Nakamura and Kondo (2001), but exhibits several new features.

The EPRIO is an hybrid model, which combines a top-down description of the economy in make-use format, and a bottom-up description of the waste management sector in which the waste flows are in physical units and the waste management technologies are in monetary units. The rest of the economy is divided in 125 sectors and 431 products, whereas the used tire management system is divided in 6 management waste management sectors including 3 waste management technologies (retreading, recycling and energy recovery) and 14 types of tires. The Producer Responsibility Organization (PRO) finances the used tire management system with the producer fee paid by the respective sectors of the rest of the economy.

Besides accounting for direct and indirect impacts, the EPRIO also accounts for several types of avoided impacts, i.e., the impacts that do not take place because of the EPR system. Avoided impacts are subdivided in substitution, alternative treatment and opportunity effects. Substitution effects arise from the replacement of goods and services by recycled products and recovered energy and are modelled in the same manner as in the WIO model.

The alternative treatment effects are the impacts in the counterfactual scenario in which the EPR system does not exist, but waste is still generated and must be disposed of. In the case of the used tire management system, the counterfactual scenario is a mix of incineration and landfill.

Finally, the opportunity effects are those which would result from additional spending if the financing of the EPR system had not taken place. Because the opportunity effects have a high uncertainty we perform a sensitivity analysis on the allocation of cost savings among producers and consumers. We consider three situations: the savings are fully captured by producers and consumer prices remain unchanged; the savings are fully captured by consumers and result in increased consumption of the EPR good or service; the savings are fully captured by consumers and result in an increase of general consumption.

We find that the net impact of the current EPR policy is positive in all dimensions considered, if compared to the alternative scenario of used tire disposal as unsorted municipal solid waste. Indirect impacts are around 50% lower than direct impacts and avoided impacts are of the same order of magnitude of indirect impacts. In terms of GDP and employment, the EPR system is beneficial because new tires are imported while the production chain of the EPR management system is mostly domestic. Concerning the treatment technologies, retreading is the most beneficial option, followed by recycling and energy recovery.

Module Managing Uncertainty in Input-Output Analysis: Session 1

Topic: Managing Uncertainty in Input-Output Analysis
Author: Joao Rodrigues

Managing Uncertainty in Input-Output Analysis

Module Managing Uncertainty in Input-Output Analysis: Session 2

Topic: Managing Uncertainty in Input-Output Analysis
Author: Joao Rodrigues

Managing Uncertainty in Input-Output Analysis

Module Managing Uncertainty in Input-Output Analysis: Session 3

Topic: Managing Uncertainty in Input-Output Analysis
Author: Joao Rodrigues

Managing Uncertainty in Input-Output Analysis

Module Managing Uncertainty in Input-Output Analysis: Session 4

Topic: Managing Uncertainty in Input-Output Analysis
Author: Joao Rodrigues

Managing Uncertainty in Input-Output Analysis

A pretopological analysis for amplification and absorption effects in the economical structure: a comparison among Mexico with center, center-periphery and periphery countries

Topic: Input-Output and the Network Theory
Author: Oscar Córdoba Rodríguez
Co-Authors: ERIK AARON JIMENEZ

This paper is based on pretopological analysis to study the influence (received and exerted) by a group of economic sectors that constituted a community. This influence is direct and indirect, by the sector of each community and the others sectors. For this purpose input–output matrix of different countries, are analyzing and contrasting by their structure through the pretopological analysis. The countries to be analyzed are: two centers (Germany and USA), two center–peripheries (Canada and Korea) and two peripheries (Mexico and Brazil) in two different years (1995 and 2009).

For this study, we use national accounts matrices found in the website of the World Input-Output Database (WIOD), these matrices have 35 sectors. We obtained four communities of these 35 sectors. The communities are conformed by the spectral method using the binarized matrix according to principal components results of 95% variance explained. The computing calculus for

the pretopological analysis is using the program MARX that provides us with the pretopology structure of influence and the interior and adherence of each community.
Marx makes a different binarization thresholds court, this helps us to find the influence of the behavior of communities. So we know if the communities cushion or amplify the economy. MARX and its results are used for an economic historical view and the relationship among Mexico and the other countries.

Identifying hubs and spokes in global supply chains using redirected trade in value added

Topic: Trade, global value chains and foreign direct investment: measurement issues and impact evaluation
Author: Hugo Rojas-Romagosa
Co-Authors: Arjan M. Lejour, Paul J J Veenendaal

Production of goods and services is becoming more complex because of increasing trade in intermediate inputs. This not only entails a growing number of traded intermediated inputs, but also that these intermediates are increasingly located at various countries. As a result, production is increasingly organized along global supply chains in which the tasks required to produce goods and services are performed at many locations all over the world. Traditional trade statistics no longer provide sufficient information on where exports of intermediate inputs are used and in which part of the production process the country's firms are actually most active. This has prompted the use of analytical tools based on trade in value added – instead of traditional measures in gross value. We use this analytical framework to develop indicators that identify hubs and spokes in international supply chains. Using these indicators and the Global Trade Analysis Project (GTAP) databases, which combine input-output tables with integrated trade flows for the global economy, we identify the importance of redirected value added trade and the hub and spoke relationships at the aggregate level and for specific highly integrated industries. Hubs are those industry-country pairs that use a relatively large share of imported value added in producing output for final use abroad. Spokes are the regions that are important suppliers of the intermediate inputs to the hubs –the incoming spokes– or the final destinations that are important receivers of the value added that is redirected by the hubs– the outgoing spokes. Thus, our study sheds light on how different countries and regions integrate (or not) into them and the role these countries play within particular global supply chains.

Melting Ice Caps and the Economic Impact of Opening the Northern Sea Route

Topic: CGE Applications to Handle Complex Data Issues
Author: Hugo Rojas-Romagosa

Besides the environmental effects, another consequence of the melting Arctic ice caps is the possibility of opening up the Northern Sea Route (NSR) for high volume commercial traffic. This shipping route will connect North East Asia (i.e. Japan, South Korea and China) with Northwestern Europe through the Arctic Ocean. This represents a sizeable reduction in shipping distances and a decrease in the average transportation days by around one-third compared to the usual Southern Sea Route. We use econometric techniques as well as a computable general equilibrium (CGE) model to examine the economic impact of the opening of the Northern Sea Route. The process will involve a dramatic shift of bilateral trade flows between Asia and Europe, diversion of trade within Europe, heavy shipping traffic in the Arctic, and a substantial drop in traffic through Suez. These reductions translate not only into fuel savings and overall transport costs, but also to significant

transport time savings that may effectively force supply chains in industries between East Asia and Europe to change. Therefore, the estimated redirection of trade has major geopolitical implications linked to both a drop in traffic on the Southern Sea Route (i.e. Suez) and heavy traffic along ecologically sensitive Arctic routes.

Do the new SNA 2008 concepts undermine Environmental Input Output Analysis?

Topic: CGE and econometric input-output modeling IV
Author: Maarten van Rossum
Co-Authors: Roel Delahaye, Bram Edens, Rutger Hoekstra, Sjoerd Schenau

The new SNA guidelines will lead to changes in the recording of global manufacturing. These changes are the result of revised recommendations regarding the treatment of goods sent abroad for processing and merchanting. The 1993 SNA stipulated that exports and imports of goods should be recorded at the time in which ownership passes from a resident to a non-resident unit. However it noted possible exceptions to the ownership principle: merchanting, and goods sent abroad for processing. With the 2008 SNA these exceptions have been dropped in favour of the application of pure ownership criteria. The 2008 SNA recommendations are to a large extent motivated by the empirical realities of a globalising world in which it becomes increasingly difficult to monitor production processes.
These recommendations not only have major implications for the supply and use tables of the National Accounts (from 'gross' flows of goods to 'net' flows of services in case of processing) , but a fortiori also call into question how this affects input-output (IO) analysis. Industries become less homogeneous by implementing the new 2008 SNA concepts. Industries could include both processors (service suppliers) as well as non-processors (goods suppliers). So industries becomes less homogeneous. As a result the emission-factor changes and this will have consequences for IO analysis.
This paper discusses the theoretical consequences of the new SNA 2008 guidelines for IO analysis but also the empirical consequences. The theoretical problems related to the new SNA2008 guidelines for IO analysis are discussed first. Secondly, by comparing the outcomes of IO analysis using both IO tables based on SNA 2008 and SNA 1993 we will test if and to what extent these new guidelines are a significant problem for IO analysis in practice.

The snowball effect of trade liberalization in global value chains: From upstream tariff removals to downstream productivity gains

Topic: Global Value Chain Analysis
Author: Dorothee Rouzet

The paper will provide new evidence on the effects of trade liberalization on the productivity and competitiveness of downstream sectors. The costs of protectionism are amplified in global value chains where, as countries specialize in stages of fragmented production processes, exporters rely on access to imported intermediate inputs. Conversely, the removal of tariffs and non-tariff measures is likely not only to render the affected sectors more competitive, but also to generate productivity spillovers to the rest of the economy through input-output linkages. The paper will quantify these productivity gains from trade liberalization in input-producing sectors. Using input-output analysis and panel regression techniques, it will compare the impact on previously protected industries and on downstream industries.

The analysis relies on three main data sources. Information on domestic and international intermediate input linkages is drawn from the OECD Inter-Country Input-Output model, which traces international transactions between 57 countries and 36 industries. The extent of protection comes from a newly-developed bilateral tariff database by industry, differentiating between tariffs on intermediate and final goods for each sector and partner country. In addition, non-tariff protection will be analyzed using the OECD trade facilitation indicators and other selected non-tariff measures. Finally, the outcome variables are primarily industry-level productivity indicators (labor and total factor productivity), but can also include indicators of upgrading such as capital intensity, R&D intensity and IT intensity. The study will cover OECD countries and emerging economies over the period 1995-2009.

The main outputs will be estimations based on regression methods and counterfactual scenario analyses simulating the impact of eliminating the remaining tariffs in regional trade agreements such as the TTP and TTIP. The study is expected to quantify the potential productivity gains from “going the last mile” in tariff elimination in sectors providing intermediate inputs, and to illustrate similar effects for non-tariff barriers.

Knowledge Spillovers through International Supply Chains

Topic: Global Value Chain Analysis
Author: Stela Rubínová

Understanding how knowledge flows across countries and whether supply chains play a role in the process is important. If knowledge is transferred internationally through supply chains, then adopting policies to attract vertical FDI or establish supplier development programmes may be justifiable. Economic literature generally suggests that international supply chains matter for knowledge transfer. Nevertheless, empirical evidence has so far been limited by data availability. Using industry-level R&D and patent data for a sample of 29 countries for the period 2000-2008, we study the importance of international supply linkages for knowledge spillovers. In order to construct measures of international supply linkages we use the WIOD database and focus on several progressively restrictive definitions of supply chains trade. Our results support the view that supply chains are a channel of international knowledge spillovers. Countries participating in supply chains do not only benefit from the technology lending from the investor to the host country, but also acquire part of the knowledge of the sending country and increase their domestic R&D productivity. We find a significant and robust knowledge-spillovers effect only for the narrower definitions of supply chains linkages between two countries, that is the case when a country offshores the production of certain components to re-import them. We also find that knowledge spillovers occur not only from the north to the south, but also in south-south production networks. We also find that the evidence that knowledge flows along the supply chains is more robust than the traditional finding that knowledge spillovers depend on geographical distance or trade flows.

Updating Supply, Use and Input-Output Tables from the perspective of the revised UN Handbook of IO Analysis and Compilation

Topic: Supply, Use and IO Tables: Methodology and Comparability
Author: José Manuel Rueda-Cantuche

The key problem in projecting Supply and Use Tables (SUTs) is that of incomplete data. The missing elements in SUTs may be due to a variety of reasons: timeliness, use of different data sources and/or conflicting external information, revisions of benchmark SUTs, estimations of multi-country SUTs and suppression of confidential information. The new draft chapter on Updating SUTs and Input-Output tables of the forthcoming UN Handbook of IO Compilation and Analysis identifies in the literature three different ways to approach this underdetermined problem where usually unknowns (e.g. elements of the interior tables) outnumber external constraints, e.g. in the form of row and column totals, namely: proportional scaling methods, constrained optimisation methods and modelling based methods. This chapter provides a tour around the most relevant literature with a focus on the issues that are more relevant to the scope and context of the Handbook (SNA). Besides, it summarises the various assessments of methods provided in the literature and presents three numerical examples.

CHOICE OF TECHNIQUE FOR MINIMIZING GREENHOUSE GAS EMISSIONS: AN INPUT-OUTPUT EXERCISE FOR THE MEXICAN ECONOMY

Topic: Environmental input-output modeling VI
Author: Pablo Ruiz-Napoles
Co-Authors: Martín Carlos Puchet Anyul

The reduction of Greenhouse Gases (GHG) emissions in the economy, i.e. mitigation, can be posed as a problem of minimization of total GHG emissions associated to production. In an Input-Output model in which we define x as the production vector and e as the vector of emissions per unit of output, we propose to minimize overall GHG emissions in the economy by means of a choice of productive techniques subset, among a finite set of feasible techniques.

The problem can be seen as one of minimizing the total amount of GHG emissions when the level of output is conditioned by the final demand f of m goods and services associated to two matrices (of m goods and services each) using n techniques of production, ($m < n$): a matrix B, associating products and techniques, and a matrix A specifying inputs required for each technique. For the not joint-production case, the problem is one of minimization of various techniques for each product.

In this work we are doing an empirical exercise for the Mexican economy, using a matrix A that includes various productive techniques for each product. These techniques are the ones that are actually working in some economies (or have been recommended by other case studies). At the same time we explore the dual problem of maximizing the final demand value, by obtaining emission-values for each good which are not over the e coefficients

Estimating impacts of minimum wages on poverty across ethnic groups in Malaysia

Topic: Input-output analysis for policy making III
Author: Mohd Yusof Saari

This paper examines the effectiveness of the minimum wages as mechanism for poverty alleviation among major ethnic groups in Malaysia. For empirical analysis, the impact of the increase in minimum wages is examined simultaneously on the household income and their cost of living. First, the micro data from the household income survey is combined with data on minimum wages to determine the income effect. Second, following the implementation of the minimum wage standards, the increase in labor costs will presumably be passed on to consumers by firms in the form of higher prices. To estimate the price effect, an input-output price model is applied to translate the higher labor costs into the total production costs for each sector. Lastly, a comparison of poverty rates before and after the implementation of minimum wages is performed. For this analysis, the impacts on poverty are decomposed into the effects that are determined by the income growth and change in income distribution. Results show that this minimum wage policy potentially reduces poverty to a large extent. Poverty for ethnic Indians is reduced the most compared to that of the Malays and Chinese. This can be explained by the limitation of minimum wages to promote wages of informal workers among the Malays and Chinese. For all ethnic groups, our decomposition analysis shows that minimum wages contribute to poverty reduction mainly through the income growth rather than the distributional change.

Construction of Social Accounting Matrix for Andhra Pradesh for 2007-08 and Impact Analysis of MNREGA

Topic: Input-output analysis for policy making I
Author: Mangat Ram Saluja

SAM, an extension of the Input-Output model, is constructed for the state of Andhra Pradesh (A.P.) for the year 2007-08. It consists of 73 producing sectors, two factors of production and nine categories of households, based on occupation and location (i.e. rural and urban). The main data sources used have been provided by the Directorate of Economics and Statistics of A.P. In addition, the sources are: NSSO's 66th round survey on consumer expenditure and NCAER's Income – Expenditure Survey 2004-05. At a number of places, all India coefficients based on the 2007-08 Input-Output Table have been used. This is the first SAM constructed for any state in India.

The impact of Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) on producing sectors of SAM and different categories of households have been estimated through the multipliers generated by this SAM. The multipliers estimated are output, value added, household income and employment multipliers.

MNREGA refers to the world's largest welfare program, run by the Government of India. It is a job guarantee scheme for rural Indians. It was enacted by legislation on 25 August 2005. It aims at enhancing the livelihood security of people in rural areas by guaranteeing hundred days of wage-employment in a financial year to a rural household whose adult members volunteer to do unskilled manual work.

Key Words: Social Accounting Matrix, Andhra Pradesh, MNREGA
JEL Classification: D57, D59

Statistical Dependence Modeling of Hurricane Impacts on Regional Workforce Sectors

Topic: Environmental Input-Output Modeling
Author: Joost Reyes Santos

Hurricanes have the potential to damage critical infrastructure systems, disrupt workforce and commodity flows, and can cause adverse socioeconomic impacts on the affected regions. Of particular interest in this paper is the assessment the cascading effects of workforce disruptions on the production outputs of interdependent economic sectors. Hence, this paper presents an impact analysis model to assess the uncertainties associated with workforce recovery. The uncertainty in workforce disruptions is linked to hurricane intensity levels inducing a statistical dependence relationship between hurricane intensity and the recovery period estimates for each workforce sector. This paper, to the best of our knowledge, demonstrates the first attempt to integrate such a statistical dependence relationship with an economic input–output (I-O) modeling approach. Additionally, the most critical workforce sectors are identified and prioritized on the basis of economic loss and sector inoperability metrics, which we use in the simulation of hurricane scenarios in the Commonwealth of Virginia. Such a prioritization may be useful to guide resource allocation to expedite hurricane recovery. The resulting model is capable of providing disaster preparedness insights to support the prioritization of sectors that are deemed critical in the recovery process.

Studying the informal aspects of the activity of countries with Social Accounting and Socio-Demographic Matrices

Topic: SAM applications
Author: Susana Santos

Social Accounting Matrices (SAMs) and Socio-Demographic Matrices (SDMs) are presented as tools that offer specific features for studying the activity of countries in several different areas, as well as for supporting policy decision processes.
Based on methodological principles derived mainly from the works of Richard Stone, emphasis is placed on the desirability of working in a matrix format, which includes not only people (SDM), but also, at the same time, activities, products, factors of production and institutions (SAM). Approaches based on SAMs and SDMs will be presented as a way of capturing the relevant network of linkages and the corresponding multiplier effects, which can then be used for the subsequent modelling of the activity of the countries to be studied. As an example of socio-economic studies that can be undertaken using approaches based on both SAMs and SDMs, the study of the activity of household unincorporated enterprises, also described as informal, will be illustrated with an application to Portugal. In that application, two scenarios will be briefly sketched out, involving, on the one hand, a change in incomes and, on the other hand, a change in expenditures. The macroeconomic effects of those changes will be summarised in the form of changes in the macroeconomic aggregates – Gross Domestic Product, Gross National Income and Disposable Income.

An integrated MRIO - CGE model for studying water and production reallocations in Spain

Topic: Environmental Input-Output Modeling
Author: Cristina Sarasa
Co-Authors: Ignacio Cazcarro, Rosa Duarte, Julio Sánchez Chóliz

Over the last years, two tools have sparked a growing interest with regard to their potential usefulness in solving environmental and economic problems. This paper proposes to combine MRIO and CGE tools in order to take advantage of the opportunities offered by both models for analyzing reallocation criteria in the Spanish economy. The main objective is to assess the economic and environmental impacts of alternative production distributions following different reallocation criteria. We specifically focus on agricultural and agri-food sectors through their full supply chains for the Spanish economy, which show important asymmetries within different regions as a consequence of important resources imbalances.

For this purpose, we first design a CGE model from the information of a MRIO for Spain, considering all 17 Spanish regions, plus the European Union and the rest of the world for the year 2005. Additionally, water flows and water footprints are computed. We then conduct sensitivity analyses on the key elements of model specification in order to provide a model which is consistent with empirical evidence of the economic effects of scenario analysis. Thirdly, we address the design of possible geographical production reallocation policies based on different criteria through alternative technological and fiscal measures. These scenarios focus on improving production distribution in accordance with natural resources distribution. Income and water variations are evaluated to provide guidelines for public deciders hand in hand with economic and environmental impacts.

Biofuels, technological change and uncertainty: Evidence from France

Topic: CGE and Econometric Input-Output Modeling
Author: Cristina Sarasa
Co-Authors: Virginie Doumax-Tagliavini

The increasing constraints on crude oil resources have contributed to the emergence of liquid biofuels as an alternative for road transport fuels. However, first-generation biofuels have been denounced as harmful in regards to their impacts on food crops prices, land use changes and ecological damages. As a consequence, some European Union (EU) governments have decided to reorient public subsidies from crop-based to cellulosic biofuels. More recently, the EU Parliament has called for a 6% limitation of crop-based biofuels and proposed a 2.5% binding incorporation target for cellulosic biofuels by 2020. In spite of this stated objective, the horizon of a large-scale adoption for advanced biofuels remains largely uncertain. Indeed, biofuels competitiveness is tightly linked to crude oil prices that also follow an uncertain evolution. In this context, including both uncertainties into the same analysis framework could be challenging.

Focusing on France, the main objective of this work is to assess the economic and environmental impacts of first and second-generation biofuels. We also determine the conditions under which advanced biofuels could become available earlier regarding to the evolution of oil prices and public subsidies. For this purpose, we develop an original approach to incorporate uncertainty within a dynamic computable general equilibrium (CGE) model calibrated on 2009 French data. In line with the existing literature, cellulosic biofuels are modeled as latent technology and biofuels by-products are included into the analysis. Different scenarios depending on the oil price volatility and the

changes in the fiscal incentives are considered using stochastic programming. We compare the effects of first and second-generation biofuels as regards mainly agricultural land, food production and greenhouse gas (GHG) emissions. These simulations provide guidelines for public deciders to design alternative fiscal policies to support advanced biofuels hand in hand with economic, social and environmental impacts.

Integrating Material Flow and Input-Output Data: All Is Not Said and Done

Topic: Material flow/stock analysis in input-output modelling II
Author: Anke Schaffartzik
Co-Authors: Nina Eisenmenger, Dominik Wiedenhofer

Using environmentally extended input-output models, a number of recently published studies have attempted to open the ‘black box’ as which material flow accounting conventionally treats production and consumption structures. With results known as “raw material equivalents” or “material footprints”, such applications have an immense potential to enhance our understanding of global material flows and the underlying drivers of resource use. However, a number of these studies have pointed to persisting caveats of the calculations on which they are based: the violation of homogeneity assumptions for prices and products and the impact of investment allocation and depreciation on the results. As a consequence, it remains difficult to pinpoint to what degree results for material footprints are shaped by production and consumption patterns or by methodological assumptions made in their calculation, respectively. We will present and discuss these methodological issues, delving both into the background calculations and using examples from published studies. In order for material footprint accounts to become relevant for policy making, the interpretation of their results must leave less room for ambiguity. However, even once methodological issues have been resolved, a debate will still be required on what this new indicator means politically. Making use of important insights gained from applications of environmentally extended input-output analysis to greenhouse gas emissions embodied in trade, we argue that in the course of this debate, the issue of accountability for resource use will have to be revisited.

This abstract is submitted for inclusion in the special session "Material flow/stock analysis and Input-Output modeling" proposed by Keisuke Nansai and Tommy Wiedmann.

Material footprint of EU27: comparison between Eurostat and Eora models - For special session on MFA & IO modelling

Topic:
Author: Karl Schoer
Co-Authors: Jan Weinzettel, Thomas Oliver Wiedmann

ABSTRACT:
The mass of materials consumed by a population has become a widely used proxy for measuring environmental pressure. The “raw material equivalents” (RME) metric of material consumption addresses the issue of including the full supply chain (including imports) when calculating national or product level material consumption. RME calculations require quantitative data on production practices along the full supply chain across different countries. Such data is not readily available. Therefore RME of trade are currently estimated by different methodical approaches. The observed considerable differences between the results require investigation.

This contribution concentrates on comparing the results on RME of imports and exports for EU-27 from two approaches, the EUROSTAT and the Eora model. The Eora model (worldmrio.com) is a multi -regional input-ouput (MRIO) approach based on 186 national monetary IOTs or SUTs with different degrees of sectoral disaggregation. The EUROSTAT model applies a highly disaggregated hybrid IOT matrix for EU-27. While the Eora model uses country-specific data on the domestic extraction and production of materials, the EUROSTAT model estimates RME of imports by assuming the production technology of the country of destination and supplementing this information with region-specific life-cycle data, e.g. on specific mines (hybrid LCI-IO approach).

The differences between the two models are analysed with the objective of understanding the reasons for differences and to find ways for improving both models. The following factors have been assessed with respect to their impact on the results:
- General conceptual differences between MRIO and hybrid LCI-IO approaches
- The effect of regional and sectoral resolution and of hybridization of the IOT matrix
- Data issues: The impact of using different data (especially on trade flows and domestic extraction) and further data quality issues

An Input-Output based approach to explore hidden potentials in global production chains

Topic: Sustainable production and consumption I
Author: Hauke Schult
Co-Authors: Armin Fügenschuh, Alexander Radebach, Jan Christoph Steckel, Ingmar Vierhaus

So far Multi Regional Input Output (MRIOs) models are used to evaluate emissions embodied in trade [1]. At the same time characteristic differences in sectoral production and emission structures around the globe exist. Thus, as a thought experiment we raise the question which amount of resources, energy or CO2 could be saved if global manufacture chains were optimal according to trade and existing production technologies with labor being immobile and global final demand to be covered. Our solution approach intents to optimally rearrange flows of MRIO-table using WIOD data setting up a linear optimization problem that is solved using a Simplex algorithm.
Regional sectors need specific inflow combinations of resources, industrial outputs and differently skilled labor to generate output . These domestic production technologies are assumed to be fix and non-tradable. At the same time labor can be shifted between domestic sectors. Additionally we cap resource and agricultural production because land and resource stocks are immobile and a natural outflow limit exists. Services are partly chosen to be non-tradable.
Optimizing resource use, first results show strong specialization for most economies, which is in line with Ricardian trade theory. Global resource consumption could be reduced significantly (-35%). This is achieved by an increase in trade volume (approximately +250 %).
Transport emissions are expected to have decisive influence in optimization processes [2]. Therefore pairwise distances are derived for all regions. For each sector transportation emissions for 1 $*km due to commodities and transportation modes are estimated. Consequently all trade related emissions are regarded in optimization process. We expect that current global production offers relevant emission reduction potentials to be discovered.

[1] G. P. Peters, J. C. Minx, C. L. Weber and O. Edenhofer (2011): Growth in emission transfers via international trade from 1990 to 2008, PNAS, 108 (21)
[2] A. Cristea, D. Hummels, Laura Puzello and Misak Avetisyan: Trade and the greenhouse gas emissions from international freight transport, Journal of Environmental Economics and Management (2012), http://dx.doi.org/10.1016/j.jeem.2012.06.002

Global Economic Impacts of Severe Space Weather

Topic: World input-output modeling and databases III
Author: Hagen Schulte in den Baeumen
Co-Authors: Manfred Lenzen, Daniel Moran, Albert Steenge

Coronal mass ejections (CMEs) strong enough to create electromagnetic effects at latitudes below the auroral oval are frequent events, and could have substantial impacts on electrical grids. Modern society's heavy reliance on these domestic and international networks increases our susceptibility to such a severe Space Weather event. Using a new high-resolution model of the global economy we simulate the economic impact of large CMEs for 3 different planetary orientations. We account for the economic impacts within the countries directly affected as well as the post-disaster economic shock in partner economies through international trade. For the CMEs modeled the total global economic impacts would range from ~ US $ 380 billion to US $ 1 trillion. Of this total economic shock ~ 50 % would be felt in countries outside the zone of direct impact, leading to a loss in global GDP of ~ 0.1 - 1 %. A severe Space Weather event could lead to global economic damages of the same order as other weather disasters, climate change and extreme financial crisis.

UK consumption-based emission reduction targets

Topic: Input-output analysis for policy making IV
Author: Kate Scott
Co-Authors: John Barrett

The UK has one if the highest net emission transfers questioning whether the current territorial approach to target setting is appropriate and whether enough policy effort is devoted to consumption measures. This paper investigates the relevance of the UK's 80 percent territorial emission reduction target from a consumption-based perspective. A time series of consumption-based accounts is developed from the EORA multi-regional input-output database for 1993 to 2010 to show trends in the UK's carbon footprint. The impact of economic structure, trade patterns and consumer demands on the footprint are explored. The UK's progress is compared with other countries. A series of scenarios compatible with the climate objective of a two degree future are developed for the UK and seven trading regions (including China, India and OECD-Europe). UK consumption emissions are analysed in a world where a two degree future is realised, and compared to a world where international actions don't go beyond pledges made in the Copenhagen Accord. Scenarios incorporate changes in UK production emissions and carbon intensities, UK final demand, UK trade relations and emission intensities in other countries. The consumption scenarios show that the UK's carbon footprint is likely to fall over time as decreases in emission intensities offset any increase in demand from imports. However, the gap between production and consumption emissions remains, and widens more significantly under less ambitious international pathways and higher import demand assumptions. The policy implications of this will be discussed.

The UK Emergency Carbon Plan

Topic: Consumption-Based Carbon Policies and IO Modeling
Author: Kate Scott
Co-Authors: John Barrett

Proposal for the convened session on 'Consumption-based carbon policies and IO modelling' organised by Kirsten S. Wiebe.

Kate Scott (University of Leeds) to present on behalf of John Barrett, Kate Scott, Katy Roelich, Piers Forster, Anne Owen, Julia Steinberger and Tim Foxon (all University of Leeds)

While the latest and past IPCC reports have been clear on the scale of the challenge to achieve a reasonable probability of limiting temperature rise to two degrees, this urgency has not been translated into carbon budgets for countries in international negotiations, let alone the generation of a coherent climate change mitigation plan. A framework is proposed to introduce an emergency carbon tax to transform the carbon intensive systems of production and consumption to a level that is consistent with carbon budgets defined to limit global temperature rise by two degrees.

Five steps are outlined to gain an understanding of the size of a carbon tax needed to align available carbon budgets with the size of the economy. First a global carbon budget is defined based on the IPCC 5th Assessment. Second this budget is distributed to countries based on per capita allocation and a new carbon budget for the UK is given taking its consumption-based emissions as a starting point. Third the contribution of carbon intensity improvements is considered in the UK's carbon budget. Fourth a hypothetical carbon tax is implemented to bring emissions in line with the trajectory for two degrees. Finally, the governance and institutions to enable this rapid transition to a low carbon economy are discussed.

Construction of Regional Input-Output Table in India using non-survey method: The Case of West Bengal

Topic: Regional input-output modeling IV
Author: Anindita Sengupta

Input–output model is one of the most useful tools for studying regional economies within a national economy and is helpful for economic planning both at the national and regional levels. In India, however, only a few numbers of studies had looked into the construction of regional input-output Table. There has been no such attempt in constructing the regional input-output Table of West Bengal, an Eastern region state in India. This study is a preliminary attempt to construct regional input-output Table of West Bengal by following non-survey method. While the survey method may provide more accurate results it is very difficult to apply this methodology to construct the regional input-output Table for any state economy in India because of non-availability of reliable state-level data. In constructing the input output matrix for West Bengal we have generated, first, the regional technical coefficients and the regional inter-sector flow matrix for the state. Then, we generate the final demand vector with the break-up of Private Final Consumption Expenditure, Government Final Consumption Expenditure, Gross Fixed Capital Formation, Change in Stocks and Export minus Import. The input output coefficient matrix of order 25×25 is constructed by applying Flegg's Location Quotient. In this methodology we have to correct for the overestimation for three sectors only. Section 2 deals with the methodological issues used in this study in estimating regional input-output Table of West Bengal. A detail discussion has been made on the quotients approach.

Section 3 deals with database and the necessary adjustments. Empirical results are analysed in section 4. Section 5 concludes the paper.

IMPACT OF NATIONAL FOOD SECURITY ACT (NFSA) ON THE INDIAN ECONOMY: AN APPLICATION OF MODIFIED LEONTIEF AND GHOSH MODEL

Topic: Impact Analysis: Multipliers
Author: Priyam Sengupta
Co-Authors: Kakali Mukhopadhyay

In September, 2013 the Parliament of India passed an act called "National Food Security Act (NFSA)". The act has stupendous importance for a country like India which is long suffering from problems like hunger and starvation. But the implications of this act are not yet fully known. Counter arguments suggest that NFSA would exert inflationary pressure to the country's economy. In this perspective, we have tried to measure four aspects of NFSA using Input-Output framework. Firstly, the required production and growth rates of different sectors of the economy to match the extra demand of food grains by the Government. Secondly, the required production and growth rates of different sectors of the economy to achieve growth target of food grain during 2016-17, as mentioned in the 12th Five year Plan of India (Planning Commission, Govt. of India). Thirdly, we measured the impact on price due to the adoption of NFSA. Lastly, we also estimate the additional water requirement to meet the extra demand for food grains.
A modified IO model has been used to capture the NFSA impacts on the Indian economy.
The most suitable methodology to capture knock-on effects of output change in an inter-dependant industrial scenario is Input-Output framework. Both demand driven Leontief model and supply driven model of Ghosh have been applied to evaluate the impact of NFSA. The direct and indirect linkage effects could be captured under this methodology to analyse sectoral impacts of output change. We have considered Input-Output Transaction Table (130X130) of 2007-08 published by Central Statistical Organisation and suitably aggregated 130 sectors into 23 broad categories.
We have assumed that the earliest when the effects of Food Security Act would be perceivable would be 2016-17. The result shows that the food grain sector has to grow by 3.75% annually to match provision of food grains according to the norm set by the act. Apart from that few sectors has to grow in higher percentage compared to the rest of the economy. These sectors are: Chemicals and Chemical Products, Mineral Fuels, Live stock products and Other Oilseeds and crops. The other sectors which need to gear up significantly to supplement this growth are Chemicals & chemical products, Mineral Fuels and Live Stock Products. From supply side the important sectors are: Other Oil seeds and crops, Food products and livestock products.
Impact on prices due to imposition of food security bill has shown that the food grain inflation would remain as high as 8.36%, even if the productivity in agricultural production increases significantly. For rest of the sectors the inflationary impact will be minimal with some effect on: Miscellaneous Manufacturing Products, Electrical & Electronics Equipments, Non-Electrical Equipments, Precision Tools and Chemicals & Chemical Products. Additionally, our analysis showed that with very prudent planning and field level application, India can meet its food demand provided it commits to work on water security.
To implement Food Security Act, the production structure of Indian agricultural sector has to be revised thoroughly. What is needed would be increase in productivity rather than increase in production. Secondly, given the same size of cultivable land, the productivity has to improve substantially. For this to happen, use of fertilizers, pesticides, more intense irrigation and modern agricultural equipments would be required. Thirdly, since in India, most of the farm sizes are small and fragmented, the productivity might have reached a saturation point where no significant improvement in productivity is possible. In this case, the only option left is to supplement "Food

Security Act" by import food grains. But that would result in huge burden on country's exchequer. Fourthly, there could be a re-allocation of farm land from non food grain to food grain sector. But that may have negative repercussion on availability of non-food grains and cash crops like tea, jute, rubber etc. This would again have a negative impact on country's exchequer, as most of the non-food items are exported. Fifthly, replacing cultivation of cash crops by food grains is not always feasible. It depends a lot on the texture of soil, its fertility and local climate. Sixthly, there would be always a tendency of increase in food grain prices. This inherent tendency could surmount any attempt to control it by Government or any other agency. Lastly, the inflationary pressure would not be confined within the periphery of agricultural sector rather it would spread to other sectors which seemingly do not have any relation to food grain production, for example "Precision Tools". In a nutshell, in this paper we have tried to throw some lights into possible macroeconomic impacts of NFSA on the Indian economy.

Female participation in recent economic growth: how, who and where?

Topic: Structural change and dynamics II
Author: Monica Serrano
Co-Authors: Rosa Duarte

European economies, in their recent process of economic growth, have experienced significant structural changes mainly linked to trade opening, greater economic integration and development of high technology industries and services. All this has meant, in general, an increase in the participation of women in economic activity. However, economic and social indicators tell us about the existence of a labour and wage gender gap, which is especially pronounced in some Mediterranean countries such as Spain. The objective of this paper is to explore the role played by the female employment on economic growth from an input-output perspective. More specifically, taking Spain as starting point, and extending the analysis to other European economies, we are particularly interested in studying how the model of growth, the different sectoral specialization and trade structure have resulted in a certain composition and distribution of female labour. More specifically, we study the extent to which countries have tended to a higher concentration of female employment in primary sectors, if such employment is concentrated at the beginning or the end of the vertically integrated production chain and therefore may be more susceptible to offshoring, we calculate feminization indexes by sectors (Seguino, 2000) and finally, we relate these structures with the process of expansion and internationalization of demand. In summary, we try to analyze to what extent the evolution of female labor gaps is explained by these structural factors. The work aims to be a first approach to gender issues using analytical and theoretical tools of input-output analysis.

Dissaggregating agricultural water flows in the world

Topic: Environmental Input-Output Analysis
Author: Ana Serrano González
Co-Authors: Rosa Duarte, Dabo Guan

Water resources are growingly transferred embodied in products internationally traded. These water displacements often involve global inequalities that need to be addressed by setting consumption and production responsibilities. Although Multi-Regional Input Output models are powerful tools to assess the interrelations among countries and sectors in global supply chains, the lack of sufficiently disaggregated sectoral data in the empirical applications may entails a notable drawback for assessing some regional problems. This is particularly important when studying water resources,

since agriculture accounts for 70% of water consumption all over the world. Therefore, in this paper we will try to join bilateral trade data on agricultural products with WIOD multiregional tables. This will allow us to analyze water consumption trends and to deepen into different productive specializations that could be triggering the increasing global water consumption happened from 1995 to 2008. Although this process was more intense in developed countries in the past, emerging areas cannot be neglected since their development entails a growing pressure on water resources. By applying a Structural Decomposition Analysis that will divide the sample into groups depending on the level of income of countries, we aim to explain water consumption trajectories on the basis of water intensities variations, changes on domestic or imported technologies and trends in demand patterns. Preliminary results seem to indicate an increase in virtual water trade chiefly due to the great boost of demand during these years. Changes in water intensities would be responsible for a partial moderation of water consumption increase in both high and low income countries. Finally, technological changes in low income nations would boost water consumption.

Designing the Health Care Services through dynamic CGE approach

Topic: CGE and Econometric Input-Output Analysis
Author: Francesca Severini
Co-Authors: Maurizio Ciaschini, Rosita Pretaroli, Claudio Socci

The sustainability of the Health care expenditure is a matter of concern for the policy maker especially when it
is financed by public funds. The public health care spending definitely represents one of the major part of total
expenditure for many Governments and the pro fitability of its restraint is constantly debated in the economic
literature. Indeed the "health" good can be considered as a key sector for the economy since it interacts with
the other commodities/institutional sectors and is able to activate other production processes and promote
income generation. The policy maker accomplishment should be therefore aimed at implementing a Health
care policy able to achieve a composite objective. This policy target is represented by the de nfiition of a level
of public health care expenditure consistent with the economic growth. In this perspective, we focus on the
importance of "Health care expenditure", as a good, in the income generation and analyse the impact of a
diff erent composition of the health expenditure between private and public funds and between Institutional
sectors in the economic system. Our attempt is to simulate a new allocation of Health care expenditure from
private to public Institutional sectors and we analyse its e ffects in the long run and along the income circular
flow through a dynamic Computable General Equilibrium model (CGE). The model is developed on a Social
Accounting Matrix (SAM) for USA economy for 2009 and is able to capture the direct and indirect eff ects of
any exogenous health economic policy on total production, prices and income distribution. This allow us to

validate the possibility to get in the long run both the economic growth and the sustainability of Health care
expenditure for the USA economy.

Keywords: Health care expenditure, Social Accounting Matrix, dynamic CGE analysis.

JEL classi fication: C68, H51, E17, I15, I18, D57, D58.

Economic policy eff ects and financial crisis: a dynamic CGE model for Italy

Topic: CGE and Econometric Input-Output Modeling
Author: Francesca Severini
Co-Authors: Irfan Ahmed, Maurizio Ciaschini, Rosita Pretaroli, Claudio Socci

The debate on the real or financial origins of downturns and expansions of economies has been incessant since the
nineteenth century. The recent global financial crises have exaggerated this debate as studies show that fi nancial
crises worsen signifi cantly countries' fiscal position, both in terms of de ficit and debt. However, the debate is
still inconclusive and the extant literature goes in both directions. In this scenario it is imperative to have a
framework which provides a dataset to analyze and to identify the origin and the dynamic of forces pushing
towards expansion or contraction. The SAM integrates detailed data on production, income and expenditure,
thereby allowing a systematic recording of economic transactions for the study of growth and its distribution
in a particular country. However, in order to have a complete picture of real and financial transactions taking
place in an economy, real accounts, as presented by SAM, can be complemented with financial accounts in
order to derive the fi nancial social accounting matrix (fSAM). Financial accounts form an important tool
for analyzing financial flows taking place between Institutional Sectors within the economy (non- financial
corporations, financial corporations, government and households), between Institutional Sectors and the Rest
of theWorld and for assessing financial interrelationships within the economy and vis- a-vis the rest of theWorld
at a particular moment in time. Because of their link to capital and use of income accounts, financial accounts
are an important instrument to monitor the transmission process of monetary policy. The completeness of
fi nancial accounts enables the analysis of monetary aggregates as well as the analysis of longer-term fi nancial
investments and sources of finance. In this perspective, our attempt is to investigate how the monetary policy
implemented by the European Central Bank influences the Italian macroeconomic variables such as real GDP,

employment and prices. For this purpose we build a financial Social Accounting Matrix (fSAM) for the Italian
economy for 2009. It represents the suitable database to calibrate the dynamic fi nancial Computable General
Equilibrium (fCGE) model that includes the formalisation of Institutional Sectors' behaviour with respect to
fi nancial tools.

Keywords: Financial accounts, Monetary policy, Social Accounting Matrix, dynamic CGE analysis.

JEL classifi cation: C63, E17, E52, D57, D58.

An Approach for Stable Input-Output Coefficients

Topic: CGE and econometric input-output modeling II
Author: Nooraddin Sharify
Co-Authors: Mohammad Ali Ehsani

Abstract
Input-output models rely on cross section data of a specific year. Hence, non-stability of coefficients is considered as one of the major limitations of these models. This paper aims to propose a model to estimate time-series input-output technical coefficients. To this end, using a Cobb-Douglas production function assumption for sectors, an econometrics model is employed. The input-output tables of Iran for different years during 1991 to 2010 are used as database of the research. The stability of the technical coefficient is an advantage of the proposed input-output model, when compared with other current ones. Another advantage of the proposed model is its testability regarding the estimated technical coefficient.

A Nonlinear Supply-Driven Input-Output Model

Topic: Methodological aspects of input-output analysis IV
Author: Nooraddin Sharify

ABSTRACT
One of the important limitations of the supply-driven input-output (i-o) Ghosh model concerns its Leontief linear production function. Using the i-o table, this paper replaces a Cobb-Douglas production function with the supply-driven model. The two models are compared both theoretically and empirically. Nonlinear production function, relative substitutability of primary factors, and variability of the proportion of intermediate inputs over product levels are the characteristics of the proposed model. Considering the Solow residual of sectors as the Total Production of Factors (TFP) of sectors, is still another characteristic of the proposed model. The model is also plausible in value added and supply shocks' computation.

Economic Impact of Social Protection Programmes in India: A Social Accounting Matrix Multiplier Analysis

Topic: Input-Output Analysis for Policy Making
Author: Akhilesh Kumar Sharma

Social protection consists of governments' policies and programs designed to reduce poverty and vulnerability by promoting efficient labour markets, diminishing people's exposure to risks, and enhancing their capacity to manage economic and social risks, such as unemployment, exclusion, sickness, disability and old age. In recent years, social protection programmes have found place in the agenda of many governments. Many studies show that measures such as cash transfer programmes and rural employment guarantee schemes have positive impact on the poverty reduction and living standard of the people. There are many methods for the assessment of impact of social protection programmes. Since most of them do not take into account the whole economy, they have limited significance for policy analysis. Impact analysis through Social Accounting Matrix (SAM) multiplier may be the best alternative. A SAM framework is ideally a matrix representation of the circular flow of income in an economy. It is a single entry accounting system that represents all transactions and transfers between different sectors of production, factors of production, and institutions of the economy in a single matrix format. Probably, there are no studies, especially in Indian context, which have analyzed the impact of these programmes through SAM multiplier. Therefore, it is pertinent to have such study.

Moreover, there are many social protection programmes (e.g. MNERGA, Direct Cash Transfer, Indira Awas Yojna, Various Pensions schemes, etc) in India. A comparative analysis pertaining to their impact on sectoral outputs, employment, gross values added and households' income may be worthful for policy makers and researchers.

The present study aims to analyze the economic impact of various social protection programmes in India through SAM multiplier analysis and to compare the economic impacts of various social protection programmes. The main data sources are SAM for India 2007-08. The expenditure on various social protection programmes have been taken for year 2009 which are obtained from CSO, India. The findings show that if the same amount is allocated for MNREGA and Indira Awas yojana and Direct Cash Transfer, the output effect, GVA effect and income effect are highest in case of Indira Awas Youjana, MNREGA and Direct Cash Transfer respectively. Morevoer, in general, the overall economic impact of MNREGA and Indira Awas Youjna are almost same and higher than Direct Cash Transfer.

Key words: MNERGA, Direct Cash Transfer, Social Protection Programmes, SAM Multiplier
JEL Classification: D57, E16, E24, E65, H53, H55, I38

Sustainable Growth of Production and Consumption in India?

Topic: Sustainable production and consumption I
Author: Ritu Sharma
Co-Authors: Shri Prakash

Following Working definition is the base of concept of sustainability. Sustainable consumption is the use of goods to satisfy basic needs without depriving future generations. Basic needs comprise food, clothing, housing , health, education , transport and such conveniences of life that boot standard of living at given levels of income and prices. Basic needs are defined with reference to the

goods and services in the affordability of masses without supply constraints at given growth stage. Sustainability refers to environmental stability, technical feasibility and economic viability. Sustainable production stands for production of given quantities of goods of basic needs with minimum intermediate, labor and capital inputs, especially mineral and agricultural goods, and toxic materials in such ways as involve minimum damage to environment. Environmental stability refers to absence of natural and manmade disaster. The paper assumes labor not being a constraint to growth. Supply of indigenously produced intermediate goods, financial and physical capital constitutes constraint to growth. Indigenous production is emphasized due to past experience that import substitution led to more imports into India. The study treats growth of output of agro raw materials, mineral goods and other intermediate goods available domestically as constraints to growth of output of such industries as use such goods.
Paper uses input output, programming and econometric models. Input Output model is used to determine commodity and sector wise input requirements. Programming model uses these input requirements as constraints. Econometric models uses relatively longer time series of GDP and selected commodities for which data are available. IO tables for years 93-94, 98-99, 02-03 and 07-08.

Multi-Country and Multi-Sector Oligopolistic Market Modeling by Using the BRICs International Input-Output Table 2005

Topic: CGE and econometric input-output modeling III
Author: Tsubasa Shibata
Co-Authors: Takashi Yano

The purpose of this study is to explain the international trade by developing a multi-country/multi-sector model, seven countries and twenty sectors, which is built upon the BRICs International Input-Output Table 2005. This model is the static one which determines sectoral price and output simultaneously along the framework of input-output table. In order to describe the reality of the strategic interaction among firms, we incorporate the oligopolistic market. There are some homogenous goods in the domestic market and the differentiated seven goods produced by each country's firm in the world market. Along with this, this model realizes to theoretically calculate the number of firms. By using this model, we will simulate the impact of the international trade policy on the world economy.

Change in supply security footprints of critical metals induced by Japanese household consumption from 2005 to 2035 (for special session on MFA and IO model)

Topic: Material flow/stock analysis in input-output modelling II
Author: Yosuke Shigetomi
Co-Authors: Keisuke Nansai, Susumu Tohno

With expansion of electronics for hybrid vehicle and IT products, the demand of critical metals including rare earth metals has been increasing. These metals are strongly related to not only usefulness of today's our life styles but also new energy technologies such as solar power, wind power for a low carbon society in the future. It is reported that, in terms of life cycle assessment of the whole of nation, household consumption is the most important factor on environmental burdens in developed countries, however, there is few study analyzing the metal consumption from the viewpoint of household consumption similarly to the previous studies focusing on greenhouse gases

(GHG) emissions and energy consumption.

This study detected the global material flows of critical metals directly and indirectly caused by Japanese household consumption with a global link input-output model (GLIO) and international material flow data. The target metals here are neodymium, cobalt and platinum whose demands will be expected to increase with the further expansion of new energy technologies. The detected global material flows are called here material flow footprints (MFFs) of the household consumption. Multiplying MFFs by the risk factor of each country involved in the MFFs yielded supply security footprints of household consumption. We calculated the supply security footprints in 2005 and then forecasted them in 2035 taking into account an aging society with fewer children coming to Japan in the near future. We considered six household types with age of household head (20s, 30s, 40s, 50s, 60s, 70s and older) and estimated respective annual expenditures by disaggregating the household sector defined as a single sector in Japanese input-output table into the six household sectors with the national household statistic, and then calibrated them with mathematical programming to be consisted with the annual expenditure of each commodity written in Japanese input-output table.

As a result, from 2005 to 2035, the trends in the MFF of neodymium by the age group of household head of the household show that remarkable reductions occur in the 20s and 30s, while rapidly boost occur in the 70s and older. The difference of MFF between reductions by 20s and 30s and increasing by 60s and 70s and older during the period is nearly same, which is slightly higher the MFF of the latter households than by the former ones. Thus, changing the number of older households with the aging society can be considered to offset the reductions achieved by younger households. As a whole volume, the MFF was estimated to be 712.8 t / y in 2005, and then fall, ultimately decline to 627.3 t / y in 2035. This change rate is about 12% below 2005 under the demographic change. This implies that ongoing of the aging society with fewer children in Japan can make the MFF of neodymium derived from Japanese household consumption reduce. The results of the supply security footprints by household types will be presented at the conference.

Global Structural Change and Its Implication for CO2 Emissions

Topic: Environmental input-output modeling II
Author: Kayoko Shironitta
Co-Authors: Shigemi Kagawa, Keisuke Nansai, Shunsuke Okamoto, Sangwon Suh

Recent studies using multi-regional input-output (MRIO) models focused on the increasing role of international trade in global CO2 emissions. Under the decreasing cost of international trade and increasing vertical specialization, however, the global economy is increasingly operating as a single entity, and the emphasis on international trade may misdirect attention to the symptoms from the causes of global changes and their implications for CO2 emissions. In this study, we used a two-tier approach to analyze the role of underlying drivers in global CO2 emission changes over the last two decades. First, we aggregated the World Input-Output Database (WIOD) into a single-region global input-output (SGIO) model and decomposed the changes in global CO2 emissions over the last two decades into underlying changes in (1) population, per capita consumption (2) volume and (3) composition (in both, distinguishing between low-, mid-, and high-income countries), (4) global economic structure, (5) energy intensity of production, and (6) carbon intensity of energy use. Structural decomposition analysis (SDA) was used to quantify the contributions by these underlying drivers to the changes in CO2 emissions. Second, major drivers identified using SGIO were further decomposed into more detailed, regional-level changes using WIOD. Our analysis highlights the importance of global-level changes such as the growing middle class and global economic structural change for explaining changes in global CO2 emissions.

Identifying the hindrance to increased trade flow between India and Bangladesh

Topic: CGE and Econometric Input-Output Modeling
Author: Chandrima Sikdar

In their bilateral trade, India and Bangladesh have always have been natural markets for each other. But issues related to this bilateral trade have been quite a few and hence there have been much attempt time and again at addressing these issues from both the sides. Given this backdrop the present study uses a CGE analysis to assess the prospect of a FTA between the two economies by considering alternative scenario of trade liberalization. To do this some assumptions of the standard CGE model are altered to capture the economic structure in these countries. The results of this exercise suggest that an FTA between the countries will not only increase the bilateral trade but will also fetch welfare gain to both parties. Further to this, the paper provides an assessment of the non tariff barriers to this bilateral trade flow using an augmented model of trade and suggests that removal of some of these barriers may go a long way in strengthening this bilateral trade flow.

Land, energy, and carbon embodied in international trade: Evidences from CREEA model

Topic: The EXIOBASE Global MRIO database – new insights developed in the projects CREEA and DESIRE (Compiling and Refining Environmental Accounts / Development of a System of Indicators for a Resource Efficient Europe)
Author: Moana Simas
Co-Authors: Edgar G. Hertwich, Richard Wood

In times when manufacture stages are increasingly spreading among different regions, tracing environmental impacts of consumed products demands supply chain analyses beyond national boundaries. Cleaner production, renewable energy sources, and increasing energy and material efficiency can be reduced or even offset by the increasing outsourcing of energy-intensive stages of manufacture to countries without greenhouse gas (GHG) emissions mitigation targets. These impacts can be even further magnified if production shifts to countries with carbon-intensive energy mix or less energy-efficient technologies – in this case, emissions would not only be reallocated, but could even increase. Discussions on carbon leakage have been gaining strength for the last years. This problem lies in the growth of emissions somewhere else due to climate change mitigation regulations in Annex 1 countries. Triggered by discussions on emissions responsibility and the role of international trade of goods and services in climate change mitigation, extended multi-regional input-output (MRIO) models have been increasingly used for consumption-based analysis. We use a fully integrated MRIO model to calculate national production- and consumption-based footprints of international trade, in order to identify carbon embodied in traded goods and services. We compare both energy and non-energy GHG emissions per capita in production and consumption, and identify main flows of land, energy and carbon embodied in trade. We identify the flows in disaggregated products and in categories related to ultimate services consumption: shelter, construction, food, clothing, mobility, manufactured products, services, and trade.
This paper is part of a case study for CREEA (Compiling and Refining Environmental and Economic Accounts), a FP7 project which will deliver an MRIO comprising 43 countries (27 European Union (EU) countries and 16 non-EU) plus the rest of the world disaggregated in five major regions (Africa, Asia and Pacific, Middle East, Latin America and the Caribbean, and rest of Europe). Trade flows comprise 163 industries and 200 products, plus seven final demand categories. Environmental extensions include 15 land use categories, energy and non-energy related emissions, and high level of detail for energy supply and use in 69 energy carriers.

Inter- Industry Linkages and the clustering of innovative activities: Framework for Indian Economy and National Innovation Policy

Topic: Input-output analysis for policy making III
Author: Manoj Kumar Singh

The relationship between economic linkages and innovative linkages is examined and a theoretical framework to determine the clustering of innovative interactions in Indian economy is recommended by using innovation interactions matrices and input output analysis. An empirical analysis has been made by identifying Innovative linkages in various industries in Indian economy and the policy responses recommended vis-à-vis the structural and institutional approaches to economic growth and development.

The questions to be answered in this paper happen to be:

1.Whether Innovations cluster in part of the economic space ? (Schumpeter,1937)
2.Whether varied linkages in everyday economic life tend to favor innovative linkages and clusters?(Aitken 1985)
3.Innovative clusters and linkages may contribute to increase the division of labor (Smithian hypothesis)

The methodology includes the innovation interaction matrices by identifying innovative activities in a sample of 27 industries in the Indian economy and mapping it with the Input Output data,released by the CSO (Central Statistical Organisation) .

The study will answer the following :

1.How does the Indian economy impact the innovative activity?
2.What is the structure of innovative interactions in Indian Economy?Who are the leading suppliers and users of the Innovative activities?
3.Where in the Indian Economy innovative activities are likely to happen?
4.How can the Indian innovation policy embed cluster competencies & direct cluster dynamics to promote innovative activities?

Impact of Infrastructure Investment on Quality of Job Creation: Closed Input-Output Analysis for Indian States

Topic: Effects of Infrastructure Investments
Author: Anushree Sinha
Co-Authors: Rajesh Jaiswal, Avantika Prabhakar

The major objectives of this study include understanding the role of key infrastructure sectors such as roads and buildings as well as canal irrigation construction in the economies of two Indian states (Gujarat and West Bengal), to examine their potential in generating employment and to analyse the quality of employment generated. This is carried out by using an economy-wide analysis to develop a set of employment multipliers (direct, indirect, and induced) for select infrastructure construction sectors (national highways/urban roads, rural roads, buildings and irrigation canals) in Gujarat and West Bengal. The focus is on analysing job creation and growth potential of the “new” infrastructure sectors. The multipliers are developed by using input-output models that are derived after constructing the state input-output (IO) tables with sixteen basic sectors plus four new infrastructure

construction sectors for the year 2009-10 for the two states. The regional/state IO tables are prepared using a hybrid method on the focussed construction sectors surveyed in the two states together with secondary data use and expert knowledge collected from both national and local levels.

The infrastructure sector has vast potential to drive growth. Developing countries, including India, are investing substantially in this sector to achieve full growth potential. The Planning Commission of India is aiming at a total outlay of Rs 51.46 trillion in the infrastructure sector during the 12th Five-year Plan (2012-17). Development of roads has been the most critical driver of India's physical infrastructural growth in recent years. India already has one of the largest road networks in the world, aggregating to around 3.34 million km. The National Highways Development Project (NHDP), the largest highway project ever undertaken by the country, is being implemented by the National Highway Authority of India (NHAI). In 2009-10, the National Highways Authority of India was able to build highways at an average of 1372 km/day (India Infrastructure Report, 2012). Gujarat (being an advanced economy) and West Bengal (being less developed) were chosen for the study as it was felt that the analysis would bring into prominence the vast contrasts present in their economic structures as well as within India as a whole. Gujarat is located on the western most part of India and its Gross State Domestic Product (GSDP) at factor cost at current prices in 2009-10 has been estimated at Rs. 4,293.56 billion as against Rs. 3,677.45 billion in 2008-09, showing a growth of around 16.8 per cent during 2009-10. The share of Gujarat state for the year 2009-10 at current prices in Gross Domestic Product at the all India level works out to 7.0 per cent. Gujarat has undergone many changes since its inception and has gained traction in industrialisation in recent years. West Bengal, located on the east, is the sixth largest economy in the country and is one of the most densely populated states. It is traditionally an agrarian economy with more than 70 per cent of the population living in rural areas. Policies adopted here are more labour friendly. During 2011-12 the rate of growth of per capita income in the state was 6.21 per cent. The study shows that open multipliers for the two states are quite similar but taking induced effects from a closed IO analysis including households into the framework marks a clear difference between West Bengal and Gujarat (West Bengal having the higher multipliers). This induced effect is important for policy considerations, specifically for government bodies pushing employment-related policies such as the Ministry of Labour. Law-makers do not necessarily consider the induced effects of a change due to an investment in a certain sector. At most, the immediate effect on jobs and output is perceived and the extra effect generated through households is ignored as that is not explicit. To provide a more realistic picture of the possible outcome of alternative investment plans, this paper places considerable emphasis on the induced multiplier effects on employment by gender and type (formal and informal). The simulations carried with alternative scenarios show that the buildings sector generates the maximum employment but this is due to the already large share of this sector within the infrastructure sector. Multiplier analysis on the other hand shows that rural roads construction in Gujarat and irrigation canal construction in West Bengal have the highest employment multipliers. Also, in all simulations, informal employment generation is much higher than formal employment generation.

Gravity Models, Interregional Input-Output, and Trade in Value Added: A New Approach Applied to Brazil Internal and International Trade

Topic: Global Value Chain Analysis
Author: Jean Marc SIROEN
Co-Authors: Joaquim Jose Martins Guilhoto, Ayçıl YÜCER

Gravity Models, Interregional Input-Output, and Trade in Value Added: A New Approach Applied to Brazil Internal and International Trade
Acil Yücer, Joaquim Guilhoto, Jean-Marc Siroen,

(i) Under the light of the recent debate on “supply chains” or “trade in tasks”, the traditional measure of trade in gross value terms is increasingly questioned and, in order to find the “real origin” and the “final destination” of the exported value-added, Input-Output (I-O) methods are frequently used nowadays. In 2013, OECD and WTO have published new results of Trade in Value-Added (TiVA) based on I-O methodology. However, empirical works are still based on the traditional measures in gross terms and the gravity models continue to estimate the trade structure in terms of bilateral gross exports. Will results be different for different determinants of trade (GDP, distance, etc.) if the analysis substitutes an analysis in terms of local value added exported? This paper proposes a re-estimation of the gravity model for the exports of each Brazilian state with a comparison between a gross and a value-added measure of trade.

(ii) Exports in value-added are estimated from the Brazilian inter-state input-output system for 27 regions (26 states and the Federal District) for the year 2008. Using the information available in the Brazilian System of National Accounts (IBGE, 2010), we could estimate an input-output system for Brazil for 2008 based closely on the Brazilian input-output systems released by the IBGE. The estimated national input-output system was then used as the basis to estimate the inter-state system for Brazil based on the methodology presented in Guilhoto et al. (2010). The inter-state IO system makes it possible to decompose the states’ gross exports into their value-added through the domestic supply chain and points the “origin” state of the exported value-added (Yücer & alii, 2014).
And finally, we estimated the structure of Brazilian states’ exports with to the rest of the world with a database on the exports of 27 states with 81 countries in 2008 in value-added terms. In order to analyze Brazilian states’ trade structure with the rest of the world and the impact of states’ characteristics, we have then estimated a gravity model, taking into account the more recent econometrical methods and the suggestions about the adaptability of the gravity model to the measure of international trade in value-added (Baldwin and Taglioni, 2011). Different models, specification and methods of estimation (OLS, PPML) are used for compare the results when we estimate the exports in gross or in value-added terms.

(iii) At first glance, results seem quite similar between the two measures, what is not so surprising because at the aggregated level, Brazil exports mainly primary products with a high share of domestic value-added. However, we find some interesting differences concerning the role of the distance on bilateral exports, which can contribute to resolve one economic puzzle, the high and amazing negative impact of distance on trade.
This paper is one the first that proposes a new specification of gravity models with the use of bilateral trade in value added and, to our knowledge, the first one applied to a regional level.

Baldwin, R., & Taglioni D. (2011), Gravity Chains Estimating Bilateral Trade Flows When Parts and Components Trade is Important, NBER Working Paper 16672, January.
Guilhoto, J. J., & Filho, U. A. (2005). Estimação da Matriz Insumo-Produto a Partir de Dados Preliminares das Contas Nacionais. Economia Aplicada, 9(2), pp. 277-299.

Guilhoto, J. J., & Filho, U. A. (2010). Estimação da Matriz Insumo-Produto Utilizando Dados Preliminares das Contas Nacionais: Aplicação e Análise de Indicadores Econômicos para o Brasil em 2005. Economia & Tecnologia. UFPR/TECPAR, 6(23), pp. 53-62.
IBGE. (2010). Sistema de Contas Nacionais Brasil: 2004-2008. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística – IBGE.
Yücer, A., Guilhoto, J., & Siroën, J.-M. (2014), Internal and International Vertical Specialization of Brazilian states– An Input-Output analysis, Revue d’Economie Politique, forthcoming.

Implementation of ESA 2010/SNA 2008 Into Czech Input-Output Tables

Topic: Supply, Use and IO Tables: Future challenges in the SNA 2008/ESA 2010 (II)
Author: Jaroslav Sixta
Co-Authors: Petr Musil, Martina Šimková

The paper deals with the implementation of new national accounts’ standards ESA 2010 and SNA 2008 into Czech input-output tables. The revision of EU member states’ national accounts is planned for 2014 and since September 2014 all published figures should be based on the new methodology. Input-output tables are significantly affected by major methodical changes such as processing in foreign trade, capitalisation of expenditures on research and development and military assets. We joined the changes from the methodology with significant improvements of recording services in foreign trade, mainly resident and nor-resident purchases. All changes are implemented into supply and use tables and finally reflected in symmetric input-output tables. Deflation techniques have to be altered in order to follow changes in methodology and provide reliable time series in constant prices. Unfortunately, the changes given by the new or updated methodology are rather important and it means that input coefficients are affected significantly.

Multinational enterprises in multi-regional input output analysis

Topic: Methodological aspects of input-output analysis IV
Author: Andrew Skelton

Global multi-regional input-output (GMRIO) models have become indispensable tools for the value-added analysis of international trade and the consumption-based re-attribution of remote environmental impacts. The concept of global supply chains underlies both these areas of research: a 'new wave of globalisation' has seen the disintegration of production processes across national borders as enterprises have strategically outsourced and offshored parts of their business. With 80% of world trade estimated to involve multinational enterprises – either through intra-firm trade or international sourcing and marketing – and growing recognition that certain 'lead' enterprises govern extended international supply networks – either through collaborative relationships or by exerting power over captive suppliers, there is a pressing need to move from analysis at an aggregate industry-level to a more disaggregate enterprise-level. In response, this paper asks: can multinational enterprises be sensibly characterised within GMRIO models.
A methodological approach, based on a stochastic disaggregation technique, is proposed for incorporating enterprises into a GMRIO model. In addition to reflecting the scale and structure of the world's leading companies, the approach deals with uncertainty introduced by incomplete information. As outside observers we are unlikely to know the true input-output structure of a given enterprise, but using Monte Carlo simulation and knowledge of the meta-constraints imposed by the original input-output data we can start to explore the probable role of large companies in the global economy. Further, by creating a framework whereby multiple enterprises can be simultaneously

incorporated into the GMRIO system, double-counting issues can also be investigated. For example, simply summing individual enterprise carbon footprints risks double-counting a portion of emissions as the enterprises in question may fall within one another's supply chain. Finally, the description of methodological steps taken is supplemented with numerical experiments that aim to highlight the advantages, limitations and possible extensions of the overall approach.

Exploring input-output data through network visualisation and analytics

Topic:
Author: Andrew Skelton
Co-Authors: Scott John Kelly

It has long been known that input-output tables can be interpreted as networks: regional industries and final demand categories take the form of nodes while inter-industry transactions and final purchases characterise edges between these nodes. By extension, we propose the application of modern network visualisation tools and techniques to the increasingly complex input-output models that are now available. Our motivations are threefold: data checking – does the data look right? are there things that jump out as being counter-intuitive or just plain wrong?; exploratory data analysis – what are the big trends? can less obvious trends be drawn out?; and, communication/impact – this is what my model 'looks' like, isn't it attractive?
This agenda is pursued in two directions. First, using force-directed algorithms, we visualise how the global economy has changed over recent decades by drawing on the WIOD and EORA time-series datasets. By adjusting what various network attributes represent (e.g., node size, label size, edge thickness, colours, etc.) and through the use of filtering techniques, different aspects of the underlying data are uncovered, including industry- and region-specific trends. By pinning network nodes in geographic space according to a world map, an alternative set of visualisations are produced. In addition to the purely visual aspects of this work, network analytics (node degree, centrality, edge criticality, etc.) are used to further scrutinise the input-output data. Second, we present networks drawn from a recently constructed enterprise-level dataset consisting of 600 of the world's leading companies and over 3,000 reported inter-enterprise transactions. In turn, this network is interpreted as a large inter-enterprise input-output model and fundamental input-output analytics performed. We conclude by mapping out a research agenda for the further integration of input-output analysis and network analysis.

Intertemporal Structural Change for the convenient Economic Policy variables through the MM approach

Topic: Structural change and dynamics III
Author: Claudio Socci
Co-Authors: Maurizio Ciaschini, Rosita Pretaroli, Francesca Severini

Economic policies against fluctuation have required great care in the last decade. In particular, the selection of economic policy objectives are becoming more complex and the use of economic policy instruments must be consistent with more composite economic policy target. These two different aspects, on which the economic policy design is based, are crucial in determining effective economic policy but alike it is of a great importance that studies focus on how economic policy design may be affected by endogenous forces of modern economy. Indeed both the amount of the funds devoted to the economic policy and its distribution between the policy tools strongly depend on the interconnection the production activities as among industries process and Institutional

Sectors.
The relevance and the intensity of these relations, that emerge in the creation of the income, drives the research to improve and specify the economic policy program until to elaborate fine tuning policies characterized by small modifications that are endogenously suggested by the behavioural patterns of the economy. Such maneuvers require the economic policy control to be twice verified with respect to: i) the stability of the production rules along with the absence of economic structural break; ii) the convenient composition of the economic policy instrument used to achieve the economic policy objectives. In this paper an effort is made to verify, for the US economy, the production system stability that contributes to achieve the medium term economic policy target. What is more the paper aims to observe the difference of the economic control variable composition from its convenient structure that is endogenously suggested by the economic system. The convenient structures for the economic policy control are identified through the Macro Multiplier (MM) approach and the elaboration is based on the series of the U.S. I-O tables for the years 2000-2011. In the first part the paper presents a quantitative analysis closely related to the U.S. economy that focuses on the trend of the leontevian multipliers with the aim to investigate the stability of multipliers and consequently the stability of technical coefficients in order to support the relevance of the economic policy instruments and their possible maneuverability. In particular, it is crucial to understand how economic policies modelled over the years deviate from the composition that at the same time could be considered convenient for the economy. In the second part the paper investigates the problem of a crucial importance regarding the instruments of the economic policy and the possibility to use a fixed rule to determine the tools (within dynamic) or by mean of a flexibility process that might generates, in some cases, some problems of inconsistency. Moreover, an effort is made to determine the composition of the convenient tool of the economic policy, its convenient path and how its observed performance can be separated from a path dependent.

keywords: Intertemporal Macro Multiplier analysis, Fine tuning policy, I-O analysis.
JEL classification:C67, D31, D57, R15.

Anticipating Impacts of Future Agricultural Production in Africa Using Global Physical and Payment Networks

Topic: Addressing Resource Challenges in a Globalized Economy II
Author: Nathaniel Paul Springer

Previous work (Springer and Duchin 2013) quantifies increased agricultural production and resource use to accommodate population growth and enriched diets in developing countries in 2050. This work also shows Africa emerging as a key region of production and exports given its large remaining availability of land and water resources and its high potential for increased agricultural yields. Projected global trade networks are therefore also quite different under the 2050 scenarios compared to the 2000 baseline. In this paper, we apply Duchin and Levine's Absorbing Markov Chain (AMC) method to calculate the physical networks and payment networks for a baseline scenario in the year 2000 and for the 2050 scenarios that correspond to the surge in agricultural production in Africa. We also examine the extent to which wages of agricultural workers in Africa could increase if they benefit from a portion of the scarcity rents on land and water used in agricultural production.

Integrating emissions transfers into international and national policy-making

Topic: Consumption-Based Carbon Policies and IO Modeling
Author: Marco Springmann

Interregional emissions transfers provide a lens on the emissions responsibilities that are driven by the import and consumption demands of a region. Emissions transfers can undermine climate policies in two ways. First, they can undermine the stringency of emissions-reduction targets as regions with emissions-reduction targets can import emissions-intensive products from non-regulating countries. Second, they can affect the distribution of emissions-reduction burden within a regulating region as subregions which are net importers of emissions bear a lower reduction burden than net exporting ones when viewed from a consumption perspective.

The presentation discusses potential policy options for integrating emissions transfers into international and national climate policies. A multiregional computable general equilibrium model of the world economy is used to analyse the environmental and economic impacts of three policy options on the international level: adjusting domestic emissions-reduction targets for emissions transfers, oﬀsetting emissions transfers by financing emissions reductions in the emissions-exporting regions, and implementing border carbon adjustments, i.e., using tariffs and subsidies to adjust import and export prices of goods in proportion to their carbon content. The results indicate that connecting emissions transfers to international offset responsibilities is the most promising option from an environmental and economic perspective and may provide another rationale for international climate ﬁnance.

The national application focuses on China and the economic impacts of distributing China's national emissions-reduction target among its provinces. A computable general equilibrium model with subnational detail is used to analyse four options for allocating the provincial reduction burden: a production-based approach, a consumption-based approach, a shared-responsibility approach, and a national emissions-trading approach with consumption-based allocation of emissions allowances. The results indicate that an emissions-trading system with consumption-based allowance allocation combines economic efficiency with distributional equity better than the regional alternative options. The presentation closes by discussing distributional preferences and the implications for international burden-sharing approaches.

The Italian experience for estimating a regional production table.

Topic: Input-Output Accounts and Statistics
Author: Carmela Squarcio
Co-Authors: Sandra Maresca

The present work shows preliminary results currently reached in Italy and related to the estimation of the table of production at sub-national level starting from the same basic information used for the construction of that at national level. The methodological approach used is substantially in line with that adopted at the national level, and the information base consists in the structural business surveys conducted annually by the National Institute of Statistics: business accounts surveys and industrial production survey. This information base, available at regional level, allows to distribute the output of each sector between the different kind of productions, principal and secondary, and thus to obtain an estimate of the matrix of production according to a simplified scheme compared to that provided at national level with regards to the level of disaggregation by industry and product. Although the case study presented relates to the table of production for Veneto Region, the

approach followed has laid the methodological framework for its applicability for all Italian Regions. The compilation of the table of production is the first step for the implementation of the Supply and Use tables at regional level and at the same time it is binding for any subsequent development focused on a detailed depiction and analysis of the economic system at regional level.
In this regard an additional line of research for the production of official statistics is dedicated. It concerns the development of the Italian Tourism Satellite Account, released for the first time in 2012 by the Italian National Institute of Statistics at national level. Our next aim is to develop a regional Italian TSA, by the means of the contribution of a regional table production.

Exploring resource efficiency through individual supply chains - precision and accuracy in analysing the impacts of apparel

Topic: Environmental input-output modeling III
Author: Konstantin Stadler
Co-Authors: Richard Wood

The European Union considers resource efficiency as one of the fundamental characteristics of a sustainable and inclusive growth.
Environmental extended multi regional input output tables (EE MRIOs) have emerged as useful tools to analyse resource use and environmental impacts across international supply chains.

The EE MRIO assembled during the fp7 EU project CREEA (Compiling and Refining Environmental and Economic Accounts) - EXIOBASE 2.0 - has been released in March 2014.
It provides the first major update of the EXIOPOL/EXIOBASE 1.0 EE MRIO.
EXIOBASE 2.0 exhibits a consistent sector classification of 163 industries / 200 products with more than 300 environmental extensions.
All countries of the European Union plus 16 major economies are included in the database. The remaining countries have been aggregated into five distinct rest of the world regions.

The high level of detail of EXIOBASE 2.0 provide a unique possibility to investigate the impacts of products which exhibit a globally dispersed supply chain.
However, the question remains if such an investigation could also be conducted using a more aggregated system.
We exemplify this by analysing the impacts caused by EU final clothing demand in countries outside Europe.

In the case of the EU, the production of clothes occur to a large extend outside Europe, especially Asia.
In fact, apparels are one of the most important exports of many developing countries in terms of value added. However, the production is also connected to a variety of undesirable environmental impacts along the supply chain.
In the last years public attention mainly focused on the social implications of this production.
Here we estimate the amount and source of embodied low skilled labor in EU apparel imports and how this is correlated with various environmental impacts.
By comparing the original results with those obtained from various aggregated systems we analyse in which cases the use of a simplified EE MRIO can be justified.

This study illustrates if the high level of detail provided by CREEA/EXIOBASE 2.0 and associated projects can be utilised to investigate resource efficiency of key product groups for the European Union taking into account multiple environmental impacts.

A Methodology for Constructing Time Series of Input-Output Accounts based on the uniform classification (Russian Experience)

Topic: Input-Output Accounts and Statistics
Author: Elena Alekseevna Staritsyna
Co-Authors: Eduard Filaretovich Baranov, Igor Alexandrovich Kim, Dmitri Piontkovski

Time series of Input-Output (IO) Accounts at current and constant prices are widely applied to economic studies of the dynamics and structure in many countries. For these purposes IO accounts have to adhere to a uniform nomenclature of products and economic activities in accordance with international standards.
After 2004 there was a break in the annual construction of Russian IO accounts. This was due to the transition of national statistics to the OKVED (All-Russian Classifier of Activities) and OKPD (All-Russian classifier of Products by Activity) classifications that are harmonized with the CPA and NACE rev. 1. Construction of benchmark IO accounts based on new classifications for 2011 will be completed at the end of 2015.
We have the opportunity to reconstruct a time series of comparable IO accounts based on the new classifications, because the development of national accounts and improvement of information, accumulation of methodological developments and experience in formulating expert assessments of IO Accounts.
Work on the reconstruction of the time series of IO Accounts has been underway in National Research University Higher School of Economics (NRU HSE) since 2010. The starting time point and the last year for which there is required information for this procedure was chosen as 2003.
Our methodology is based on international standards of SNA including IO accounts as well as mathematical modeling of inter-industry research. As part of work for 2010-2013, we developed a methodology for transformation of IO accounts for 2003 from the Soviet classifications into the new classifications. We also construct the Use table of domestic goods and services at basic prices, the Use table of imports at basic prices, table of transport margins, table of trade margins, table of net taxes on products, as well as the use table at purchasers' prices on the NACE/OKPD basis as the sum of all listed tables.
When constructing these accounts, we identified a lack of numerical values for the correspondence tables and matching between national accounts totals and column and row totals of transformed IO accounts for 2003. An iterative method of reconstruction of IO accounts from Soviet classifications to the OKVED an OKPD classifications has been developed and applied.
To date, we developed the algorithm of constructing time series of IO accounts based on the new classifications for 2004 and subsequent year on the basis of transformed IO accounts for 2003. A time series of IO accounts (consisting of listed above tables) at current prices as well as Use table of goods and services at basic prices at previous years prices have been developed.
This research provides the basis for refinement of the methodology for constructing IO accounts and retrospective restatement of these time series for more detailed nomenclature of economic activities and the types of goods and services after the official publication the benchmark IO accounts for 2011.

Collateral Imbalances in Intra-European Trade? Accounting for the Differences between Gross and Value Added Trade Balances

Topic: Global Value Chain Analysis
Author: Robert Stehrer

One of the main stylised facts that has emerged from the recent literature on global value chains is that bilateral trade imbalances in gross terms can diﬀer substantially from those measured in value
added terms. However, the factors underlying the extent and sign of the diﬀerences between the two
measures have so far not been investigated. Here, we propose a novel decomposition of bilateral gross
trade balances that accounts for the diﬀerences between gross and value added concepts. The bilateral
analysis contributes conceptually to the literature on double counting in trade by identifying the trade ﬂow in which value added is actually recorded for the ﬁrst time in international trade statistics. We
apply our decomposition framework to the development of intra-EU27 trade balances from 1995 to 2011 and show that a growing share of intra-EU bilateral trade balances is due to demand in countries
other than the two direct trading partners. The latter accounted for 25% of the total variance of intra-EU gross bilateral trade balances in 2011, which marks a considerable rise from 3% in 1995. A structural decomposition analysis indicates that this evolution was especially due to the rising importance of international production sharing.

Global value chains and the cost of protection

Topic: Trade, global value chains and foreign direct investment: measurement issues and impact evaluation
Author: Susan F Stone

Integrated Industry-Level Production Account for the United States: Intellectual Property Products and the 2007 NAICS

Topic: Structural change and dynamics III
Author: Erich H. Strassner
Co-Authors: Matthew Russell

Integrated Industry-Level Production Account for the United States: Intellectual Property Products and the 2007 NAICS

Steven Rosenthal, Matthew Russell, Jon D. Samuels, Erich H. Strassner, Lisa Usher

December 31, 2013

Abstract

Ongoing structural change in the U.S. economy due, in part, to globalization, the spread of information and communications technology, and the Great Recession, has reinforced the need for an up-to-date decomposition of aggregate GDP to industry-level sources of growth. This approach, typically labeled “KLEMS” accounts has been developing at an accelerating rate within the international community and has garnered significant attention in recent years. Partly in response, the U.S. Bureau of Economic Analysis and the U.S. Bureau of Labor Statistics collaborated to introduce an integrated industry-level production account for the United States, spanning the years 1998-2010 (Fleck, Rosenthal, Russell, Strassner and Usher 2012). In this paper, we update the integrated industry-level production account through 2012 in order to incorporate the results and methodological changes of the 2013 comprehensive revision of the U.S. national income and product accounts, the 2007 benchmark input-output account, and the times series of integrated GDP by industry and annual input-output accounts for the United States. We trace the sources of U.S. economic growth and productivity using our updated account, and provide new estimates of the contributions of expanded investments in intangible capital—intellectual property products, including research and development and entertainment, artistic, and literary originals.

Socioeconomic consumption modelling in an input-output model

Topic: Input-Output Analysis for Policy Making
Author: Britta Stöver
Co-Authors: Thomas Drosdowski, Marc Ingo Wolter

Household specific consumption behavior is of interest for various social and economic problems. The “Poverty Report” of the Federal government of Germany for example uses the information on consumption expenditures by different household types in the context of social participation. Other fields that can be addressed are poverty consumption, sustainable consumption, effects of income redistribution, implications of demographic change etc. These subjects play a major role in the project soeb3 (Sozioökonomische Berichterstattung, Reporting on socioeconomic development, http://www.soeb.de/en/) that aims at analyzing the social development in Germany.
To quantify the consequences of changes in the household composition the macro-econometric input-output model INFORGE has to be extended by socioeconomic information. This will be done by including a household specific consumption module into the model environment. The paper will describe the methodology, structure and functioning of the consumption module disaggregated by socioeconomic characteristics.
The applied method takes into account the availability of data and combines a macroeconomic model with micro-data based information. The socioeconomic consumption module includes 70 consumption purposes and 42 income components from the German Household Budget Survey (Einkommens- und Verbrauchsstichprobe (EVS)). The social dimensions are social status linked with household size. Changes in income estimated in the macro-economic input-output model induce changes in the household specific income composition. These changes affect the households’ consumption expenditures. Summing up the newly calculated consumption expenditures by social characteristics the aggregate consumption by purpose can again be reintegrated into the macroeconomic model. The resulting economic consequences can then be traced and quantified.
One significant result is the possibility to model complex socioeconomic interactions with limited data availability. The applied method provides the opportunity to integrate socio-economic structures in an economic model environment and thus reveal the inter-related macroeconomic effects of social characteristics. The combination of micro-based and macro data enhance the original model output. Finally, the implications of demographic change, social transformation and/or changes in income can be analyzed.

Alternative approach to measure the emissions embodied in value added and resulting income-based emissions

Topic: Environmental Input-Output Modeling
Author: Bin Su
Co-Authors: Beng Wah Ang

With growing concern about global warming, much effort has been put on quantifying the responsibilities of each country/region’s carbon emissions in fighting against climate change. Currently, both direct and indirect responsibility measures have been advocated. Direct measure is the production-based responsibility, which is simple and easy to calculate, but not able to account for the “carbon leakage” issues. Indirect measures using environmentally-extended input-output framework include the consumption-based and income-based responsibilities. They are linked with upstream and downstream embodied emission flows. The upstream embodied emission flow is connected with the final demands using the Leontief model, while the downstream embodied emission flow is connected with value added using the Ghosh model. The results of indirect measures are found to be useful to implement direct measure in global and regional climate policy makings. This paper gives an alternative approach to measure the emissions embodied in value added using the Leontief model and resulting income-based responsibility. An illustrative example and empirical studies using the data of the Asian countries will be presented. Implications of different approaches to measure the embodied emissions in value added will also be discussed.

OPTIMAL COMMODITY TAXATION IN THE SECOND BEST SITUATION

Topic: CGE and Econometric Input-Output Modeling
Author: Guntur - Sugiyarto

The standard theory on optimal commodity taxation is incomplete in the sense that it ignores the fact that taxation -as a system- is attributed with administrative and other costs. The costs could be very large even for the theoretically optimum one. In addition, its application requires estimations of preference and elasticities that can be unobtainable for developing countries. The common practice of applying a uniform rate across sectors does not always produce better results. Therefore, in the second best situation it might be useful to focus on minimising the taxation costs.

A CGE model representative to the Indonesian economy is developed to examine this issue by first assessing the marginal excess burden and welfare costs of the existing commodity taxation. The latter is then used as a basis for designing an optimal allocation of commodity taxation. The results suggest that most sectors have already been over taxed and the existing tax system is not an efficient way for collecting revenue. The proposed commodity tax rates will give much better results for the economy, welfare and even for the government revenue.

ECONOMIC AND POVERTY IMPACTS OF INCREASING OIL PRICES AND SUGGESTED POLICY RESPONSE: The Case for Indonesia

Topic: CGE and Econometric Input-Output Modeling
Author: Guntur - Sugiyarto

The global economy must face crucial challenge on how to cope with soaring oil prices, which have been on a precipitous increase in the last years. The high rise has alarmed countries around the world, especially the net oil importers, since continuing oil price hikes tend to lower economic growth and reduce productivity by increasing production costs and overall domestic prices. It is also likely to increase poverty by reducing income level of the poor and increasing their consumption costs.
A computable general equilibrium model calibrated to the Indonesian economy and linked to household survey data was developed in this study to shed light on the issue. The results indicate that higher oil prices generate adverse effects to the economy and poverty, working through their impacts on sectoral outputs, household incomes, and consumer prices. Moreover, the welfare effects across different household groups vary considerably, calling for careful policy responses. The government cash transfer program introduced subsequently to mitigate the adverse effects on the poor shows a sensible but modest result. More comprehensive policies are therefore needed to really help the poor to cope with adverse effects and to improve their conditions. This includes incorporating better and progressive targeting and positive conditionalities to maximize the programs benefits and to make the poor taking actions closer to the social optimum that will benefit the economy in the long term.

Module Environmental LCA: Session 4

Topic: Environmental LCA
Author: Sangwon Suh

Environmental LCA

Module Environmental LCA: Session 3

Topic: Environmental LCA
Author: Sangwon Suh

Environmental LCA

Module Environmental LCA: Session 2

Topic: Environmental LCA
Author: Sangwon Suh

Environmental LCA

Module Environmental LCA: Session 1

Topic: Environmental LCA
Author: Sangwon Suh

Environmental LCA

Decompose tourism carbon footprint using the Environmental Extended Input-Output Model

Topic: Environmental input-output modeling XI
Author: Ya-Yen Sun
Co-Authors: Wen-Huei Chang

International travel has grown into more than 1 billion cross boarder trips a year firsts time in 2012 and is estimated to reach to 1.8 billion by 2030. While destinations have eagerly embarked on the tourism development, one of the pressing issues is to evaluate and recognize the scale of tourism carbon footprint in order to account for the environmental externality of this economic driver. Empirical tourism carbon applications range from the national analysis to regional scales, and from targeting a single industry to a specific visitor segment. However, most of the existing literature has only focused on a snapshot of tourism consumption and carbon emissions, generally for one year period, without analyzing and decomposing long-term carbon emission for its sources.

The purpose of this study is to apply the decomposition analysis within the framework of Environmental Extended Input-Output Model (EEIO) as a macro-economic approach to study the underlying factors for driving the tourism GHG emission from 2001 to 2011 in Taiwan. Changes of tourism carbon footprint over the past decade will be decomposed into 5 individual factors: 1) final demand changes, 2) energy requirement per dollar output, 3) the composition of different energy required in the production, 4) the energy converting ratio with respect to GHG emission, and 5) domestic production structure. This research aims to contribute to a better understanding of the economic driver, energy structure, and technological adjustment with respect to tourism development.

Comparative analysis of methods for assessing the value transfer in the formation of the final product

Topic: Methodological aspects of input-output analysis I
Author: Iskander Vilevich Syrtlanov
Co-Authors: Alsu Sayapova

The aim of the research is a comparative analysis of different methods for assessing the transfer of the value added in the formation of the final product. This issue in terms of content is reduced to estimating degree of participation of domestic and foreign manufacturers in products' value creation for consumption, capital formation and exports. An overview of methods to solve this problem on the basis of input-output model is made in the paper. Russian researchers' approaches are also considered among the methods for assessing the transfer of value added. Review of methods is accompanied with an identification of degree of difference between the approaches based on mathematical analysis of Leontief inverse properties for NIOTs and WIOTs. Empirical calculations are also performed to assess the value added structure of the final domestic products through

national and world input-output tables in the example of Russia. International input-output model is based on the WIOD database. These calculations require appropriate modification of Russian input-output tables. Symmetric input-output tables are published as product-by-product tables in Russia, while WIOTs are published as industry-by-industry tables in WIOD. Therefore, the Russian symmetric tables are converted to the industry-by-industry form. Analysis of the results of calculations performed by various methods, allows us to decompose the cost of the final product on the value added produced by groups of domestic and foreign manufacturers.
The calculations show that the dependence on import of Russian final consumption and accumulation is significantly higher than assumed in assessing it on a gross basis. It should also be mentioned that imports into intermediate consumption is undeniably more profitable for the country than imports for the needs of final consumption.

Keywords: National and World Input-Output Tables (NIOT & WIOT), Leontief inverse, value added.

Sector relatedness, revealed comparative advantages and production in global value chains

Topic: Global Value Chain Analysis
Author: Jennifer Taborda

State of the art
A new way of thinking for a new economy is emerging; from a traditional approach based on final goods and services, to a global chain approach based on specific tasks and trade of intermediate goods. Previous research has exploited trade data to identify patterns of product relatedness based on common required capabilities that could guide diversification strategies. In particular (Hidalgo, Klinger et al. 2007) build a product space that relies on the fact that revealed comparative advantages are a reflection of a country pool of capabilities. However, in the 21st century trade, goods and services are the combination of capabilities and resources from different countries; making export data an imperfect measure of country capabilities (Baldwin 2008). Input-Output (I-O) tables are instead, a rich source of information to understand the position of countries on the international supply and value added chain. Measures of vertical specialization (Hummels, Ishii et al. 2001) and value added exports (Johnson and Noguera 2012) can be used to understand specialization patterns and returns appropriation along the global value chain (GVC).

Research gap
In a globalized world, it would be necessary to identify the contribution in value added of countries in the production of specific goods and services to indirectly measure existent capabilities. Taking advantage of linked input- output data, this paper contributes on that direction, exploring structural differences between the network of sectors based on gross exports, and the sector space based on value added exports. Such distinctions are informative about the way that potential patterns of related diversification are understood under diverse production modes at the global level. This paper takes an empirical approach to understand how important is the gap between trade statistics and domestic value added content of exports, and what is the effect of such gap on both, perceived competitiveness of countries; and sector relatedness.

Theoretical arguments
As the position along the GVC has an strategic value, changes from low value added segments to high value added ones characterize growth patterns were returns appropriation are higher. In the modern production system, were countries are specialized in particular tasks; both the kind of products and the stage in which a country adds value, are important to identify paths for

diversification and growth. Under this perspective, structural change is constrained both by the capabilities accumulated by a country, and the pattern of linkages among products.

Method
Recently released World Input Output Database (WIOD) covering 40 countries plus an estimation of the rest of the world, and 35 sectors for the period 1995-2009 is used to carry a full decomposition of gross exports in value added components, following (Koopman and Wang, 2012) methodology. Balassa Reveal Comparative Advantage (RCA) indexes at sector- country level constitute the basis of sector networks, where sector linkages are cosine similarities based on value added exports. Network structure analysis is implemented, to understand similarities and differences between sector networks based on gross and value added exports. Patterns of connectivity, centrality and assortativity are studied from 1995 to 2009.

Results
Obtained results reveal an increase in production fragmentation at the country level during 1995 - 2009. The increased specialization of countries in specific segments of the GVC translates into a higher gap between gross and value added exports. The gap is considerably higher in manufacturing activities than in other sectors. However, such gap is not uniformly translated into differences in the distribution of revealed comparative advantages among countries. At the sector level a high degree of heterogeneity among sectors indicate that ordinal differences between both indexes can be quite high at lower levels of disaggregation.
There are important structural differences between network of sectors based on gross exports and the network of sectors based on value added. In particular, more opportunities for diversification in the short term are found if distances among sectors are based on value added instead than on gross exports. However, long term diversification opportunities are more constrained under a value added exports view. Diversification paths in the 21th century trade are more specialized than those existent under the 20th century view. Choosing the right diversification path seems now even more important than before.

Business Cycles and Sustainable Economic Development

Topic: Structural change and dynamics
Author: Milagros Dones Tacero

Business Cycles and Sustainable Economic Development
Milagros Dones Tacero
Universidad Autónoma de Madrid
(milagros.dones@uam.es)
María Isabel Heredero
Universidad Autónoma de Madrid
(maribel.heredero@uam.es)
Santos M. Ruesga
Universidad Autónoma de Madrid
(ruesga@uam.es)

The aim of this research is to analyze the behavior of the Spanish economy during the last decade. During the last ten years, the Spanish economy has experienced several stages of unstable economic growth due to different causes, highlighting the economic structural change, the tax system, the demography, the labor market performance, the compositions of production costs and the technological development. Adding to these factors also is important to consider the trade

openness process carried out by the economic actors during this period, which has not only been focused on the European area, but also in different economic areas around the world.
For achieve our research objective, we have elaborated homogeneous Input-Output Tables (IOT) for the years 2000, 2005 and 2007, which incorporates the SEC new system, from the Supply and Use Tables provided by the National Institute of Statistics (INE). Although we are conscious about the versatility that it has an empirical model created to make predictions and simulations about the Spanish economic performance in the future, we have estimated a symmetrical IOT for the years 2010 and 2015, to obtain an instrument which is able to analyze the impact that the different policy making decisions could generate to reach a balanced and sustained economic growth.
In sum, this research aims to analyze the different stages of economic growth for the Spanish economy, trying to obtain a better knowledge about the characteristics of its business cycles, and creates a new instrumental support for the decisions made by policy makers', about adopting economic measures for improve the macroeconomic performance of the Spanish economy.

The Impact of Exchange Rate on Exports Goods Price Indices in Iran

Topic: Input-output analysis for policy making
Author: Vahid Taghinezhad Omran
Co-Authors: Nooraddin Sharify, Tahereh Valinejad Ahangaree

Exchange rate is an important factor that influences on price index of exports of a country. It affects the exports goods' prices indices through different ways. The imported intermediate commodity is one of the important ways in which the change in exchange rate affects on exports goods price of a country. This paper uses an input-output model to investigate the impact of exchange rate volatility on exports goods price indices in Iran. To this end, the symmetric commodity by commodity input-output table of Iran for the year 2010 is employed as database of the research. The results of the research demonstrate, since the exporters transmit a large percentage of the exchange rate change to the domestic currency price of exports to maintain their competitiveness and market share abroad, the exchange rate influences on exports price indices incompletely.
Keywords: Exchange Rate Volatility, Exports Goods Price Indices, Input-Output Model, Iran

Connecting new and old data to GVC concepts

Topic: Global Value Chain Analysis
Author: Daria Taglioni

The objective of this paper is to offer a framework for characterizing and quantifying as precisely as possible countries' participation in GVCs though the knowledge obtained by linking the new indicators obtained through World input-output modelling and databases with more traditional indicators and other data sources. Such knowledge is intended to contribute to improved policy towards raising countries' competitiveness and facilitating countries' integration into global markets. Specifically, this paper connects the new information on GVCs derived from IO measures to key GVC concepts in a systematic way, providing a theoretical framework for interpreting the evidence. This allows a better understanding of countries' integration and linkages within GVCs, even in those cases where not all available datasets cover a particular economy. While we now have much better data to analyze a country's participation in global value chains, the current challenges are two. First, not all of the most useful measures are available for all countries, and existing GVC databases are presented at a fairly aggregate level from the standpoint of goods and services. Second, no single database in isolation (not even the most sophisticated and recent ones) gives a complete,

policy-actionable overview of countries participation in GVCs. By connecting GVC concepts to existing data, this paper proposes therefore strategies for leveraging and triangulating among both traditional and newer data used in GVC analysis, so to move a step further both in the direction of analyzing the GVC participation of smaller and poorer countries and in facilitating micro analysis of GVC participation with a more detailed product focus.

Environmental policy and consumer behavior under monetary budget and time constraint

Topic: Sustainable production and consumption I
Author: Koji TAKASE
Co-Authors: Yasushi Kondo

The economic growth during the last several decades has made consumers' living very convenient. This substantial change can be viewed primarily as the results of substitution of time with energy (Binswanger, 2001 Ecol. Econ.). For example, a lot of days can be saved by taking an express train instead of traveling hundreds kilometers on foot; one can reduce the number of times of grocery shopping if he or she has a refrigerator. It should thus be noticed that time-use aspects of consumer behavior should be properly taken into account, particularly for analyzing energy and environmental issues. Jalas (2002 JIE, 2005 Ecol. Econ.) and Druckman et al. (2012, Ecol. Econ.) are a few exceptional examples that have studied the consumers' time-use and its effects on the environment. However, they did not explicitly considered consumers' monetary budget.
With this background, we propose a consumer model in which monetary budget and time constraints are simultaneously considered as in Becker (1965, Econ. J.). The model consists of consumption "technologies," each of which is expressed as a set of goods and time necessary to achieve its purpose. We utilized the Japanese Time-Use Survey and Household Survey to develop our model that includes multiple consumption "technologies" to achieve particular purposes; for example, laundry modes (home washing and laundry shop) and transportation modes (private car and public transportation). Combining this consumer model with an environmentally extended input-output model, we constructed a linear program (LP) to minimize environmental emission. An optimal solution to the LP can be interpreted as a social outlook in terms of consumer behavior. Moreover, the shadow prices, or dual variables, for constraints representing environmental regulation can be used as indicators for evaluating the effectiveness of these regulations.

Assessing the estimation accuracy of LQ method for regionalization of input coefficients: a case study in Japan

Topic: Input-Output acccounts and statistics
Author: Kazuki Tamesue

A survey-based technique is regarded as a reliable method for constructing regional input-output tables; however, it requires huge amounts of time and money. On the other hand, a non-survey technique only requires existing statistics data, and its recent advances and developments are remarkable, especially in location quotient method. LQ method is found to be a useful and strong tool through some empirical studies, but more empirical evidences are needed to prove its efficiency. Furthermore, different behaviors of parameter δ of FLQ and AFLQ in existing researches also suggest that more applications and examinations should be carried out. The objective of the present study is to compare accuracies of estimated regional input-output tables with various LQ techniques using nine Japanese regions data. Moreover, the obtained optimum

values of parameter δ in FLQ and AFLQ are examined to have insight into further development of regionalization techniques of IO tables.

Global Productive Efficiency from a Input-Output framework.

Topic: Productivity and efficiency analysis II
Author: Miguel-Angel Tarancon
Co-Authors: María-Jesús Gutiérrez-Pedrero

The main goal of this paper is to build an index that quantifies the global efficiency level of a country's economic system, identifying those elements of its productive structure on which the efficiency depends. For this aim, we apply a methodology based on the Takayama's dynamic model and the concept of largest real eigenvalue of a real square matrix (Perron-Frobenius Theorem) which, in this case, is the technical coefficients matrix. Starting from that, we propose a global efficiency index and analyze the eigenvector associated to the largest eigenvalue, in order to identify the patterns of sectoral specialization that lead to a given global efficiency level. Also, we applied a sensitivity analysis in order to map the transactions between sectors (e. g., technical coefficients) which are more relevant for increasing the efficiency since a change in their magnitudes involves major variations in the efficiency index. This methodology is applied to the case of the productive structure of several European countries. The global productive efficiency index provides four groups of countries with a different degree of global efficiency. Further, we find out that the productive sectors which support a gain of efficiency are Business, Transport and Storage, Wholesale and Retail Trade, Financing Activities, Chemistry, Basic Metals, Mining and Quarrying, and Electricity. Important specific transactions between sectors are also provided from the sensitivity analysis.

Distance-based shared responsibility

Topic: Methodological aspects of input-output analysis II
Author: Umed Temurshoev
Co-Authors: Ronald E Miller

In operationalizing Gallego and Lenzen's (2005) upstream (downstream) shared producer-consumer (producer-worker) responsibility input-output model, Lenzen et al. (2007) (resp. Lenzen, 2008) proposed pegging the required upstream (downstream) sharing parameters to value added (final demand) because this approximates the extent of producers' control over the production recipe (sales structure). In this paper we consider alternative distance-based choices for the sharing parameters. For the upstream responsibility we suggest approximating the sharing parameters by the inverse of sectors' average distance from their primary inputs providers in the input demand chain (Miller and Temurshoev, 2013). The reasoning for such a choice coincides with that of Lenzen et al. (2007): if the distance between producer i and its primary inputs suppliers is small, then it must be the case that producer i adds significant value to the product in its production process compared to another producer k who is positioned much farther away from its providers of primary inputs. This implies that producer i has higher influence over production processes, hence should be levied with larger responsibility share. Similarly, for the downstream responsibility we propose as a proxy of the sharing parameters the inverse of sectors' average distance to their final users in the output supply chain (Antras et al., 2012). The argument for such a choice is that the shorter the distance between producer i and its final users, the larger proportion of its output it sells to final demand, hence the higher influence it has over sales and advertising, and subsequently it should be levied with a larger share of downstream responsibility, which is also consistent with Lenzen's (2008) reasoning. In our

empirical exercises we compare the distance-based shared responsibility outcomes with those where the sharing parameters are pegged to value added and final demand, and also analyze the sensitivity of the results with respect to aggregation.

Sources of the changes in global industrial energy use, 1995-2009

Topic: Structural change and dynamics III
Author: Umed Temurshoev
Co-Authors: Luis Delgado sancho

In the period 1995-2009 global industrial gross energy use (IGEU) has increased by 145.8 million terajoules (TJ), which makes 28.4% of its 1995 level. Using data from the WIOD dataset (www.wiod.org) and full first-order structural decomposition analysis (SDA), we study the driving forces behind such changes at annual intervals. We find that at the world level the changes in per capita demand (consumption) volume have contributed most to the cumulative growth of IGEU (+2.21×108 TJ or +151.9%). Smaller positive contributions are found for population growth (+0.74×108 TJ or +51.0%) and changes in technology (+0.39×108 TJ or +26.6%). These effects were partly offset by changes in energy intensity (-1.82×108 TJ or -125.0%) and changes in the structure of demand (-0.07×108 TJ or -4.6%). However, not surprisingly these overall effects hide a lot of country-specific heterogeneities. For example, while the overall technology effect has positively contributed to the change in the world IGEU, its regional contributions are found to be both negative with the largest effects (in percentage of the overall technology effect) of -54.5% for USA, -14.3% for Russia, -11.3% for Japan; -6.2% for Italy, -4.8% for the UK and -3.8% for Australia, and positive with the largest effects of +98.2% for the rest of the world region, +73.1% for China, +11.8% for Taiwan, +4.4% for France, +4.3% for Germany, +4.1% for Spain, and +4.0% for Korea. To get further insights on such issues as substitution between energy products and country responsibility, we also analyze the sources of changes in global IGEU for different types of energy and region-specific final demands.

Experience in implementing the SNA 2008 in Mexico's SUT and IOT for the benchmark year 2008

Topic: Supply, Use and IO Tables: Future challenges in the SNA 2008/ESA 2010 (II)
Author: Jose Teran-Vargas

This paper presents the National Institute of Statistics and Geography (INEGI) experience in the compilation of the Supply and Use Table (SUT) and Input-Output Table (IOT) for the benchmark year 2008 published in the mid-2013 and the implementation of the international recommendations of the SNA 2008, the G-20 and the IMF ROSC for Mexico. Local law established to shorten the switch of the benchmark to 5 years; on the other side there have been efforts to keep publishing the annual series, short-term and regional indicators of Mexican SNA based on the later benchmark year 2003, to improve the availability of data for the users of official statistics.
In order to implement the international recommendations, the SUT and IOT compilation was performed by direct methods with a high level of detail in the process of balance, also different sources of information were added.
The new annual, short-term and regional macroeconomic indicators series of the Mexican SNA have as a benchmark the SUT and IOT for 2008; time series horizons have been extended with the benchmark year to 2003 in the annual series, and up to 1993 in the Quarterly series. It has also been established a calendar with two annuals versions to accelerate the availability of statistics of

the Mexican SNA in an environment of a policy of revision of figures in INEGI. Mexico has also share information classified into KLEMS project.
In accordance to North American International Trade Agreement (NAFTA), Mexico shares the North American Industrial Classification System (NAICS) as Activity Classification, so that SUT and IOT 2008 has been integrated and published with the NAICS 2007 version and for the first time published at 4 digit level of disaggregation giving 262 Products and Activities.
From the open 58 items set in the 44 SNA 2008 recommendations, 37 were implemented in the benchmark 2008 year. The subjects are related to Non Financial Assets, Government and Public Sector, Financial Services, Rest of the World, Ancillaries Activities, Informal and Illegal Activities.
In addition, an Industry-by-industry input-output table was elaborated. This table aims to help National Statistics' users to monitor economic activities with secondary products. As concluding remark, the institutional effort to improve the database's quality and quantity is part of the exchange experience and the future challenges to improve the SUT and IOT into the framework of international recommendations.

Value Added regional growth decomposition: structural and demand-led regional economic growth

Topic: Global Value Chain Analysis
Author: Mark Thissen

Economic growth is equivalent with producing and selling more or better products and services. This economic growth can be due to economic growth and demand from other regions, or it can be due to internal factors raising productivity. These internal factors that increase a region's competitiveness result in a gain in the market share of this region and these are the most policy relevant as they can be influenced by the region itself. As a result a region may implement excellent regional policies and relatively outperform many other regions while having an overall negative growth rate. The reason is that this negative growth rate may be caused by a collapse in the demand for goods and services from other regions. The economic crisis in Europe that started with the banking crisis in 2008 and still continues into 2014 is an illustration of these negative interregional demand spillovers. We therefore have to distinguish between regional growth that is the result of an increase in demand in other parts of the world, and growth that is due to a change in structural factors strengthening a region‘s competitiveness and increasing its productivity.
The here proposed Value Added growth decomposition is based on the PBL multiregional Supply and Use tables (Thissen et al., 2013) and gives these region specific sources of economic growth. Furthermore, it will give a ranking of those regions that outperform other regions and give a precise number by how much they outperform these other regions. Naturally, it also gives a ranking of regions that perform worse than the region under investigation. The performance of all regions is also analyzed on different product markets and different geographically markets. This gives the information needed to evaluate and monitor regional policies. The methodology allows to evaluate regional policies in either a worldwide economic boom or recession. It is an ideal framework for policy evaluation and monitoring of regional economic progress. Every year a region can analyse its performance vis-à-vis other regions and see which regions performed better and which regions performed worse. The decomposition can be done on the aggregate or sector level. The whole world can be included in the decomposition and it can be shown whether a European region loses competitiveness to, for instance, China or the US. It can even be shown in what geographical markets these losses occur.

Is family seasonal consumption good for the environment? Unraveling the monthly local and international trade using a MRIO

Topic: CGE and econometric input-output modeling IV
Author: Maria A. Tobarra-Gomez
Co-Authors: Maria Angeles Cadarso, Nuria Gomez, Luis A. Lopez

Proximity and in-season consumption of fruits and vegetables has been suggested as a joint solution for consumers to lead the economy into a more sustainable development. Local consumption reduces food miles and consequent transport emissions. In-season consumption avoids or reduces the use of greenhouses, the demand for electricity to heat them, or the need for imports with their embodied virtual carbon. Nevertheless, when we import food products that are in-season in their country of origin, their reduced embodied emissions can compensate for emissions from transport and therefore, decrease the carbon footprint (CF) of these agricultural products. In this paper we develop a new seasonal input-output model to calculate and compare the CF of local in-season products and of imported fruits and vegetables.
Firstly, we identify monthly trade (by country of origin and transport mode) for different agricultural products to classify it in terms of seasonality. From those data we can derive the seasonal component of final demand and technical coefficients as a basis for a hybrid input-output model. Secondly, we calculate food miles and emissions from that trade. Depending on the season, each region exports some excess agricultural products and imports others both as inputs and final demand, according to its industry's requirements and consumers' preferences. Thirdly, we estimate a balance of avoided emissions of agricultural products that incorporates the seasonal component, to evaluate whether trade of out-of-season products reduces or increases the households' CF. In other words, we can analyze if a change towards seasonal consumption (for example, reducing imported oranges in August in exchange of an increased consumption of local melons in Spain) could contribute to reduce the families' CF or it would even increase it. We apply this idea to a multiregional model for Spain in 2009 with other six regions in the world, using the WIOD database together with information from the Spanish Customs Office.

Education Services and Reallocation of Government Expenditure

Topic: Input-output analysis for policy making II
Author: Lorenzo Toffoli
Co-Authors: Maurizio Ciaschini, Claudio Socci

Education Services and Reallocation of Government Expenditure

Maurizio Ciaschini*, Claudio Socci*, Lorenzo Toffoli+1

*Department of Economics and Law, University of Macerata
+Department of Economics and Finance, Catholic University of Milan

Expenditure on education, beyond being a source of short run changes in output and GDP levels, can contribute to the accumulation of human capital, which is of critical importance in determining a country productive capacity and productivity. General government indicators reveal that in 2010 U.S. National defense expenditure as a percentage of GDP is three times higher than the OECD average and that only Israel exhibits a higher value. Moreover, National defense expenditure accounts for sixteen percent of total outlays in the 2014 proposed U.S. Federal budget. Recent studies on the

U.S. economy suggest that a relocation of Federal funds from investments in National defense to the education system can have an overall positive or recessive impact on output and GDP levels depending on the way in which the funds reinvested are distributed between capital and current expenditure. Furthermore, short run effects can be accompanied by medium and long run benefits due to the enhanced productivity stemming from efficient expenditure on education. The aim of this paper is to design and evaluate balanced budget policies that foster the U.S. education system by relocating Federal funds from investments in National defense to the education system. National defense expenditure in capital account is reduced by one percent over a period of five years. The education policies proposed differ in the way in which saved funds are reallocated. Funds can be expended in capital or current account, can be partitioned between public and private education industries, between market and non-market education services or by education level. The research first focuses on changes in income of the institutional sectors, then compares output changes occurring in education and non-education spheres. Finally, on the basis of the changes in the production of human-capital related services, the increase in the stock of human capital is estimated by a cost-based approach. A suitable framework for conducting this kind of analysis is a dynamic extended multisectoral model where final consumption depends on the institutional sectors income level of the previous period and investments react to institutional sectors income changes. While traditional multisectoral analysis is purely static and doesn't deal with the complexity of evolving systems, the introduction of structural relationships that link variables belonging to different time periods allows for multisectoral economic dynamics. The model proposed is based on the Social Accounting Matrix (SAM) approach and the economic process is represented as a circular flow. In this framework it is possible to account for direct, indirect and induced effects produced by the policy proposed.

Keywords: Expenditure education, Government expenditure, Dynamic extended multisectoral model
JEL codes: I28, C67, E16, E62

1Corresponding author. E-mail address: lorenzo.toffoli@unicatt.it. Dipartimento di Economia e Finanza, Università Cattolica del Sacro Cuore, Largo A. Gemelli 1, 20123 Milano, Italy.

Revisiting the “Great Trade Collapse” with the Endogenous Input-Choice Model

Topic: World input-output modeling and databases II
Author: Ichiro Tokutsu
Co-Authors: Mika Saito

It is an established argument that more than 70 percent of the sharp increase in trade elasticity, measured as the ratio of the real growth rate of world trade over that of world GDP, during the "Great Trade Collapse" can be explained by demand spillovers via vertical specialization trade. We revisit the role of vertical specialization and supply constraints during this period with new data and new model, which allow us to resolve some of the conceptual and data limitations faced by previous studies.

Based on the recently released consistent and comprehensive input-output tables (WIOD), we find that demand factors explain only 40 percent of the actual trade elasticity. Moreover, the factor decomposition reveals that the actual change of input demand is mostly attributed to change of input coefficients rather than synchronized change to output decrease. A sharp decline in demand for durables and heavy reliance of the durable sectors on global supply chains are often highlighted in explaining the "Great Trade collapse." Changes in input coefficient, however, took place least in the

durable sectors. These evidences lead us to a different model that assumes flexible input coefficients.

The price-endogenized input-choice model developed in this study does reasonably well in predicting total supply and total demand patterns. Even with flexible input coefficient, however, the model still does poorly in replicating domestic versus foreign demand composition of inputs trade; it systematically underestimates the decline in imported demand and overestimates that of domestic demand. We analyze this systematic gap between model predictions and actual observations from the viewpoint of export price premium based on the right upward sloped supply curve within the framework of input-output analysis. It is found that the export price premium, though varies tremendously across sectors and countries, is about 4 percent on average.

Repercussion of Effects of Final Consumption on Production and Environmental Loads: Detailed Multi-regional Waste Input–Output Approach in the 47 Prefectures of Japan(for a Special Session)

Topic: Waste Input-Output Analysis
Author: Makiko Tsukui
Co-Authors: Ryoji Hasegawa, Shigemi Kagawa, Yasushi Kondo

Multi-regional input–output approaches (MR-IOA) have developed in response to the increasing need for analytical methods to empirically evaluate the economic benefits (production, employment, etc.) and environmental loads (CO2 emissions, waste generation, etc.) that have accompanied globalization. Many of the MR-IOA studies that have been conducted to date have examined trade-induced emissions (e.g., Peters and Hertwich, 2008). The next step is to investigate the interregional relationships that exist between regions or cities in different countries within the context of globalization and localization. However, despite the need for such detailed regional analyses, the lack of basic input-output databases has meant that the extent to which the amounts of wastes generated and greenhouse gasses produced are embodied in interregional trade are not well understood. The 2005 multi-regional waste input–output for the 47 prefectures of Japan has been used to perform detailed interregional analyses. The prefectures, which are the highest official administrative subdivisions in Japan, have populations that range from about 600,000 to 13 million people. In this study, we will clarify the effects of the final consumption in all 47 prefectures and discuss their interdependence in terms of production, waste generation, and landfill usage. These findings will enable us to develop policies that consider both the environmental burden within each prefecture and the waste-treatment efficiency of the entire country.

Trade reconciliation in MR EE IO – the approaches in EXIOPOL and CREEA

Topic: Supply, Use and IO Tables: Different approaches to reconcile world trade asymmetries (I)
Author: Arnold Tukker

Trade reconciliation in MR EE IO – the approaches in EXIOPOL and CREEA
IIOA conference, 14-18.07.2014

Arnold Tukker1,2,3
1 Centre of Environmental Sciences (CML), Leiden University
2 Netherlands Organisation for Applied Scientific Research, Delft, Netherlands
3 Norwegian University of Science and Technology, Industrial Ecology Program, Trondheim,

Norway

Abstract for a talk in the proposed Trade reconciliation session. More authors to be added in final paper
Abstract
TNO, CML, NTNU, Wirtschafstuniversität Wien and others created the Global MR EE IO EXIOBASE. A key problem in MR EE IO construction is the reconciliation of trade data and trade data in individual SUT/IOT tables. The EXIOPOL and CREEA projects have developed two approaches to deal with this issue.
The EXIOPOL project used a method developed by Maaike Bouwmeester and Jan Oosterhaven of RU Groningen which they summarized in Tukker et al. (2013) as follows. Using trade shares from trade statistics, the harmonized import use tables are spatially disaggregated into bilateral import use tables that specify the country of origin. In this way, per country, 42 bilateral import matrices are obtained. When considering the group of matrices with the same country of origin, the summation over the sectors and countries of destination should equal the exports as reported by the country of origin. There is however asymmetry caused by trade and transport margins, taxes less subsidies and statistical errors. First the total exports are re-scaled to match the overall total of the imports. The difference between the original export column and the re-scaled column is entered in the final table as a discrepancy column in order to maintain the original accounting identities. This discrepancy column does not distort the input coefficients of the ultimate IO model, which would have been the case if the total imports would have been re-scaled. Second, the information contained in the product structure of the exports vector is used to bi-proportionally adjust the import matrices to make them structurally consistent with the export data. The adjustment of the import matrices is favored over adjusting the export data as the latter are in the desired valuation. The difference between the original import table and the adjusted import table gives a crude estimation of the trade and transport margins involved in international trade . The information on origin and destination of the inputs used in production as recorded in the bilateral import use tables can be combined with the national supply tables to obtain an import-based Multi-Regional SUT.
One of the drawbacks of the method above, is that trade and transport margins are estimated from the difference between the implicit exports and the exports in a country SUT. In the context of the CREEA project, TNO developed an alternative approach that roughly works as follows:
• The import vector in country SUT is disaggregated into a matrix indicating country of origin, using trade shares from trade statistics. This is similar as above.
• For each bilateral trade flow, transport and insurance margins are estimated using international transport databases. Numbers should match imports and exports of transport and insurance services. This allows moving from imports in c.i.f. to imports in f.o.b. prices.
• The difference between implicit exports (f.o.b.) and exports in the SUT is calculated, both for all products together at global level, and per product in our database. We hence see which % mismatch exists between imports and exports for total trade, and for trade per product.
• We have two options to deal with the mismatch at product level:
o Not using the RoW as ‘dump’ of the differences, but to move the differences to changes in inventories, or showing them explicitly in a ‘statistical error’ column
o Use the RoW to absorb most of the differences. Since in extensive MR EE IOs the RoW is relatively small (5% of global GDP), this solution is however not always possible since it would distort the
• To come to a harmonized bilateral trade matrix, we use an optimization routine that allows slack in the trade shares (and in which we may vary the extent to which we use the RoW as ‘dump’). In this way, we make sure that trade shares are adapted in such a way that the mismatch at product level is minimized for each country.
The talk will in any case explain the two approaches in detail. If project budgets allows this, we may also show some practical examples of the differences in results the different methods give.

Multiplier effects of change in household spending in Europe

Topic: Productivity and efficiency analysis II
Author: Tetyana Anatoliivna Tyshchuk

The paper addresses the problem of cross country investigation of change in household consumption impact on macroeconomic aggregates. Taking change in household consumption as exogenous variables input-output-based and path-based multipliers are calculated for European economies. These multipliers measure the economies’ responses to change in households spending taking into the consideration direct, indirect and induced effects. Initial amount of household spending leads to change in demand for intermediate goods and services, which enables increase in output and value added and cause the multiplier indirect effects. The value added is transformed into the incomes of institutions which expend the domestic demand for consumer and investment goods and form the induced effect of change in consumption.
The benchmark analysis reveals that the calculated multipliers vary for different countries depending on the consumption patterns, inter-industry linkages and import-to-domestic proportion at the domestic market. The values, which measure the indirect and induced effects, differ cross the analyzed countries and depend on the output and income structure of economy. The calculated multipliers reflect the full effect of household income injection taking into consideration the changes which are generated on each round of impact.
The analysis is implemented for 18 European countries based on the WIOD, Eurostat data and data from national statistical agencies. The obtained results demonstrate quite strong dependence between the multipliers, GDR in purchasing power parity per capita and trade balance for the considered countries.

Construction of subnational multiregional Input-Output tables: The case of Germany's federal states.

Topic: Regional input-output modeling IV
Author: Johannes Többen

The construction of Multiregional Input-Output (MRIO) databases on the subnational level is considerably hampered by its significant cost in terms of manual labour and scarcity of data on regional industry- and household structures as well as interregional trade. The construction, therefore, often relies heavily on nonsurvey methods with questionable reliability. In order to improve data quality superior data can be used facing problems of heterogeneous classifications and possibly conflicting information.

In the case of the MRIO construction for Germany’s 16 federal states these issues are addressed as follows: The construction is based on a hybrid approach, which combines an initial estimate based on nonsurvey techniques with large amount of superior data. Regional industry cost- and household consumption structures are estimated from survey data. The estimation of interregional trade is based on transportations statistics in combination with regression analysis taking effects of distance and weight on value-to-ton ratios explicitly into account. The consolidation of the initial estimate and superior data is conducted using the Automated Integration System for Harmonized Accounts (AISHA), which allows the time saving and transparent integration of possibly conflicting data.

Regional economic impacts of the 2013 heavy flooding events in Germany

Topic: Input-Output Analysis of Desasters
Author: Johannes Többen
Co-Authors: Thomas Schröder, Hagen Schulte in den Baeumen

During May and June 2013 heavy rain caused disastrous flooding events in several countries of central Europe. For Germany's eastern and south-eastern federal states it has been the third 'flood of the century' since 1997. In the particularly affected states of Bayern, Sachsen and Sachsen-Anhalt alone damages are estimated at 6 billion euros, which is approximately in the order of 1% of gross regional product. In addition to these direct damages substantial impacts on regional economies not directly affected by the flooding event can be expected, due to the heavy dependence of modern economies on inter-regional trade.
In the current paper we account for the economic impacts of the recent flooding events on the economies of Germany's 16 federal states. Industry- and region-specific direct impacts are estimated from lost working hours due to the disaster. These direct damages to regional economic output capacities are then used to account for indirect economic impacts in other federal states using a new high-resolution model of the German subnational economy (MRIO) for disaster impact analysis.

Goods for processing: the case of Russia

Topic: Supply, Use and IO Tables: Future challenges in the SNA 2008/ESA 2010 (I)
Author: Natalia Ustinova
Co-Authors: Irina Masakova

The 2008 SNA has significantly changed the treatment of the goods sent for processing. Updated SNA recommends to apply net recording system (without imputing a change of ownership of goods) for measurement of goods for processing, making no difference between the goods for processing domestically and abroad.

In Russia processing of goods is widespread in many sectors of economy, especially in manufacture of petroleum, chemical products, basic precious metals and other non-ferrous metals. Feature of the Russian economy is the predominance of processing within the country where one enterprise sends raw materials for processing to another domestic entity.

Estimation of goods for processing domestically and abroad is complicated task for statisticians.

The paper is focused on the methodological and practical aspects of measurement of goods for processing in the frameworks of SUT. The paper describes existing and updated approach to estimation, data used for calculation, measurement steps and problems. There are some figures in the paper showing the scale and features of this economic phenomenon in Russia.

Goods for processing: the case of Russia

Topic: Global Value Chain Analysis
Author: Natalia Ustinova
Co-Authors: Irina Masakova

The 2008 SNA has significantly changed the treatment of the goods sent for processing. Updated SNA recommends to apply net recording system (without imputing a change of ownership of goods) for measurement of goods for processing, making no difference between the goods for processing domestically and abroad.

In Russia processing of goods is widespread in many sectors of economy, especially in manufacture of petroleum, chemical products, basic precious metals and other non-ferrous metals. Feature of the Russian economy is the predominance of processing within the country where one enterprise sends raw materials for processing to another domestic entity.

Estimation of goods for processing domestically and abroad is complicated task for statisticians.

The paper is focused on the methodological and practical aspects of measurement of goods for processing in the frameworks of SUT. The paper describes existing and updated approach to estimation, data used for calculation, measurement steps and problems. There are some figures in the paper showing the scale and features of this economic phenomenon in Russia.

INTERNATIONAL TRADE AND EMISSIONS: AN LONGITUDINAL INPUT-OUTPUT ANALYSIS

Topic: Environmental input-output modeling IX
Author: Vinicius de Almeida Vale
Co-Authors: Fernando Salgueiro Perobelli

Nowadays, an important debate in the international economies is the problem of greenhouse gas (GHG) emissions and climate change related. Discussions begin to gain the world with the signature of the Kyoto Protocol, December 1997, where an international agreement was reached to reduce global emissions to the atmosphere. Thus, in terms of CO2 emissions, the majority of European countries, including the European Union as a whole agreed to reduce such emissions.

However, in this context of mitigation, many controlling policies are based on reducing domestic emissions of greenhouse gases, which ignores, for example, CO2 emissions embodied in international trade flows. Thus, in order to reduce GHG emissions is necessary to investigate not only the major sources of emissions, but also the location and the sectors involved, i.e. the assignment of responsibilities for emissions as an important step.

Moreover, given sudden expansion and globalization of world economies, pollution embodied in trade flows becomes important for measurement of responsibilities, because the use of final goods and production inputs that a country need not necessarily produced by itself, leading to a growing concern about the problem of carbon leakage.

Thus, many studies have taken into consideration the estimated emissions embodied in international trade through, for example, the input-output analysis, where issues involving responsibility for GHG emissions and international trade are incorporated, giving focus to sectoral and interactions between countries in relation to CO2 emissions.

In this context, this paper seeks to make an empirical investigation on the responsibility for emissions and international trade. We use data from WIOD, where the data structure consists of Input-Output Tables (IOTs) for 40 countries (27 EU countries and 13 other selected countries) plus the “Rest of the World” (RoW) for the period 1995 to 2009. Furthermore, the production side is disaggregated into 35 productive sectors, i.e. shows the transactions between the 35 industries in 40 countries and the rest of the world and these industries for families, governments and users of capital goods for the same set of countries. Finally uses atmospheric emissions of CO2 for the same 40 countries selected and RoW and the same range of time and sectors of the input-output tables.

The overall aim is to measure emissions embodied in international trade and to analyze the interactions in terms of sectors and regional, from such countries. We propose the following specific aims: a) to observe, through CO2 emissions in international trade, if there is a concentration of emissions and if this behavior is maintained over the years (1995-2009), b) measure CO2 emissions embodied in production and consumption, c) measure the CO2 emissions embodied in exports and imports of each country and thus verify if the international trade has been used as a way to reduce emissions by countries, d) construction carbon balance for each country, and e) approach issues involving carbon leakage.

The methodology used involves input-output techniques for calculating carbon emissions embodied in international trade. Thus, aggregate indicators for different countries are obtained, such as coefficients of intensity of CO2 emissions, allowing classifying the country as intensive or not. Moreover, trade balances global CO2 emissions embodied in international trade are calculated for the 40 countries and the major net exporters and net importers of CO2 emissions in the world economy are identified, being able to show the extent to which the final demand of a country is responsible for emissions abroad, for example.

Moreover, these indicators represent the empirical basis for the discussion on the responsibility for emissions, being possible, for example, to make a discussion of responsibilities between producer and consumer countries for environmental impacts.

Finally, Miyazawa multipliers are calculated, a methodology that approach the issues of feedback loop between countries, through the decomposition of the Leontief inverse matrix in sub-matrices.

Tourism interactions and redistribution effects in the Balearic Islands: A SAM analysis

Topic: Input-Output Analysis of Tourism
Author: Elisabeth Valle
Co-Authors: Clemente Andrés Polo

This paper presents the first social accounting matrix of the Balearic Islands with several households. It has 62 accounts and the information provided is used to specify numerically three alternative models. The models provide new estimates of the weight of tourism in the BI economy. They also shed new light on the interactions among tourism oriented sectors and the rest of sectors and allow to quantify the redistribution effects of tourists’ expenditure. The SAM has been constructed by the authors ‘closing’ the 2004 input-output table with data from the Regional Accounts and other statistical sources. The analytical part of the paper uses three linear models defined by the appropriate partition of the matrix into endogenous and exogenous accounts. The results of the paper clearly indicate that the more encompassing models provide a fairer picture of tourism effects.

An evaluation of the impact of the new ESA rules for Goods for Processing and Merchanting on the Belgian SUT and IO tables for 2010.

Topic: Supply, Use and IO Tables: Future challenges in the SNA 2008/ESA 2010 (I)
Author: Bart Maria Jan Van den Cruyce

In the ESA 2010 goods flows related to processing are to be excluded from imports and exports, leaving only a net flow of a service corresponding to the processing fee. In contrast, merchanting services will now appear as trade margins and net exports of goods. In order to accurately determine import and export flows according to these new rules, different sources including international trade data on goods and services, annual accounts, industrial statistics and Structural Business Survey data have to be reconciled at the firm level.The paper and presentation will show and discuss the methodology applied and the quantified impact of both changes on the Belgian Supply and Use and IO table and on IO-multipliers.

The new struture of international trade: the participation and position of countries in global value chains.

Topic: International Trade
Author: Itzel Guadalupe Vázquez López
Co-Authors: Leobardo Enriquez Hernandez, Victor Antonio Romero Ramirez

The interdependence of countries due to trade has increased significantly because most countries incorporates parts or imported services, on the other hand, exports of any country incorporated a higher proportion of foreign value-added, namely, the proportion of inputs third-country domestic exports is increasingly, more and more products are made entirely in one country and increasingly on sales of product types include related services. As the aim of this study to examine the role and position of various countries in Global Value Chains (CGV) due to their impact on the global economy of today, the goods and services covered by the trade contain inputs can come from many different countries and traditional trade statistics incur a mistake to attribute the full transaction value of these products to the latest economy that invests in the production process. Using the rate of participation in global value chains allow us to know the extent to which a country's exports are integrated in international production networks. Using methodologies Dietzembacher, et. al. (2007) and Koopman, et. al. (2011), we proceed in the first case the methodology to calculate the sectorial composition of the countries within the Global Production Chain (CGP) and in the second case to calculate the matrix exports in value added at the sector and country, using the matrix of bilateral trade WIOD and the share of value added is calculated VAF foreign and domestic VAD incorporated in exports for all countries. In addition the position of a country is calculated within the CGV whether it is upstream or downstream yielding results that specialize in various stages of production.

A Comparative Kernel Structure of Mexico, Brazil and South Korea: A Pretopological Input-Output Analysis.

Topic: Emerging Developing Countries
Author: Fernando Vázquez-Bravo
Co-Authors: Enrique Gutierrez-Carreras, Ana Sofía Malagamba

The purpose of this paper is to perform a structural analysis of the fundamental (kernel) sectoral interdependence, in order to study the importance of the general economy structure in the

development of each country: Mexico, Brazil and South Korea. The years of the research are 1995 , 2001, 2008 due structural paralell changes in the three economies, notably in trade and financial liberalization. After the Indsutrialization by Substitution of Imports (ISI) process, these economies applied different trade policies that resulted in the protection of some key sectors that support the currently growth of Brazil and South Korea unlike what happened in Mexico.

This work is based upon the pretopological concepts of pseudoclosure and minimal closed subsets. Firstly, we will generate a binary transaction matrix with a specific Decision Rule. Secondly, we will seek different core structures of each economy with an economics-based Function Decision Rule using the concept of minimal closed subsets. Finally, we will compare each of the structures and identify critical sectors which determine the structural topology of the different economies.

The expected results will be that economic policy applied to modify the structural conformation of an economy is fundamental in the sucess of the development process in open trade developing countries.

Trade Redirection in Global Supply Chains

Topic: Vertical specialization and outsourcing II
Author: Paul J J Veenendaal

In global input-output models the global Leontief inverse links value added from a given source to its final sinks (where both sources and sinks are country-industry pairs). Rising globalization has raised the share of cross-border linkages between sources and sinks and thus gross trade is increasingly carrying value added to its final destination. Notwithstanding the rising literature on trade in value added the nature of this process is still ill-understood. The paper provides an interpretation of the processes operating beyond the global Leontief inverse and splits the process of value added accumulation from the source towards the sink into three different stages: from the source to the final output factory gate (via trade in intermediates), at the final output factory (in final output production) and at the sale of final output to foreign customers (via international transport). Unsurprisingly, the accumulation in the first and second stage is closely related to the forward and backward multiplier impact analysis in interregional input-output models.

Several conclusions emerge when the findings are confronted with those from the pioneering and some of the more recent studies on trade in value added. First, value added exports are often underestimated by excluding value added exports that return home. The exclusion is always incomplete however and thus does not seem to be useful. Second, decompositions that aim to fully decompose gross trade flows into value added trade flows are inappropriate and not useful. Third, vertical specialization measures based on value added trade generally exclude the domestic value added exports that are needed abroad to produce the intermediate imports for final output production at home and thus are incomplete.

The framework developed in the paper has useful applications. I include as examples: allocation of the difference in bilateral trade balance in gross and value added terms to net earnings or losses of specific third countries for the bilateral balances USA-China and USA-Germany; the identification of the major producer hubs, their major suppliers and their major customers in the global supply chains for electronics and other business services.

The SAM as a tool of economic data base architectural design. The case of Chile: 2008-2011

Topic: SAM applications
Author: José Orlando Venegas

The SAM primarily is an accounting framework. If SAM microdata base is exhaustive then SAM is a map of the economy. The practical consequence of this two assumption is the SAM give the best approach to design economic multidimensional data base. In this paper we demostrate that the two assumptions are realistic and prove that SAM is a robust data base model design. Demostration are based on the four SAMs for chilean economy covering from 2008 to 2011. Those SAMs replicate in a matricial way all of the chilean national accounts officially published. In order to present the full data and the architectural design a Microsoft Access data base is used. This tool is easy to apply for any SAM or national accounts of every country. Many practical consequences are derived from that. For example, the data base model can be used in any new initiative to build a SAM every where. The model allows to implement a robust intertemporal and international data base with historical SAMs. Also, gives the best approach to extend the data model from national accounts standard framework to satellite accounts.

The added value of combining a bottom up with a top down approach for assessing the environmental impact in a specific context such as space missions

Topic: Input-Output economics and industrial ecology - LCA analysis
Author: An Vercalsteren
Co-Authors: Luc Bierque, Katrien Boonen, Theo Geerken, Jorrit Leijting, Ann Van der Linden

In order to elaborate a methodological framework and database for space missions and to identify environmental hot spots from a life cycle perspective, the European Space Agency commissioned a consortium of VITO, Pré Consultants and QinetiQ to perform a Life Cycle assessment (LCA) of a satellite mission. The paper will discuss the bottlenecks and present the methodology applied in this specific context, illustrated by clear examples.
The assessment of the life cycle impacts of space missions is very challenging due to sector-specific characteristics, such as the use of special materials and the custom made components which have a much lower product output/overhead ratio compared to mass produced products. Furthermore, data collection on space missions can be rather difficult due to confidentiality issues and limited time availability to model a very complex life cycle. A specific pilot case on solar panels (domestic versus space-specific solar panels) was performed to better understand the challenges of applying LCA to space applications and to compare results of a bottom up (process-based LCA) with a top-down (IO) approach. Ultimately, the LCA model which we applied for the space mission uses a combination of physical and cost data in a so called hybrid LCA.

Another issue is the time-consuming nature of modelling the environmental impact of man-hours (services such as research) in high-tech contexts with LCA databases. On top, this approach still might cause an underestimation of the impacts. Therefore, the environmental impact of man-hours is in this case also modelled with IO data.

This study indicates that using only easily retrievable process-based data may lead to an underestimation of the environmental impact of a space mission. The hybrid LCA approach is a very useful and cost-efficient method for estimating environmental impacts from the space sector, as the

truncation errors in process-based LCA may be very high due to the complexity of the supply chains and the importance of services (man-hours). IO-databases are based on a top-down approach and thus include the whole supply chain. The combination of process-based LCA data on well-known materials and processes and IO (cost-based) data on the remaining materials and processes provides the best of two worlds: details and completeness.

Globalization and the European Crisis

Topic: Global Value Chain Analysis
Author: Bart Verspagen
Co-Authors: Jan Fagerberg

The European Economy is currently in a slump, the worst since the 1930s. It is the aim of this paper to investigate the causal factors behind this crisis. Although the European crisis is often seen as a consequence of the financial crisis that hit the capitalist world in 2007-8, this paper, which particularly focuses on the period leading up the crisis, argues that many of the problems that Europe faces today have long term roots and have to do with the fact that Europe consists of countries with quite different dynamics and capacities for adapting to changes in the global (and European) economic environment. We start by comparing Europe's growth performance to that of other parts of the world, and then consider some popular but arguably erroneous explanations of the present crisis. Subsequently, we delve into the development of the external balances of various European countries. This leads to the identification of three European "archetypes", characterized by different adaptability and performance, i.e., the North, the South and the East. We then proceed to explore the consequences of globalization and European economic integration for the economic performance of these archetypes. For this, we employ an input/output methodology aimed at decomposing the growth of GDP and the development of the trade balance in Europe and its global partners. It is demonstrated that the effects of globalization have been quite asymmetric between European countries, and that in particular the Southern countries have benefited very little if at all. Finally, we sum up the lessons from the analysis and consider the implications for policy. It is argued that what is needed is a European growth policy, properly adapted to the different capacities across Europe, and that places the welfare of the European population as a whole at the center.

Water energy nexus under globalization with the implications of trade policy

Topic: Environmental input-output modeling III
Author: Liyang Wan
Co-Authors: YONGKAI JIANG

Water and energy are interlinked, managing them in tandem offers potential for global-change adaptation. However, as conventional conceived the water-energy nexus primarily refers to the water and energy in resource use in production. Such as water footprint of electricity from hydropower on one hand and energy needed to secure water supply on the other hand. The production and consumption are linked through economic chains in an economy, where water and energy are discussed separately. Displacement of water and energy consumption comes about as embodied form in trade. Trade adjustment is regarded as a way to alleviate regional resource crisis in the face of the displacements of resource depletion. However, policies commonly focused on one single resource, lacking a comprehensive assessment of impacts for both resources. Since knowledge on how water and energy interact under the trade pattern can provide important information on resource utilization, it calls for the need to integrate both water and energy together

with their conflicting and synergistic interactions under specific policies. This paper establishes a multi-region input-output framework to quantify both water and energy embodied in global trade in differentiated trade scenarios under the corresponding policies, and whether regional scarcity of one resource will be jeopardized when policies only concerning about the other resource. At last, this paper seeks for the 'win-win' possibility of trade policy making to achieve both water and energy security.

Human Capital Embodied in China's International Trade

Topic: International Trade
Author: Huijuan Wang

International trade offers the opportunity for human capital flow across national borders. As the world's second largest trading nation, as the leader of world's most populous nation，the masses of cheap labour made great contributions to the economic development of our country. First, this paper presented a new model, called input-occupancy-output model with education classified employment. This model include employment matrix, which classified the human capital according to the level of education. Based on this model, this paper proposed the concept and calculation formula of human capital embodied in international trade. Secondly, this paper calculated the human capital embodied in import and export export and its structure in 2007. And using time-series this model form 1992 to 2005, this paper analyzed the human capital changing over a long period. According to the calculated results, our country has always been a net export country of embodied human capital.

Constructing a time series of Chinese multi-region input-output tables

Topic: Environmental input-output modeling X
Author: Yafei Wang
Co-Authors: Arne Geschke, Manfred Lenzen

Multi-region input-output (MRIO) tables have been acknowledged as a key tool at the forefront of environmental policy debates. However, several versions of Chinese sub-national multi-region (ChineseMRIO) tables lack harmonization with the aggregated regions and sectors and have less detailed trade information for years 1987, 1997, 2002 and 2007, resulting in limited applications of their use in environmental footprinting and life-cycle assessment, as well as driving forces analyses. A time series of environmentally extended MRIO tables for China's 30 provinces is developed. The innovative series is constructed using an Automated Integration System for Harmonised Accounts (AISHA) tool. First, it is available as a continuous time series of ChineseMRIO tables from 1997 to 2011. Second, it distinguishes 135 commodity sectors in combination with 185 countries in Eora MRIO database. Third, it provides updated information therefore significantly improving timeliness. Fourth, it integrates satellite accounts, including energy use, greenhouse gas emission, water, land use, and material use at the provincial level. These advances will dramatically improve the applications of ChineseMRIO tables for policy-makers and researchers.

The Arts and Cultural Production Satellite Account

Topic: Input-Output Analysis of Tourism
Author: David B. Wasshausen
Co-Authors: Paul Vincent Kern, Steven L Zemanek

The U.S. Bureau of Economic Analysis (BEA) and the National Endowment for the Arts (NEA) released, for the first time, prototype estimates December 5, 2013 from the new Arts and Cultural Production Satellite Account (ACPSA). In this satellite account, we used an input-output (I-O) framework to conduct an in‐depth analysis of the arts and cultural sector's contributions to current‐dollar gross domestic product (GDP).

Culture can be defined in a variety of ways to include language, traditions, beliefs, and values. For this new account, we defined arts and cultural production to be largely consistent with definitions used by the United Nations and the European Union. The I‐O framework provides the necessary tools to identify and then estimate the value of the "creative chain" associated with arts and cultural production. This chain captures the economic value as we move from the creation of a cultural product (composing a symphony) to its production (the performance being recorded in a studio), then the distribution (by various modes), and finally the consumption (by the listener). In this paper, we will explore the processes and methods used to identify and estimate the value of arts and cultural production, including key findings that enable us to quantify the impact of arts and culture on GDP for the first time.

Asymmetries in bilateral trade statistics: challenges in harmonising trade in goods and services for linking national I-O tables

Topic: Supply, Use and IO Tables: Different approaches to reconcile world trade asymmetries (II)
Author: Colin Webb
Co-Authors: Norihiko Yamano

We describe current and persistent asymmetries in reported international trade statistics and summarise methodologies we use to harmonise bilateral trade statistics with statistics reported under National Accounts / SUT frameworks. We explore the challenges involved in producing coherent bilateral trade estimates for the construction of an Inter-Country Input-Output (ICIO) model at a global level. We reconfirm that some of the sources of trade asymmetries that need to be considered include the treatment of confidential, unallocated, second hand and recycling products and that re-exporting and off-shoring trading activities can have a significant impact on the coherence of reported trade between partners. Important conceptual differences such as price valuation and non-residents' expenditures are also addressed.

An Inhomogeneous Approximation-and-Update Approach to Refine Multi-Regional Input-Output Tables

Topic: Input-Output analysis of disasters I
Author: Leonie Wenz
Co-Authors: Robert Bierkandt, Anders Levermann, Alexander Radebach, Jan Christoph Steckel, Sven Norman Willner

The potentially increasing intensity of extreme weather events may lead to severe damages on

global infrastructure. In order to use multi-regional input-output tables (MRIOT) for an analysis of these damages including the downstream effects of production and transport failure, the tables need to be more detailed both regionally and sectorally than most currently available global matrices.

Here we present a simple approximation-and-update practice to refine existing multi-regional input-output tables. Our basic idea for enlarging an MRIOT by certain subsectors or sub-regions is to find suitable weights that reflect their economic importance within the superordinate sector or region. These ratios can then be used to deduce their inputs and outputs. Particularly, the apportioning of economic flows does not need to be homogeneous. We argue that for many purposes a heterogeneous MRIOT allowing for uneven sectoral and regional detail is more convenient than aggregated data. The down-scaling procedure is complemented by an update algorithm. Once more information on an estimated flow is available, all associated flows are updated accordingly. The enlarged MRIOT thus becomes asymptotically accurate.

Embedded in the community data project Zeean (www.zeean.net) we apply this method to the refinement of the EORA World MRIO database.

Naturally, our algorithm just approaches an exact MRIO dataset and any investigation based on it has to be supplemented by an error analysis revealing potential misinterpretations. However, the refinement procedure will enable a more precise analysis of damages on global supply chains and their economic, environmental and social implications.

Consumption-based carbon policies from a top-down and a bottom-up perspective

Topic: Consumption-Based Carbon Policies and IO Modeling
Author: Kirsten Svenja Wiebe
Co-Authors: Simon Gandy, Christian Lutz

The approaches for calculating consumption-based carbon emissions can be divided into two broad categories: top-down approaches, in the form of multi-regional input-output (MRIO) models, and bottom-up approaches, in the form of life cycle assessment (LCA). Both have their virtues and drawbacks. Both approaches are very data intensive. Several MRIO databases have been developed and published over the past years. Now that these databases exist and have been refined and validated, they will be used to inform policy makers. LCA is usually only applied to very specific products and product groups, so there still exist many products that have not yet been subject to this kind of research. This paper uses both a top-down and bottom-up approach to calculate the effects of different policy measures on the development of consumption-based carbon emissions in the EU28.
This paper shows how the MRIO model GRAM can be applied to analyze the effect of these policies. The underlying MRIO database itself is a pure static accounting system. To analyze the effects of the policies, the accounting system needs to be linked with a dynamic macro-economic model that can be used for policy simulation. In this dynamic model, final demand, productions structure, energy use and related carbon emissions are determined endogenously and the interactions in the economy are represented in the model equations. The outcome of the policy simulation is reflected in changes in the different model variables. The impact on final demand, intermediate input structure, trade and emissions is then implemented in the static MRIO. This is then used to calculate the impact of the policies on consumption-based carbon accounts of the EU. The policy examples used are two sector specific policy options: the EU's CO2 in Cars Regulations, and the Gas Flaring aspect of the Global Methane Initiative. The results from the top-down approach

are then compared with those from the bottom-up LCA approach. Both, bottom-up and top-down approach use the same underlying assumptions regarding the impacts, but due to the very different nature of the methodologies, differences in the results are expected and need to be explained.

Carbon emissions – the relevance of consumption-based accounting and policy

Topic: Consumption-Based Carbon Policies and IO Modeling
Author: Kirsten Svenja Wiebe
Co-Authors: Arnold Tukker

This is a paper for the special session on "Consumption-based carbon policies and IO modelling"
Kirsten Wiebe is not an author of this paper. It is a paper by Arnold Tukker and will be presented by Arnold Tukker

Abstract
Climate change mitigation policies are currently focused on production processes within national borders. However, all production ultimately serves consumption. Consumption rather than production is the ultimate driver of increases in greenhouse gas emissions, reducing the likelihood of keeping global average temperature increase below 2 °C with respect to pre-industrial levels. Mitigation policies that include a consumption- and trade perspective thus bear the promise of providing new, cost-effective and efficient solutions complementing existing production and territorial oriented policies.
This talk will first review some important findings about past analyses of carbon emissions by country related to final consumption of goods and services in a country. The talk then will explain the approach of a new EU FP7 funded project called CARBON-CAP (www.carboncap.eu), that aims to:
a) Improve and harmonize global MR EE IO databases that often are used for consumption based accounting
b) Propose consumption based policy options to mitigate climate emissions
c) Assess the economic and environmental impacts of such policies, with the models FIDELIO, EXIOBASE and E3MG

Material stocks of capital and infrastructure in environmentally-extended input-output analysis – what makes sense? (for special session on MFA & IO modelling)

Topic:
Author: Dominik Wiedenhofer
Co-Authors: Nina Eisenmenger, Anke Schaffartzik

Recent advances in combining material flow accounts and input-output approaches have yielded crucial insights on global resource use required to satisfy national consumption. These developments have benefited greatly from methodological and data-related efforts in carbon footprinting, where a lively debate on uncertainty, interpretability and wider policy implications is already ongoing.

Additionally, for material footprints or raw material equivalents of consumption, material stocks of capital/investments and infrastructure are a crucial but underexposed issue. This is of particular relevance for non-metallic minerals, which constitute half of global resource use and are predominantly used for buildings and infrastructure, where they are in-use for decades. However,

current input-output applications treat investments similarly as final consumption - as throughputs of the same year, without consideration of long-term stock accumulation. This has significant implications, for example in analyses of international trade between developing and industrialized economies.

We examine potential ways of appropriately dealing with these stock considerations in the flows-based input-output approach, drawing on our hybrid-IO model (Schaffartzik et al. 2013). This ranges from internalization of capital formation to depreciation of investment flows and the potential use of more detailed material flow indicators as a more appropriate environmental extension. Utilizing our work on biophysical material stocks modelling, we examine the differences between service lifetimes of physical stocks (infrastructure, buildings, and factories) versus time frames used for depreciating investment flows. Furthermore, the issue of potential double counting has to be addressed – while, for example, flows of energy carriers are only used once, stocks, by definition, are useful over many years.

Especially in the light of growing efforts towards implementation in official reporting and the high policy relevance of material footprints we conclude on the potential and drawbacks of above approaches and sketch out possible next steps.

Carbon accounting and footprinting of cities using a virtual input-output laboratory

Topic: Environmental input-output modeling IX
Author: Thomas Oliver Wiedmann
Co-Authors: Guangwu Chen

With more than half of the world's population now living in cities, urbanization is recognized as a major driver of global greenhouse gas (GHG) emissions. To assess the full scale of cities' contribution to climate change both direct and indirect GHG emissions need to be accounted for. Two fundamental approaches have evolved in research and in practice: a) metabolism-based approaches (MBA) that record the physical flows of emissions within a city's territory, including important trans-boundary flows and b) consumption-based approaches (CBA) that account for the total direct and indirect emissions associated with the activities of urban consumers. So far, these two approaches have been used more or less independently and few studies exist that compare results for the same city, using both approaches. In this contribution we show how one detailed environmentally extended input-output framework can be used to account for GHG emissions from both perspectives, MBA and CBA. Based on the Australian Industrial Ecology Virtual Laboratory we demonstrate how supply and use tables for cities have been derived and converted into detailed 'carbon maps' at suburban spatial scale. These maps allow for an unambiguous identification of Scope 1 (direct, territorial), Scope 2 (electricity & heat) and Scope 3 emissions (out-of-boundary energy use, infrastructure supply chains and imported goods and services). The mathematical relationship between MBA and CBA derived from one IO table and the ability to convert from one approach to another is demonstrated. We show first empirical results for Australian cities and discuss limitations and challenges of the approach.

Integrated Modeling of the Land Use, Water and Energy Nexus of Brazilian Biofuels Expansion under Climate Change

Topic: Environmental Input-Output Analysis
Author: William Wills
Co-Authors: Romulo Neves Ely, Marcelo Moreira

Biofuels have come under scrutiny due to adverse impacts on water resources, biodiversity, and food security. In this context, Brazilian biofuel production is considered a success story given low GHG emissions, little induced deforestation, and social inclusion targets for family farmers. However, sustainable expansion of Brazilian biofuels is put to a test as biofuels demand is rising and climate change is predicted to affect agricultural productivity and water resources. The lack of empirical evidence on this nexus continues to be a major challenge for climate policy and planning. This study aims to inform policymakers and stakeholders on the potential biofuels expansion scenarios in Brazil under climate change until 2030 in order to mitigate adverse impacts on water resources, land use, and food security while promoting sustainable production of biofuels.

This analysis is done through a multi-institutional modelling effort that integrates basin-scale water resources assessment, land-use change and economy-wide modelling of socioeconomic and GHG impacts due to biofuels use. A hybrid input-output table was developed to feed the Computable General Equilibrium (CGE) Model IMACLIM-Brasil. The CGE model determines, along with the transportation model (LEAP), the level of demand for biofuels in 2030. A land use model (BLUM) allocates the expansion of sugar cane and soya production over the Brazilian territory, allowing a basin-scale modelling of water resources. BLUM returns to the CGE model the effects on the price of land. The land price variation impacts on the revenues and wages of different household classes and on the price of agricultural goods – revealing the risk of “food insecurity” faced by the poorest class in each scenario of the study.

Carbon and land footprint time series of the Netherlands - integrating data from the GTAP and WIOD databases

Topic: Environmental input-output modeling I
Author: Harry C Wilting

The paper presents the results of an analysis of the carbon and land footprints for the Netherlands from 1995 to 2011. A multi-region input-output (MRIO) model was used for the calculation of the footprints. In recent years, several MRIO databases have become available all with their specific characteristics, advantages and drawbacks. In the MRIO model used, data from two of these databases, WIOD and GTAP, were integrated. The WIOD database enables the calculation of a consistent year-to-year time series. The GTAP database has more detail in regions and sectors than the WIOD database. Therefore GTAP data were integrated into the WIOD data for a more detailed allocation of greenhouse gases and land use in agriculture. Furthermore, the regional detail in the GTAP database was used for allocating land use and greenhouse gas emission emissions in the WIOD rest-of-the-world region to continents.
Greenhouse gas emissions related to Dutch consumption rose slightly with an annual increase of 0.3% in the period 1995-2011 with the rise in CO2 emissions as the main driver. Where the domestic emissions decreased the emissions related to imports for Dutch consumption rose. Especially the Chinese CO2 emissions for Dutch consumption increased with 3.5% each year. The land footprint increased with 0.4% a year as a result of a higher demand for crop and pasture land. The forest land footprint decreased in the period considered. By integrating GTAP data into the

WIOD data the contribution of African land use in the Dutch land footprint, which was in the order of 15%, became visible.

Dissecting Trade Imbalances in the Eurozone: A WIOD Analysis

Topic: Trade and Value Chains
Author: Ariel Luis Wirkierman
Co-Authors: Nadia Garbellini

[Abstract]

External imbalances have been a pervasive feature in several explanations of the current Eurozone (EZ) crisis (e.g. Ca'Zorzi, Chudik, and Dieppe 2012; European Commission 2012; Flassbeck and Lapavitsas 2013; Guerrieri and Esposito 2012), probably because domestic demand policy is constrained by the trade balance. In all these analyses, however, each country's balance of trade (BoT) is computed with respect to the rest of the world, without distinguishing between intra- and extra-EZ patterns of surplus and deficits (see Collignon 2012).

But this is a serious limiting factor, given that trade integration and international fragmentation of production have made clear that a single country's foreign trade constraint is no longer solely a problem of its own effective demand: an important proportion of its own intermediate imports depends on autonomous expenditure decisions of others (Rampa and Lanza 1988). In fact, trade in intermediates is induced by the import requirements to satisfy final uses, so that each source of domestic final demand activates a trade balance of intermediate inputs in every country.

Hence, by taking advantage of the rich time-series of World Input-Output Tables for the 1995-2011 period, provided by the WIOD project (Dietzenbacher, Los, Stehrer, Timmer, and De Vries 2013), this paper aims at formulating a Balance of Trade (BoT) decomposition for every EZ country by activating source of final demand and geographical origin of products, in order to trace, for example, intra-EZ trade in intermediates activated by final demand of intra-EZ regions for intra-EZ products, or any other possible combination of these criteria.

By proceeding in this way at both (country) aggregate and sectoral levels, we try to uncover the inner structure of trade imbalances in the EZ, in order to arrive at a characterisation in terms of international exposure, specialisation and hierarchy for each country. Such a characterisation might be useful to identify structural strengths and weaknesses of a monetary union in need of reflating effective demand.

[References]

Ca'Zorzi, Michele, Alexander Chudik, and Alistair Dieppe (2012). "Thousands of models, one story: Current account imbalances in the global economy". In: Journal of International Money and Finance 31.6, pp. 1319-1338.

Collignon, Stefan (2012). Macroeconomic imbalances and comparative advantages in the Euro Area. European Trade Union Institute (ETUI), Brussels.

Dietzenbacher, Erik, Bart Los, Robert Stehrer, Marcel Timmer, and Gaaitzen De Vries (2013). "The Construction of World Input-Output Tables in the WIOD Project". In: Economic Systems Research 25.1, pp. 71-98.

European Commission (2012). "Current account surpluses in the EU". In: European Economy, Directorate General for Economic and Financial Affairs, 9/2012.

Flassbeck, Heiner and Costas Lapavitsas (2013). The Systemic Crisis of the Euro - True Causes and Effective Therapies. Studien der Rosa-Luxemburg-Stiftung. Berlin. Rosa-Luxemburg-Stiftung.

Guerrieri, Paolo and Piero Esposito (2012). "Intra-European imbalances, adjustment, and growth in the eurozone". In: Oxford Review of Economic Policy 28.3, pp. 532-550.

Rampa, Giorgio and Alessandro Lanza (1988). "A Model for Assessing the Growth Opportunities of EEC Countries when Interdependence Is not Ruled Out". In: Input Output Analysis: Current Developments. Ed. by Maurizio Ciaschini. London: Chapman & Hall, pp. 367-390.

Yeasty vs. mushroom-like patterns of hyper-integrated productivity growth: An analysis of six advanced industrial economies

Topic: Productivity and Efficiency Analysis
Author: Ariel Luis Wirkierman

[Abstract]

The aim of this paper is to apply a visualisation technique for depicting sectoral concentration patterns of technical change to a disaggregated physical productivity measure, which is based on the notion of hyper-integrated labour content of commodities.

In Harberger (1998), a particular Lorenz-curve type of diagram is introduced, which displays the cumulated absolute contribution of each industry to aggregate TFP growth, according to its cumulated share in initial value added. From the form of the curve, it is possible to infer relative sectoral contributions to aggregate performance. In particular, Harberger (1998, p.4) coined the distinction between a 'yeasty' and 'mushroom' pattern, representing a balanced and broad growth pattern as opposed to an uneven and localised one, and conjectured that a 'mushroom' vision dominates the growth process.

However, given that TFP growth reflects additive real cost reductions rather than physical productivity changes, Harberger's diagrams could be applied to Pasinetti's (1988) physical notion of vertically hyper-integrated labour content of commodities, to identify the concentration pattern of total labour-saving trends among a set of growing sub-systems (in the sense of Sraffa, 1960, p. 89).

Hence, by switching the disaggregated unit of analysis from industries to (growing) sub-systems, Harberger diagrams are devised from a set of Input-Output accounts, fixed-capital flow matrices and labour input coefficients; depicting hyper-integrated productivity patterns and, thus, evaluating Harberger's conjectures with respect to this productivity measure for six advanced industrial economies (US, UK, Germany, Japan, France and Italy) during the 1995-2005 period.

[References]

Harberger A.C. (1998). A Vision of the Growth Process. The American Economic Review 88(1):1-32

Pasinetti L.L. (1988.) Growing subsystems, vertically hyper-integrated sectors and the labour theory

of value. Cambridge Journal of Economics 12(1):125-34

Sraffa P. (1960). Production of Commodities by Means of Commodities. Cambridge University Press, Cambridge.

Construction of China's Input-Output Table Time Series for 1980-2010: A Supply-Use Table Approach

Topic: Input-Output acccounts and statistics
Author: Harry X Wu

This paper documents the work under the China Industry Productivity Database (CIP) Project on the reconstruction of China's input-output table series for the period 1980-2010. After introducing and discussing our basic research problems concerning coverage and classification inconsistencies and flaws in the implicit official price deflators, we report our data work for national accounts, industry-level producer price indices, and input-output and supply-use tables, including the reconstruction of the 1981 SNA IOT and SUT-based on the 1981 and 1987 MPS IOTs, and the 1987 SNA IOT and SUT. Adopting the SUTRAS model of the WIOD Project, we then reconstruct China's IOT series for the period 1980-2010. Our reconstructed PPI-matrices for this entire period enable us to apply the double deflation approach to the nominal IOTs, i.e. deflating the intermediate input and gross output, respectively, in measuring China's real value added. In the discussion of the results, we compare both the single and double deflation results-based real GDP growth rates with that of the official GDP estimates, and then assess our results against the background of the macroeconomic performance and policy regime shifts in China.
Key works: Input-output table (IOT); supply-use table (SUT); national accounts (NA); gross value of output (GO); gross value added (VA); producer price index (PPI)
JEL classification: C82, E01, E31

Carbon trading and its provincial economic impact: a multi-regional Input Output analysis

Topic: Regional Input-Output Modeling
Author: Yan Xia

In the 12th Five-Year Plan of China proposed in 2011, China carried out the target to reduce its economy's carbon intensity by 17 percent by 2015 compared to 2010 levels. To achieve this goal, seven carbon emissions trading pilots have been established to find a way for the unified national carbon trading market. China is featured by diversity of natural environment and resources and spatial heterogeneity of social-economic development because of its large scale of territory. In China, regional differences and interregional economic linkages have played key roles in China's regional economy development and spatial structure formation. To get a national target, each region will have a different contribution. In the 12th Five-Year work program of energy conservation and emission reduction, a set of regional emission targets have been proposed. Difference of initial quota allocation and emission reduction cost among provinces in China is the driving force of unified national carbon trading market. The initial quota allocation of carbon permits will have important effects on regional economic development, industrial structure and interregional trading. Therefore, the allocation of the emission reduction target at the provincial level may not only take regional economic development into consideration, but also the regional reduction potential to achieve the goal, while at the same time emphasizing regional equity and a regional development strategy.

This paper attempts to simulate the unified national carbon trading market through provinces with a multi-regional CGE model in China. It concerns different initial quota allocations and their effect on regional economic. Commonly there are three principles in initial quota allocation: equity principle, auction principle and current production principle. In the model, four scenarios are designed: one is free allocation by grandfathering, that is, a region receives quotas based on historic performance according to equity principle; the second is auctioning of quotas with revenues recycled as lower VAT, this model assumes the government budget balances, so the exact amount rebated in lower VAT will also partly reflect changes in economic output and the tax base; the third is allocation of quotas relative to current production, which means disguised subsidies and will encourage regions to improve production efficiency; the last one is allocation of quotas according to the pre-given emission reduction target in the 12th Five-Year work program of energy conservation and emission reduction, through comparing with other three scenarios, we can evaluate the feasibility of this policy.
Different economic effects will be investigated under these four scenarios from the view of regional economics. Cost efficiency is the primary factor to appraise the different allocation schemes, and then we use a modified Gini Coefficient to see if it will narrow the gap between east China and west China. Social welfare loss minimization is also one of the evaluation criterions. Besides, it will also have an observation on VAT change, terms of trade change, real wage and employment in each region.

Using Low-Rank Approximation to Estimate Input-Output Accounts

Topic:
Author: Ming Xu
Co-Authors: Sai Liang

Current practices of developing input-output (IO) accounts often involve estimating missing entries and identifying abnormal entries in an IO matrix. These processes usually rely on manual balancing, reconciliation, and harmonization of data. Is there a way to complete an IO matrix solely based on incomplete or corrupted observations without manual manipulation of data? We seek to answer this question in this research.
In particular, we hypothesize that an IO matrix, which in theory characterizes the production structure of an economy in a given year, possesses certain type of pattern that is likely related to the production structure of the economy, and can be approximated with a low-rank matrix which preserves such pattern. If this hypothesis is valid to a certain extent, it is then possible to estimate the “true” IO matrix solely based on limited known observations or a “wrong” matrix with incorrect data derived from traditional survey-based or non-survey approaches.
To test this hypothesis, we first empirically examine the singular values of an IO matrix in various forms, including the transaction matrix, technical coefficient matrix, Leontief inverse, and the logarithm of these, using existing real-world IO tables. We found that in many cases the singular values of an IO matrix, no matter in what form, decrease rapidly with the increasing rank, which indicates that an IO matrix can potentially be approximated with a low-rank matrix. Next we evaluate the accuracy of estimating the original IO matrix A assuming rank k (1≤k<r = rank(A)), using the Frobenius norm ||A-F||k, where F is the estimated matrix with rank(F)=k. Our preliminary result shows that low-rank approximation can estimate an IO matrix to a certain degree of accuracy in the form of logarithmized technical coefficients. In the full paper we will also show the accuracy of estimating an IO matrix based on an incomplete or corrupted matrix.

Environmental Kuznets Curve and Effects of Emission Outsourcing

Topic: Environmental input-output modeling X
Author: Yan Xu

The ‘Environmental Kuznets Curve’ (EKC) refers to an inverted-U-shaped relationship between some pollutant level and per capita income. Since the early 1990s, a considerable number of empirical studies have been conducted on the EKC. However, only the production-based emissions were considered. Due to the increase of globalization in the past decade, there are more and more emissions embodied in trade, which leads to a considerable gap between consumption-based and production-based emissions. More importantly, the gaps differ considerably across countries. Although trade factors are employed as controls in many previous studies, a consumption-based study is more capable to rule out the direct effect of trade completely, and its results are more relevant for the purpose of global emission control and reduction. This study compares the estimated EKC with consumption-based and production-based emissions during the period 1990-2010. For production-based emissions, evidence for EKC is found. However, we could not find strong evidence with regard to the consumption-based emissions. The curve turns flat and does not drop after a certain income level has been reached. To explain such difference, we test the relationship between income and emission leakage and find a positive relationship between them. Results show that developed countries tend to trade away their emissions to such an extent that leads to reductions of production-based emissions.

Keywords: Environmental Kuznets Curve, consumption-based emissions, emission outsourcing, emission leakage

A Regional Social Accounting Matrix for India 2007-08

Topic: Regional input-output modeling I
Author: Bhupesh Yadav

India is a large country with huge diversification in geography, climate, natural endowments, infrastructure, production structure and socio-cultural development. These factors affect the economic performance of a state relative to that of others and therefore, a widespread regional disparity prevails. A regional SAM may visualize a more precise and comprehensive picture of an economy. This may be helpful for researchers and policy makers to recommend suggestions that may be most suited to the specific problems of the regions and better allocation of resources.

The present study attempts to build a regional SAM of India for 2007–08. It is an extension of the regional SAM of India for 2003-04. State level input-output table for year 2003-04 have been used for this study. The regions have been categorized as poor, middle, rich and special category income groups on basis of state gross domestic product for year 2003-04. The regional SAM 2003-04 consists of 41 sectors and nine categories of households based on occupation and location (i.e. rural and urban). The gross value added has been divided into two factors of production, i.e. labour and capital. Sector wise export and import of different states have been estimated on the basis of sector wise export/import-output ratio at all India level and output at state level. Data from RITES and other agencies have been used for estimation of inter regional trade. For constructing regional SAMs for the year 2007-08 All-India SAM for 2007–08 has been proportionally disaggregated into four regional SAMs based on regional SAMs for 2003-04.The main data sources used in the construction of these regional SAMs are All India Input-Output (I-O) table for 2003-04, Central Statistics Office (CSO); Directorates of Economic and Statistics of different states; SAM for India

2007-08; 66th round of survey on consumer expenditure, National Sample Survey Organization (NSSO) and Income-Expenditure Survey 2004-05, National Council for applied Economic Research (NCAER).

Keywords: Social Accounting Matrix, I-O Table, India, Regional SAM
JEL Classification: D57, D59

Co-authors:
Basanta K. Pradhan , Institute of Economic Growth (IEG) (Not a member)
M.R. Saluja , India Development Foundation (IDF) (Member under the name Prof. Mangat Ram Saluja))
Akhilesh K. Sharma, IEG (Member)
Bhupesh Yadav, IDF (Member)

Construction of a Multi-regional Input-Output Table for Nagoya Metropolitan Area, Japan

Topic: Regional input-output modeling III
Author: Mitsuo Yamada

Japan has many input-output tables, national and regional. We focus our attention to Nagoya metropolitan area, in which the headquarter office of Toyota Motors is located and many manufacturing industries of transport equipment and other machinery are concentrated. This area is included in the region covered by three prefectures; Aichi, Gifu, and Mie. To construct a multi-regional input-output table from these prefecture tables, at first, we break down each prefecture table with 186 sectors to several smaller sub-regional tables. Then we combine each table to one multi-regional input output table, which consists of 14 sub regions. Transaction values among sub-regions of each sector are estimated by the gravity-RAS method, in which the initial values are obtained by the gravity model. Using the multi-regional table, we discuss the structural characteristics of Nagoya metropolitan area. We could show a way to cope with the inconsistency of regional definitions, administrative and economic, in the input-output analysis.

On Economic Growth, Services trade exports in China

Topic: International Trade II
Author: Lianling Yang
Co-Authors: Cuihong Yang

With the formation of the global service economy, service industry, instead of manufacturing, is becoming the focus of international competitiveness and the important force for economic development of countries. China has achieved high economic growth for a prolonged period of time. However, although the service trade keeps rapidly increasing in China, the overall development is low and it is in a situation of deficit for a long time. This is in sharp contrast with the huge surplus of China's goods exports. Therefore, scientifically analyzing the relevant factors which affect the export of China's service trade is extremely urgent and important. The experience of the development of world service, especially the countries with developed service industry, the structure of trade in service is one of the most important characteristics of service trade development level and quality. So at first, this paper analyses the services trade exports structure change in China. It shows that the export change is very slow during the decade from 2002 to 2011, traditional labor-intensive and

resource-dependent service trade is still taking up the dominant advantage, but the technology-intensive and capital-intensive service trade is developing very quickly such as financial service trade and IT service trade. In addition, it analyses the reasonability of China's service exports structure. Then, based on the current research which applied the Input-Output method in analyzing the goods trade contribution to economy, this paper analyses the contribution of Chinese service exports to GDP and employment, as well as the contribution rate of Chinese service exports growth to GDP and employment growth. The results show that, compared to goods exports, 1000 US $ service exports trade can generated about more than one third on China's value-added and employment as China's goods exports contains a big part of processing trade.

The role of inward FDI to service industry in China

Topic: International Trade II
Author: Lianling Yang
Co-Authors: Cuihong Yang

The service sector has emerged as the largest and fastest-growing sector in the global economy, providing more than 60% of global output and a large share of employment. Meanwhile, the inflow of foreign direct investment (FDI) to the services sectors is growing worldwide, which made service industry, rather than manufacturing, become the main bearer. Along with China's accession to WTO, inward FDI in China has risen dramatically under the open-door policy. And more and more multinational began to enter China's service industries, such as finance and distributions industries. The proportion of China's actual utilization of FDI in services industries is continued to increase to more than 50% after 2011. The increase in services FDI bring capital and technology to the development of services, improve the quality and structure of services, as well as to enhance the international competitiveness of China's service trade. As China been an attractive site for FDI, there has been a growing literature on the role of FDI in Chinese economy. However, most of these are on effects of FDI on exports of goods. In this case, it will have significant sense to research the relationship of FDI and service trade in China. This study seeks to find the growth of service and its link with inward FDI flows, and compare the difference between FDI in services and FDI in goods. Using the input-output measurement of industry linkages, this study identifies the key sectors of service industrial development. And to show the importance of FDI in services, this study calculates the contribution to economic growth by FDI to services in China.

The role of bio-product supply chains in regional bio-economy: A sustainability analysis with input-output modelling

Topic: Sustainable production and consumption II
Author: Devrim Murat Yazan
Co-Authors: Giorgio Garau, Giovanni Mandras

In the recent the diffusion of bio-economy concept has accelerated as the role of bio-resources to sustain regional development has been expanding. Having the advantage of multiple output production and energy recovery from secondary wastes, bio-resources have an important contribution to the sustainable development of regions.
Such a contribution is strongly dependent on the integration of different supply chains traditionally located in different sectors, which can be connected via waste and by-product valorisation. As the input-output modelling is capable of tracing primary and main inputs, wastes, by-products, and secondary wastes, it is particularly useful to assess the resource efficiency, waste reduction, and

added-value creation in the integration of such supply chains.
This paper adopts an input-output model to measure the environmental sustainability of innovative bio-product supply chains using thistle as a second-generation biomass to produce bio-oil, animal feed, bio-plastics and bio-lubricants. It further aims at computing the energy recovery from the secondary wastes emitted during the production of these products. As the recovered energy is reused within the same supply chains, our model is also capable of assessing the loop-closing impact from an energy-efficiency perspective.
The practical contributions of this paper are highly relevant for traditionally separate sectors located in the region since it provides a holistic environmental performance analysis and discusses new business models to achieve chain integration. The paper also theoretically contributes to the bio-economy literature as the investigated production processes are recently developed and their products have been recently introduced in the market.

Import Content of Exports and Industrialization

Topic: Vertical specialization and outsourcing I
Author: Mohammadgholi Yousefi
Co-Authors: Mojtaba Esfandiari Kaloukan, Hadi Mousavi-Nik, Zahra Zakeri

Classical and neo classical economists have made a high emphasize on integration into the world economy. While factors such as geography, history, trade policy and structure of the economy, help explain comparative advantage and differences across countries and are regarded as the main determinants of international trade integration. The aggregate value of international trade in goods and services is, thus, regarded as the seriousness of the efforts of the countries' to integrate into the world economy. Small countries are generally more integrated, their domestic demand being limited; they have to export, to enjoy economies of scale. They also need to import more goods and services than larger countries in order to satisfy domestic demand. Where measured trade may include a significant proportion of re-exports and intra-firm trade linked to the presence of multinational firms. Integration into global value chains and production networks not only are important ways through which countries can integrate into the world economy, they are in fact unavoidable. Participating into international division of labour and specialization help countries to promote exports, using imported intermediate goods. Production processes increasingly involve a sequential, vertical trading chain stretching across many countries, with each country specializing in particular stages of a good's production sequence. We emphasize on a key aspect of these vertical linkages — the use of imported inputs in producing goods that are exported — which may be called vertical specialization. Many countries have succeeded to diversify their output and export. In this paper , using input- output technique and tables of more than 34 countries, we try to provide another evidence to show, how through direct and indirect imports, trade help countries to increase their exports of manufactured goods and enable them to industrialize .
Key Words: Import Content of Export, Industrialization, Input-Output Technique.
JEL: C67, F43, L52, N65, O14, O24, O25, O53

Modelling the Effects of Successive Disasters: A Dynamic Inoperability Input-Output Approach

Topic: Input-Output analysis of disasters II
Author: Krista Danielle Sy Yu
Co-Authors: Kathleen Bernardo Aviso, Michael Baliwag Promentilla, Joost Reyes Santos, Raymond Roca Tan

Input-output models have proven useful for understanding the impacts of isolated disasters. However, available literature sources on modeling the effects of successive disastrous events are relatively sparse. In this work, we consider such events, because another natural disaster can strike while a country is still recovering from a previous disruptive event. These events may come in the form of a series of meteorological disturbances during a hurricane or typhoon season, or an earthquake triggering a tsunami. In the case of the Philippines, seven of the ten most destructive typhoons occurred in the last five years. Aside from typhoons, its location along the Pacific Ring of Fire makes it predisposed to earthquakes and volcanic eruptions. This paper seeks to illustrate the impact of the occurrence of consecutive natural disasters to an economy using the dynamic inoperability input-output models (DIIM). We consider the case of the Central Philippines in 2013, which suffered a 7.2 magnitude earthquake in the island of Bohol, and one month later was hit by Typhoon Haiyan, the strongest recorded typhoon to make landfall in world history. Our calculations show that a sequence of shocks can create a compounded impact that propagates through an economy. The results of this study can be useful for formulating policies with respect to ensuring disaster preparedness, and optimizing disaster recovery.

Technology-based criterion to share environmental responsibility

Topic: Sustainable production and consumption II
Author: Jorge Enrique Zafrilla
Co-Authors: Luis A. Lopez, David Soto-González

Global greenhouse-gas emissions (GHG) are rising faster than ever. The number of Kyoto Protocol signatory countries is shrinking. Europe´s Carbon Emissions Market is crashing. Positions of high pollutant and exporters emerging countries according to the acceptance of supranational agreements are far from making real. Why is the Kyoto Protocol failing and which are the post-Kyoto perspectives? From our point of view one of the main problems of the Kyoto Protocol is the establishment of the producer responsibility criterion for emissions allocation by region. Big pollutant and exporter countries, like China or India, are not willing to sign this kind of international agreements. A consumer responsibility criterion would be more adequate for those virtual carbon exporter countries. The question is clear: Is there any assignment criterion which tries to solve the controversy and which favor a technological transfer between the regions and countries considered? In this paper we asses a new perspective for sharing internationally traded emissions allocation by region based on a technological criterion. Virtual carbon embodied in trade will be shared depending on the technology benchmarking between multiple countries involved in the global supply chains. Developed countries with negative emissions balances would be responsible of a part of emissions embodied in imports, the non-domestically produced emissions which are avoided by trade. Incentives to not outsource pollutant phases of production to environmental lawless countries will arise. Big exporter countries would be responsible of the rest of real emissions, transferring a part of the producer responsibility. Differences between technological structures will be the allocation key.
The analysis will be done using bi-regional models for the pursuit of easier international agreements between the two regions involved in a trade relationship. Thirty bi-regional models for six major

regions will be developed to capture the estimation of new emissions inventories by country.

Labour analysis based on Time Input-Output Tables

Topic: Physical and Hybrid Input-Output Analysis
Author: Jaroslav Zbranek
Co-Authors: Eva Javorská

The paper is focused on the description of the methods and tools for the analysis of labour intensity. A model example is based on the figures for the Czech Republic covering period of 1990-2010. We applied the approach using Time Input-Output tables broken down by commodity. Besides the methods of the analysis, the paper briefly describes current compilation procedures of Time Input-Output Tables, as well. We compiled Time Input-Output Tables (TIOTs) for 1990-2010 with respect to available data sources. TIOTs combines published Supply and Use tables, data on hours worked and data on wages and salaries. The key results are expressed as indices of labour intensity and these indices are compared with volume indices of gross value added and also with the development of capital endowment of labour. Labour intensity is estimated as a ratio of index of hours worked and volume index of output. The development of capital endowment of labour describes the change of the amount of capital per one unit of labour. We used net stocks of fixed assets as capital indicator and the hours worked from the TIOTs as labour indicator. We transformed net stocks of fixed assets (obtained from Czech national accounts) from the industry classification to the commodity classification. One of the key advantages is that the results are not affected by changes in price level and it allows interesting comparisons in long period.

The role of income in household energy consumption patterns in China

Topic: Environmental input-output modeling I
Author: Haiyan Zhang
Co-Authors: Michael L Lahr

China's households have experienced rapid lifestyle changes during the current decade. From 2000 to 2010, per capita disposal income has rose 152% for urban residents and 97% for rural residents. However, there were huge income disparities among different income groups. In 2010, the income Engel Coefficient was 35.7% for urban residents and 41.1% for rural residents. Thus, lifestyle varies among different income groups. Compared to the household cohort with the lowest 10% income, their counterpart with the highest 10% income cohort spent almost five times more expenditure in 2010. Also, they spend less proportion of their total expenditure on 'Food', 'Residence', and 'Health Care and Medicare Services' while higher proportion on other consumption activities.

This paper adopts Consumer Lifestyle Approach to explore the energy consumption of different income groups of both rural and urban households. The energy and carbon intensities of each consumption activities are calculated based on the analysis of I-O tables of year 2000, 2002, 2005, 2007, and 2010. This article examines the changing trend of lifestyles as well as their induced energy consumption of different income groups in China from 2000 to 2010. This article will also explore how energy consumption would change when households move up income ladders and the future changing trend of household energy consumption in the recent future.

Mapping Knowledge Domains between Input-Output Analysis and Complex Network Analysis

Topic: Inpu-Output Economics and Network Theory I
Author: Yanxia Zhang
Co-Authors: Sai Liang, Haikun Wang, Ming Xu

The input-output (IO) model characterizes the flows of products and services between industries in an economy. It is natural to relate IO analysis with complex network analysis given that an IO system can be considered as a network in which industries are nodes and inter-sectoral transactions are links. While it seems promising to applying methods in complex network analysis in IO analysis in the hope of revealing additional insights regarding economic systems, an IO network possesses features that are fundamentally different from networks that are commonly studied in complex network analysis such as social networks, protein interaction networks, and power grid networks. These commonly studied networks are often sparse, while an IO network is almost fully connected. In addition, nodes in an IO network are weighted, while links in an IO network are both weighted and directional. These features of IO networks represent the most complex network possible and call for deliberations on the suitability of apply existing complex network analysis tools in IO analysis. This study aims to map metrics, methods, and tools between complex network analysis and IO analysis to identify opportunities to apply complex network analysis in the IO domain.

In this study we conduct a critical review of current metrics, methods, tools, and applications of complex network analysis, and link each one of them with existing approaches in IO analysis if possible. Differences between similar tools from complex network analysis and IO analysis are documented. We expect to develop a map of knowledge connecting the two fields and provide a roadmap for developing network-based tools in IO analysis.

The Impact Analysis of TTIP on BRICs—based on dynamic GTAP model considering GVC

Topic: Global Value Chain Analysis
Author: Yaxiong Zhang

Within the global value chain (GVC), the intermediate inputs of the products in one country come from various countries around the world, the imported products consumed in domestic may also include the domestic intermediate inputs. Therefore, it is very important to reflect this GVC characteristic when Using GTAP (Global Trade Analysis Project) model to analyze the trade policy. Because of the lack of necessary data, the Armington assumption of trade linkage is implemented in two levels in the GTAP model: producers and consumers distinguish the domestic variety of a good from its imported variety without regard to the country of origin of the imported input; the sourcing of imported goods is placed at the border of an economy. In order to improve this common approach which simplifies the import decision at the border level, we introduce the WIOD（World Input-Output Database）with a micro-based determination of bilateral trade to place the sourcing of imports at the agent level. In this study, we use the improved dynamic GTAP model (we call it GTAP-GVC model) to assess the economy-wide impact of TTIP (Transatlantic Trade and Investment Partnership) on BRICs. In the simulation, we mainly do the work in two aspects. Firstly, we reduce both tariff and non-tariff barriers (NTBs) between US and EU. Because average tariff levels on both sides of the Atlantic are relatively low already, various non-tariff barriers or NTBs (often in the form of domestic regulations) on both sides of the Atlantic constitute important impediments to deepening transatlantic trade linkages. For quantification of NTBs, this study has

adopted the equivalent tariff levels of NTBs from the research results of Ecorys (2009) to capture the impact of removing NTBs. Secondly, the simulations that are carried out also take into account two sets of possible spillover effects beyond bilateral liberalization. These are defined as follows. First, we have included direct spillover. It is based on the assumption that improved regulatory conditions negotiated between the EU and the US will also result in a limited fall in related trade costs for third countries exporting to the EU and US. A second indirect effect involving third countries is considered as well: the indirect spillover. It means to gauge the economic implications if third countries adopt some of the common standards agreed between the EU and the US.

China's economic and trade interdependencies with other BRIC countries - from a GVC Perspective

Topic: Global Value Chain Analysis
Author: Yaxiong Zhang

The fact that the economic relations of BRIC have been strengthened is manifested by the BRIC value added, which has been driven by the final demand of each country. In this context, certain commodity's producing process is considered under a global value added chain (GVC). This is no existing literature estimating the economic interdependencies of BRIC in terms of their trade relation. This paper tries to explore how their final demand drives the value added of BRIC countries. We calculate the international linkages and how much each country's final demand contribute to the value added among BRIC countries by using the WIOD through 2001-2011. We find that China's external trade with other BRIC countries both in Customs data and in value added is increased greatly through 2001 to 2011, but the structures between these two kinds of data are clearly different. The inter-industrial linkages between China and other BRIC are getting closer, at the same time the final demands contribute to sectoral value added for each country are also rising. It shows the economic interdependencies among BRIC are obviously greater. At the same time, there is a wide variety of manufacturing goods in China exports , while Russia and Brazil agriculture and mining sector's value added are contributed largely by other BRIC final demand. The further strength of economic interdependencies among BRIC could be predicted, while the pattern should be improved and thus contribute to domestic economic development.

Transnational Interregional Input-Output Analysis: from the perspective of the People's Republic of China

Topic: The BOK-IDE-SIC Transnational Interregional Input-Output Project
Author: Yaxiong Zhang
Co-Authors: Jianqin Yuan

This paper is presented for a convened session jointly organised by the Bank of Korea, Institute of Developing Economies, JETRO (IDE-JETRO), and the State Information Center of PRC.
IDE-JETRO's new project of constructing 2005 Transnational Interregional Input-Output Tables (TIIO2005) aims to link interregional input-output tables of China, Japan and Korea into a single matrix using the import/export data of the regional customs of individual countries. The table will enable us to study economic linkages across borders on a region-to-region basis, say, between Huanan region in China and Kyushu region in Japan. It is expected that the data will serve to draw a detailed mapping of cross-national production networks in East Asia, in particular of the dynamics of regional industrial structures after China's accession to the WTO in 2001.
This paper will discuss the compilation method on China side for TIIO2005, and then conduct a

structural analysis of regional production networks from the perspective of China, try to find the evidence of the strengthen of the inter-industrial linkages of the regions across borders among China, Japan and Korea, then estimate the value added contributions among the regions under the cross-national production networks consideration.

Rescue the 3H region from water resources crisis: the role of virtual water versus real water transfer

Topic: Input-output analysis for policy making
Author: Zhuoying Zhang
Co-Authors: Na Li, Minjun Shi, Hong Yang

The Huang-Huai-Hai (3H) region is the most water scarce region in China. Its regional water security is closely relevant to interregional water movement, which can be realized either by real water transfers through massive engineering projects or by virtual water transfers in form of commodity trade.
This study conducts an interregional input-output analysis to investigate the roles of real water and virtual water in coping with its regional water crisis based on China Interregional Input-Output model 2007. The results show that both virtual water and real water are indispensable water supplements in alleviating the water pressure in the 3H region. The 3H region no longer undertakes the role of "breadbasket" but has become a region depending on external supply of agricultural products. In the meantime, the positive role of the real water as a powerful water supplement should be fully confirmed and its function is expected to be strengthened. This study also points out the fundamental way for the 3H region in tackling with its water crisis lies in internal improvement in water use efficiency and industrial structure upgrading.
This study deepens our understanding of the water problem in the 3H region by providing a new perspective of virtual water and the results can be taken as useful scientific references for the establishment of combating strategies coping with water crisis in the future.

A multilevel analysis of FDI: The role of big world players (China, East Asia, EU28, Japan, U.S.) in production networks and final markets

Topic: CGE Applications to Handle Complex Data Issues
Author: Jing Zhou
Co-Authors: Maria C. Latorre

FDI accruing to China has an important impact on world trade flows. Using a computable general equilibrium model, this paper analyzes the different nature of Textiles, Chemicals, Electronics and Machinery sectors along several dimensions. It also offers a thorough analysis of the distinct role played by the biggest regions in world consumption, production, exports and imports across different levels: local industry, global industry, national economy and world economy.
GDP and welfare improve in China after simulating the FDI accruing to the sectors mentioned above, while they mildly diminish in the rest of geographical areas. Chinese exports of Electronics, Machinery and Chemicals increase intensively crowding out exports from the rest of regions. The biggest reductions are experienced by exports of Electronics and Machinery from Europe and of Chemicals from the Rest of World. However, European exports of Chemicals survive to Chinese competition and gain market access. There is an increase in Chinese imports of Textiles, Chemicals and, to a greater extent, of Electronics, following bigger FDI inflows. They satisfy Chinese rising appetite for imported intermediate inputs in order to produce more Electronics and Chemical goods,

as well as, the Chinese increasing final consumption of Textiles following a higher national income. By contrast, Chinese Machinery imports decrease due to low private consumption and also low reliance on imported intermediates for Machinery production.
Even though the four sectors of analysis have different production technologies, Chinese exports and imports still follow a general pattern: East Asia and Japan are the main intermediate suppliers while the rest of regions play more the role of final markets.

Trade Costs, Global Value Chains and Economic Development

Topic: Global Value Chain Analysis
Author: Yuan Zi

Trade Costs, Global Value Chains and Economic Development

Topic:
Author: Yuan Zi

I develop a model with sequential production stages and international trade frictions that permits an analysis of how a decrease in trade costs shapes the interdependence between countries, with special focus on the joining and industrialization pattern of developing countries into the global value chains. The model yields sharp predictions of the industrialization pattern of developing South in a two-country (North-South) setting: as trade costs in intermediates fall, the model predicts that the industrialization process of the South consists of two episodes. The first episode is associated with specialization of North in high-end intermediates and an expansion of modern industry in the South. Labor in the South moves from the traditional to the modern sector à la Lewis (1954). During this period, South operates increasingly in complicated stages and wage inequality between North and South expands. The second episode starts from the modern sector in the South absorbing all of the country's labor force. In this period, a decrease in trade costs is associated with the South moving up the value chain and North hollowing out its industry base; real wage increases for both countries, and wage inequality goes down. When moved to a multi-country setting, I am able to prove the general specialization pattern across nations and the joining conditions for countries outside of the global value-chain networks. In addition, I provide two thought-experiments characterizing the sequential development of South countries: one with learning-by-doing and one without. I show that in both cases, factory-economies are regionally clustered, while the supply-chain network exhibits either sequential or hub-and-spoke structure. In these two cases, the interdependence of countries is very different. Furthermore, the model can be easily extended to more complex settings to answer several policy questions and for empirical analysis using input-output tables.

LIST OF AUTHORS

FULL NAME	INSTITUTION, COUNTRY, EMAIL
ABDOLAHI, MOHAMADREZA	MAJLIS(PARLEMENT) RESEARCH CENTER, IRAN m.abdolahi86@gmail.com
ABDULLAH, AMBIYAH	IGES, JAPAN abdullah@iges.or.jp
ACQUAYE, ADOLF	UNIVERSITY OF KENT, UNITED KINGDOM a.a.acquaye@kent.ac.uk
AGUIAR, ANGEL	PURDUE UNIVERSITY, UNITED STATES aaguiar@purdue.edu
AHMAD, NADIM	OECD, FRANCE nadim.ahmad@oecd.org
AHMED, IRFAN	UNIVERSITY OF MACERATA, ITALY, ITALY irfisam@gmail.com
ALATRISTE CONTRERAS, MARTHA	AIX-MARSEILLE SCHOOL OF ECONOMICS-EHESS, FRANCE martha.alatriste@ehess.fr
ALBINO, VITO	DIMEG, POLITECNICO DI BARI, ITALY v.albino@poliba.it
ALI, JALAL	GEORGE WASHINGTON UNIVERSITY, UNITED STATES jalal.ali.zaidi@gmail.com
ALI, YOUSAF	UNIVERSITY OF MACERATA, ITALY y.ali@studenti.unimc.it
ALSAMAWI, ALI	THE UNIVERSITY OF SYDNEY, AUSTRALIA alia@physics.usyd.edu.au
ALTIMIRAS-MARTIN, ALEIX	UNIVERSITY OF CAMBRIDGE, UNITED KINGDOM aleix.altimiras@gmail.com
ALVAREZ-MARTINEZ, MARIA TERESA	EUROPEAN COMMISSION. JRC-IPTS., SPAIN maria.alvarez@ec.europa.eu
ALWARD, GREG	IMPLAN GROUP LLC, UNITED STATES greg@implan.com
AMARAL, ANTONIO MIGUEL	IST - UNIVERSITY OF LISBON, PORTUGAL miguel.amaral@tecnico.ulisboa.pt
AMIR, HIDAYAT	FISCAL POLICY OFFICE OF MINISTRY OF FINANCE, INDONESIA, INDONESIA hamir@fiskal.depkeu.go.id
AMORES, ANTONIO	EUROPEAN COMMISSION'S JOINT RESEARCH CENTRE - INSTITUTE FOR PROSPECTIVE TECHNOLOGICAL STUDIES, SPAIN antoniof.amores@ec.europa.eu
ANG, BENG	NATIONAL UNIVERSITY OF SINGAPORE, SINGAPORE iseangbw@nus.edu.sg
ARCE, GUADALUPE	UNIVERSIDAD DE CASTILLA LA MANCHA, SPAIN guadalupe.arce@alu.uclm.es
AROCHE, FIDEL	UNAM, MEXICO aroche@unam.mx
ASENSIO PARDO, MARISA	UNIVERSITY PABLO DE OLAVIDE, SPAIN marisaasen@gmail.com
AVISO, KATHLEEN	DE LA SALLE UNIVERSITY, PHILIPPINES kathleen.aviso@dlsu.edu.ph
AYDOGUS, OSMAN	DEPARTMENT OF ECONOMICS, EGE UNIVERSITY, TURKEY aydogus@yahoo.com
AZIZKHANI, FATEMEH	MAJLIS(PARLEMENT) RESEARCH CENTER, IRAN fatemehazizkhani@gmail.com
AZZONI, CARLOS	UNIVERSITY OF SAO PAULO, BRAZIL cazzoni@usp.br
BAGHERI PORMEHR, SHOLEH	ALLAME TABATABA'I UNIVERSITY, IRAN sholeh_bp@yahoo.com

FULL NAME	INSTITUTION, COUNTRY, EMAIL
BAHALOU HOREH, MARZIYEH	UNIVERSITY OF ISFAHAN, IRAN m.bahaloo.h@gmail.com
BALABANOVA, ZLATINA	EUROPEAN CENTRAL BANK, GERMANY zlatina.balabanova@ecb.int
BARANOV, ALEXANDER	NOVOSIBIRSK STATE UNIVERSITY, RUSSIAN alexbaranov@mail.ru
BARANOV, EDUARD	STATE UNIVERSITY HIGHER SCHOOL OF ECONOMICS, RUSSIAN efbaranov@mail.ru
BARATA, EDUARDO	FAC. ECONOM. UNIV. COIMBRA, PORTUGAL ebarata@fe.uc.pt
BARDAZZI, ROSSELLA	UNIVERSITY OF FLORENCE, ITALY, ITALY rossella.bardazzi@unifi.it
BARRERA-LOZANO, MARGARITA	UNIVERISTY OF SEVILLE, SPAIN mbarrera3@us.es
BARRETT, JOHN	UNIVERSITY OF LEEDS, UNITED KINGDOM j.r.barrett@leeds.ac.uk
BAZZAZAN, FATEMEH	ALZAHRA UNIVERSITY, IRAN fbazzazan@alzahra.ac.ir
BEKCHANOV, MAKSUD	CENTER FOR DEVELOPMENT RESEARCH (ZEF), GERMANY maksud@uni-bonn.de
BELEGRI-ROBOLI, ATHENA	NATIONAL TECHNICAL UNIVERSITY OF ATHENS, GREECE belegri@central.ntua.gr
BENVENUTI, MICHELE	BANCA D'ITALIA, ITALY michele.benvenuti@bancaditalia.it
BEORLEGUI, ARI	UNIVERSIDAD AUTÓNOMA DE BAJA CALIFORNIA, MEXICO abeorlegui@outlook.com
BERMEJO, FERNANDO	UNIVERSITY OF CASTILLA-LA MANCHA, SPAIN fernando.bermejo@uclm.es
BERNERS-LEE, MIKE	SMALL WORLD CONSULTING, UNITED KINGDOM mike@sw-consulting.co.uk
BHATTACHARJYA, SOUVIK	THE ENERGY AND RESOURCES INSTITUTE, INDIA souvik.bhattacharjya@teri.res.in
BHUTTO, NIAZ	SUKKUR INSTITUTE OF BUSINESS ADMINISTRATION, PAKISTAN niazbhutto@gmail.com
BIERKANDT, ROBERT	POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH, GERMANY robert.bierkandt@pik-potsdam.de
BIERQUE, LUC	QINETIQ SPACE, BELGIUM luc.bierque@qinetiq.be
BOLAND, JOHN	UNIVERSITY OF SOUTH AUSTRALIA, AUSTRALIA john.boland@unisa.edu.au
BONOMI, ANTONIO	BRAZILIAN BIOETHANOL SCIENCE AND TECHNOLOGY LABORATORY - CTBE, BRAZIL antonio.bonomi@bioetanol.org.br
BOONEN, KATRIEN	VITO, BELGIUM katrien.boonen@vito.be
BOUCHAIN, RAFAEL	INSTITUTO DE INVESTIGACIONES ECONÓMICAS UNAM, MEXICO modelo_insumoproducto@yahoo.com.mx
BOUCHAIN, RAFAEL	INSTITUTO DE INVESTIGACIONES ECONÓMICAS/UNAM, MEXICO modeloinsumoproducto@gmail.com
BOUWMEESTER, MAAIKE	UNIVERSITY OF GRONINGEN, NETHERLANDS m.c.bouwmeester@rug.nl
BRADLEY, PETER	UNIVERSITY OF THE WEST OF ENGLAND, UNITED KINGDOM peter.bradley@uwe.ac.uk
BRUCKNER, MARTIN	VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS, AUSTRIA martin.bruckner@wu.ac.at
BRUGUÉS, ALEJANDRO	EL COLEGIO DE LA FRONTERA NORTE, MEXICO abrugues@colef.mx
BULLON, DAVID	COSTA RICAN MINISTRY OF FOREIGN TRADE, COSTA RICA david.bullon@comex.go.cr
BURKOWSKI, ERIKA	UNIVERSIDADE FEDERAL DE JUIZ DE FORA, BRAZIL erikabkw@yahoo.com.br

FULL NAME	INSTITUTION, COUNTRY, EMAIL
CADARSO, MARIA	UNIVERSITY OF CASTILLA-LA MANCHA, SPAIN angeles.cadarso@uclm.es
CAGATAY, SELIM	DEPARTMENT OF ECONOMICS, AKDENIZ UNIVERSITY, TURKEY selimcagatay62@gmail.com
CALISKAN, ELIF	DEPARTMENT OF ECONOMICS, EGE UNIVERSITY, TURKEY eliftunalicaliskan@gmail.com
CANTO, SIMONE	FACULTY OF MECHANICAL ENGINEERING - UNIVERSITY OF CAMPINAS - BRAZIL, BRAZIL simone.tati@gmail.com
CARDENETE FLORES, MANUEL ALEJANDR(	UNIVERSITY PABLO DE OLAVIDE, SPAIN macardenete@upo.es
CARDOSO, TEREZINHA	BRAZILIAN BIOETHANOL SCIENCE AND TECHNOLOGY LABORATORY - CTBE, BRAZIL terezinha.cardoso@bioetanol.org.br
CARNEIRO, DIANA	FEDERAL UNIVERSITY OF RIO DE JANEIRO, BRAZIL dianac@physics.usyd.edu.au
CARRASCAL, ANDRE	IDEGA - UNIVERSITY OF SANTIAGO DE COMPOSTELA, SPAIN andre.carrascal@rai.usc.es
CASSIDY, NATALIE	MAASTRICHT GRADUATE SCHOOL OF GOVERNANCE, UNITED KINGDOM natalielcassidy@gmail.com
CASTILLO, JUAN CARLOS	UNU-MERIT, MAASTRICHT UNIVERSITY, NETHERLANDS castillo@merit.unu.edu
CAYAMANDA, CHRISTINA	DE LA SALLE UNIVERSITY, PHILIPPINES christina_cayamanda@dlsu.ph
CAZCARRO, IGNACIO	RENSSELAER POLYTECHNIC INSTITUTE (RPI), UNITED STATES cazcai@rpi.edu
CERNAT, LUCIAN	EC, BELGIUM lucian.cernat@ec.europa.eu
CERVANTES-MARTINEZ, ROSARIO	UNIVERSIDAD DE GUADALAJARA, MEXICO mariac@cucea.udg.mx
CHAGAS, MATEUS	BRAZILIAN BIOETHANOL SCIENCE AND TECHNOLOGY LABORATORY - CTBE, BRAZIL mateus.chagas@bioetanol.org.br
CHAKRABORTY, DEBESH	JADAVPUR UNIVERSITY,KOLKATA,INDIA, INDIA debesh_chakraborty@hotmail.com
CHANG, WEN-HUEI	INSTITUTE FOR WATER RESOURCES, USACE, UNITED STATES wen.h.chang@gmail.com
CHATZIDIMITROGLOU, CHRYSANTHI	ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS (AUEB), GREECE chrysanthich@hotmail.com
CHAUDHURY, SASWATA	THE ENERGY AND RESOURCES INSTITUTE, INDIA som0303@gmail.com
CHEN, BAOLINE	BUREAU OF ECONOMIC ANALYSIS, UNITED STATES baoline.chen@bea.gov
CHEN, GUANGWU	UNSW, AUSTRALIA guangwu.chen@student.unsw.edu.au
CHEN, QUANRUN	UNIVERSITY OF GRONINGEN, NETHERLANDS cqrmaths@163.com
CHEN, QUANRUN	ACADEMY OF MATHEMATICS AND SYSTEMS SCIENCE, CHINESE ACADEMY OF SCIENCES, CHINA qrchen@amss.ac.cn
CHEN, XIANGYIN	ACADEMY OF MATHEMATICS AND SYSTEMS SCIENCE, CAS, CHINA xchen04@gmail.com
CHEPELIEV, MAKSYM	"INSTITUTE FOR ECONOMICS AND FORECASTING, UKRAINIAN NATIONAL ACADEMY OF SCIENCES" (IEF/UNAS), UKRAINE chepelev@gmail.com
CHERUBINI, LUCA	BANK OF ITALY,, ITALY luca.cherubini@bancaditalia.it
CHRISTIS, MAARTEN	VITO, BELGIUM maarten.christis@vito.be
CIASCHINI, MAURIZIO	UNIVERSITY OF MACERATA, ITALY claudio.socci@alice.it
COELHO, DULCE	IPC-ISEC AND INESC, PORTUGAL dcoelho@isec.pt

FULL NAME	INSTITUTION, COUNTRY, EMAIL
COOKE, STEPHEN	IMPLAN GROUP LLC, UNITED STATES stephen.cooke@implan.com
CORTEZ, LUIS AUGUSTO	FACULTY OF AGRICULTURAL ENGINEERING - UNIVERSITY OF CAMPINAS - BRAZIL, BRAZIL cortez@feagri.unicamp.br
COSTA, INES	3DRIVERS-ENGINEERING, INNOVATION & ENVIRONMENT, PORTUGAL ines.santos.costa@gmail.com
CRUZ, LUÍS	GEMF - FAC. ECONOM. UNIV. COIMBRA, PORTUGAL lmgcruz@fe.uc.pt
CRUZ, MARIA	INE PORTUGAL, PORTUGAL conceicao.cruz@ine.pt
CUI, YUE	MICHIGAN STATE UNIVERSITY, UNITED STATES cuiyue.msu@gmail.com
CUNHA, MARCELO	INSTITUTE OF ECONOMICS - UNIVERSITY OF CAMPINAS, BRAZIL marcelocunha@eco.unicamp.br
DAALMANS, JACCO	STATISTICS NETHERLANDS, NETHERLANDS jadaalmans@hotmail.com
DANGA, ANNE MAYBELLE	DE LA SALLE UNIVERSITY - MANILA, PHILIPPINES amrdanga@gmail.com
DAS, PANCHANAN	UNIVERSITY OF CALCUTTA, INDIA panchanandaswbes@gmail.com
DASGUPTA, PARAMITA	ANANDA CHANDRA COLLEGE, INDIA paramitadasgupta23@gmail.com
DAVAR, EZRA	INDEPENDENT RESEARCHER, ISRAEL ezra.davar@gmail.com
DAVILA FLORES, ALEJANDRO	UNIVERSIDAD DE COAHUILA, MEXICO alejandro.davila@uadec.edu.mx
DE LA FUENTE, LAURA	UNIVERSITY OF OVIEDO, SPAIN laura@indurot.uniovi.es
DE MIGUEL-VELEZ, FRANCISCO JAVIER	UNIVERSITY OF EXTREMADURA, SPAIN demiguel@unex.es
DE VRIES, GAAITZEN	UNIVERSITY OF GRONINGEN, NETHERLANDS g.j.de.vries@rug.nl
DEDEGKAJEVA, ILJEN	STATISTICS ESTONIA, ESTONIA iljen.dedegkajeva@stat.ee
DEFENSE-PALOJARV, PILLE	EUROPEAN COMMISSION EUROSTAT, LUXEMBOURG pille.palojarv@ec.europa.eu
DEGER, CAGACAN	DEPT OF ECONOMICS, EGE UNIVERSITY, TURKEY cagacan@gmail.com
DELAHAYE, ROEL	STATISTICS NETHERLANDS, NETHERLANDS rdle@cbs.nl
DELGADO LÓPEZ, MARÍA DEL CARMEN	LOYOLA UNIVERSITY ANDALUSIA, SPAIN mcdelgado@uloyola.es
DELGADO SANCHO, LUIS	EUROPEAN COMMISSION, SPAIN luis.delgado@ec.europa.eu
DI COMITE, FRANCESCO	EUROPEAN COMMISSION, DG JRC, IPTS INSTITUTE, SPAIN francesco.di-comite@ec.europa.eu
DI FONZO, TOMMASO	ISTAT - ISTITUTO NAZIONALE DI STATISTICA, ITALY tdifonzo@istat.it
DIAS, ANA	PORTUGUESE ENVIRONMENT AGENCY, PORTUGAL anadias@apambiente.pt
DIAS, JOÃO	ISEG - LISBOA SCHOOL OF ECONOMICS & MANAGEMENT, PORTUGAL jdias@iseg.utl.pt
DIAS, JOSE	FACULTY OF ECONOMICS, UNIVERSITY OF COIMBRA, PORTUGAL, PORTUGAL zedias85@hotmail.com
DÍAZ, ALEJANDRO	EL COLEGIO DE LA FRONTERA NORTE, MEXICO adiazbau@gmail.com
DIETZENBACHER, ERIK	UNIVERSITY OF GRONINGEN, NETHERLANDS h.w.a.dietzenbacher@rug.nl
DILEKLI, NACI	RPI, UNITED STATES dilekn@rpi.edu

FULL NAME	INSTITUTION, COUNTRY, EMAIL
DILS, EVELIEN	VITO, BELGIUM evelien.dils@vito.be
DO AMARAL, JOÃO	ISEG, PORTUGAL famaral@iseg.utl.pt
DOBRESCU, EMILIAN	ROMANIAN ACADEMY, CENTRE FOR MACROECONOMIC MODELLING, ROMANIA emiliand@clicknet.ro
DONDOKOV, ZORIKTO	DEPARTMENT OF REGIONAL ECONOMIC INVESTIGATIONS, BURYAT SCIENTIFIC CENTRE, RUSSIAN ACADEMY OF SCIENCES, RUSSIAN dzorikto@mail.ru
DOUMAX-TAGLIAVINI, VIRGINIE	AIX-MARSEILLE UNIVERSITY, CERGAM, FRANCE vic.doumax@hotmail.fr
DROSDOWSKI, THOMAS	GWS, GERMANY drosdowski@gws-os.com
DUAN, YUWAN	INSTITUTE OF SYSTEMS SCIENCE ACADEMY OF MATHEMATICS AND SYSTEMS SCIENCE CHINESE ACADEMY OF SCIENCES, CHINA duanyuwan@126.com
DUARTE, ROSA	UNIVERSITY OF ZARAGOZA, SPAIN rduarte@unizar.es
DUCHIN, FAYE	RPI, UNITED STATES duchin@rpi.edu
DYRKHEEV, KONSTANTIN	DEPARTMENT OF REGIONAL ECONOMIC RESEARCHES, BURYAT SCIENTIFIC CENTRE, SIBERIAN BRANCH OF RUSSIAN ACADEMY OF SCIENCES, RUSSIA, RUSSIAN dyrkheev56@mail.ru
EDENS, BRAM	STATISTICS NETHERLANDS, NETHERLANDS bees@cbs.nl
EGUCHI, SHOGO	KYUSHU UNIVERSITY, JAPAN miero2004jp@yahoo.co.jp
EHSANI, MOHAMMAD ALI	UNIVERSITY OF MAZANDARAN, IRAN m.ehsani@umz.ac.ir
EISENMENGER, NINA	INSTITUTE OF SOCIAL ECOLOGY (SEC), IFF-VIENNA, ALPEN-ADRIA UNIVERSITY, AUSTRIA nina.eisenmenger@aau.at
EL MELIGI, ANDREA KARIM	UNIVERSITY OF MACERATA, ITALY a.elmeligi@unimc.it
ELY, ROMULO	ENERGY PLANNING PROGRAM - COPPE/ FEDERAL UNIVERSITY OF RIO DE JANEIRO, AUSTRALIA romulo@ppe.ufrj.br
ENRIQUEZ HERNANDEZ, LEOBARDO	FACULTAD DE ECONOMIA, UNAM, MEXICO leobardo.enriquez@gmail.com
ESCAITH, HUBERT	WORLD TRADE ORGANIZATION, SWITZERLAND hubert.escaith@wto.org
ESFANDIARI KALOUKAN, MOJTABA	ANDISHEH URBAN AND ECONOMIC RESEARCH INSTITUTION, IRAN esfandiari.mojtaba@gmail.com
ESPITIA, MOISÉS	UNIVERSIDAD AUTÓNOMA DE BAJA CALIFORNIA, MEXICO moisesespitia.g@gmail.com
ESTRADA, JOSÉ MANUEL	NATIONAL AUTONOMOUS UNIVERSITY OF MEXICO, MEXICO jmmechepo@gmail.com
FAGERBERG, JAN	TIK - UIO, NORWAY jan.fagerberg@tik.uio.no
FANG, DELIN	BEIJING NORMAL UNIVERSITY, CHINA delinf@163.com
FEBRERO, ELADIO	UNIVERSITY OF CASTILLA-LA MANCHA, SPAIN eladio.febrero@uclm.es
FENG, CAI	STATE INFORMATION CENTER OF CHINA, CHINA caisongfeng@126.com
FENG, GUANGMING	ACADEMICIAN,WORLD ACADEMY OF PRODUCTIVITY SCIENCE(WAPS), CHINA fenggm1954@163.com
FENG, KUISHUANG	UNIVERSITY OF LEEDS, UNITED KINGDOM lec3kf@leeds.ac.uk
FENG, KUISHUANG	UNIVERSITY OF MARYLAND, UNITED STATES kfeng@umd.edu

FULL NAME	INSTITUTION, COUNTRY, EMAIL
FERNANDEZ, MELCHOR	IDEGA-UNIVERSIDAD DE SANTIAGO DE COMPOSTELA, SPAIN melchor.fernandez@usc.es
FERNANDEZ VAZQUEZ, ESTEBAN	UNIVERSITY OF OVIEDO, SPAIN esfervaz@gmail.com
FERREIRA, JOÃO	GEMF - FACULTY OF ECONOMICS, UNIVERSITY OF COIMBRA, PORTUGAL joao.pr.ferreira@gmail.com
FISCHER, JAKUB	UNIVERSITY OF ECONOMICS, PRAGUE, CZECH REPUBLIC fischerj@vse.cz
FLEGG, ANTHONY	UNIVERSITY OF THE WEST OF ENGLAND, BRISTOL, UNITED KINGDOM tony.flegg@uwe.ac.uk
FLORES, CARLOS	EL COLEGIO DE LA FRONTERA NORTE, MEXICO falcon_fo@hotmail.com
FOLTETE, ANNE	EUROPEAN COMMISSION EUROSTAT, LUXEMBOURG anne.foltete@ec.europa.eu
FRACCASCIA, LUCA	POLITECNICO DI BARI, ITALY l.fraccascia@gmail.com
FROST, ROBIN	LANCASTER UNIVERSITY, UNITED KINGDOM r.frost2@lancaster.ac.uk
FRY, JACOB	UNIVERSITY OF SYDNEY, AUSTRALIA j.fry@physics.usyd.edu.au
FU, XUE	NANCHANG UNIVERSITY, CHINA fuxue@amss.ac.cn
FUENTES, NOÉ	EL COLEGIO DE LA FRONTERA NORTE, MEXICO afuentes@colef.mx
FUENTES SAGUAR, PATRICIA D.	UNIVERSIDAD PABLO OLAVIDE, SPAIN pfuesag@upo.es
FUJII, GERARDO	UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO (UNAM), MEXICO fujii@servidor.unam.mx
FÜGENSCHUH, ARMIN	HELMUT SCHMIDT UNIVERSITY, GERMANY fuegenschuh@hsu-hh.de
GANDY, SIMON	RICARDO-AEA, UNITED KINGDOM simon.gandy@ricardo-aea.com
GARAU, GIORGIO	UNIVERSITY OF SASSARI - DEPARTMENT OF POLITICAL SCIENCE, ITALY giorgio@uniss.it
GARAVELLI, ACHILLE	POLITECNICO DI BARI, ITALY c.garavelli@poliba.it
GARBELLINI, NADIA	UNIVERSITÀ DEGLI STUDI DI BERGAMO, ITALY nadia.garbellini@unipv.it
GARCÍA MUÑIZ, ANA	UNIVERSITY OF OVIEDO, SPAIN asgarciamu@gmail.com
GEERKEN, THEO	VITO, BELGIUM theo.geerken@vito.be
GEHLHAR, MARK	US DEPARTMENT OF THE INTERIOR OSM, UNITED STATES mgehlhar@gmail.com
GESCHKE, ARNE	ISA / UNIVERSITY OF SYDNEY, AUSTRALIA geschke@physics.usyd.edu.au
GHAEMI, MAHDI	UNIVERSITY OF ECONOMIC SCIENCES, IRAN m.ghaemi84@gmail.com
GHEZZI, LEONARDO	IRPET, ITALY leonardo.ghezzi@irpet.it
GIANNOCCARO, ILARIA	POLITECNICO DI BARI, ITALY ilaria.giannoccaro@poliba.it
GILJUM, STEFAN	SUSTAINABLE EUROPE RESEARCH INSTITUTE (SERI), AUSTRIA stefan.giljum@seri.at
GILMUNDINOV, VADIM	NOVOSIBIRSK STATE UNIVERSITY, INSTITUTE OF ECONOMICS AND INDUSTRIAL ENGINEERING (SIBERIAN BRANCH OF RUSSIAN ACADEMY OF SCIENCE), NOVOSIBIRSK STATE TECHNICAL UNIVERSITY, RUSSIAN gilmundinov@mail.ru
GOLDAR, AMRITA	INDIAN COUNCIL FOR RESEARCH ON INTERNATIONAL ECONOMIC RELATIONS, INDIA goldaramrita@gmail.com

FULL NAME	INSTITUTION, COUNTRY, EMAIL
GOMEZ, NURIA	UNIVERSIDAD DE CASTILLA-LA MANCHA, SPAIN nuria.gomez@uclm.es
GOMEZ, PEDRO	POSGRADO DE ECONOMÍA/UNAM, MEXICO pedrogomez.geo@gmail.com
GOMEZ Y PALOMA, SERGIO	EC-JRC-IPTS, SPAIN sergio.gomez-y-paloma@ec.europa.eu
GONÇALVES, CARLOS	UNIVERSIDADE ESTADUAL DO OESTE DO PARANÁ, BRAZIL carlosalbertojr@hotmail.com
GRILO, ISABEL	EC, BELGIUM isabel.grilo@ec.europa.eu
GRÜNEWALD, OLLE	NATIONAL BOARD OF TRADE, SWEDEN olle.grunewald@kommers.se
GUAN, DABO	UNIVERSITY OF CAMBRIDGE, UNITED KINGDOM dg346@cam.ac.uk
GUERRA, ANA ISABEL	UNIVERSIDAD DE GRANADA, SPAIN anaisabelguerra@ugr.es
GUEVARA, ZEUS	UNIVERSIDAD DE LISBOA, PORTUGAL zeus.guevara@ist.utl.pt
GUILHOTO, JOAQUIM	UNIVERSITY OF SAO PAULO, BRAZIL guilhoto@usp.br
GUNAL, GULCIN	DEPARTMENT OF ECONOMICS, EGE UNIVERSITY, TURKEY gulcngurel@gmail.com
GUO, JIEMIN	OECD, FRANCE jiemin.guo@oecd.org
GUO, LIN	UIBE, CHINA icecreamlinlin@gmail.com
GUTIERREZ-CARRERAS, ENRIQUE	NATIONAL AUTONOMOUS UNIVERSITY OF MEXICO, MEXICO enrique.gutierrez.c@gmail.com
GUTIÉRREZ-PEDRERO, MARÍA-JESÚS	UNIVERSITY OF CASTILLA - LA MANCHA, SPAIN mariajesus.gutierrez@uclm.es
GÜL, ZAFER	AKDENIZ UNIVERSITY, TURKEY zafergul1974@gmail.com
HABRMAN, MICHAL	UNIVERSITY OF ECONOMICS IN BRATISLAVA, DEPARTMENT OF ECONOMIC POLICY, SLOVAK REPUBLIC habrman.michal@gmail.com
HADDAD, EDUARDO	UNIVERSITY OF SAO PAULO, BRAZIL ehaddad@usp.br
HAMBÿE, CAROLINE	FEDERAL PLANNING BUREAU, BELGIUM ch@plan.be
HAQIQI, IMAN	UNIVERSITY OF ECONOMIC SCIENCES, MONETARY AND BANKING RESEARCH INSTITUTE, IRAN iman.haqiqi@gmail.com
HASEGAWA, RYOJI	OSAKA INTERNATIONAL UNIVERSITY, JAPAN hasegawa@oiu.jp
HASHIGUCHI, YOSHIHIRO	INSTITUTE OF DEVELOPING ECONOMIES, JETRO, JAPAN yoshihiro_hashiguchi@ide.go.jp
HE, JIANWU	DEVELOPMENT RESEARCH CENTER, THE STATE COUNCIL, CHINA, CHINA jianwu@drc.gov.cn
HENRIQUES, CARLA	POLYTECHNIC INSTITUTE OF COIMBRA ISCAC AND INESCC, PORTUGAL coliv@inescc.pt
HERTVELDT, BART	FEDERAL PLANNING BUREAU, BELGIUM bh@plan.be
HERTWICH, EDGAR	NORWEGIAN UNIVERSILTY OF SCIENCE AND TECHNOLOGY, NORWAY edgar.hertwich@ntnu.no
HEWITT, NICK	UNIVERSITY OF LANCASTER, UNITED KINGDOM n.hewitt@lancaster.ac.uk
HOEKSTRA, RUTGER	STATISTICS NETHERLANDS, NETHERLANDS rhka@cbs.nl
HORST, RONALD	INFORUM-UNIVERSITY OF MARYLAND, UNITED STATES ronald.horst@gmail.com

FULL NAME	INSTITUTION, COUNTRY, EMAIL
HOSOE, NOBUHIRO	NATIONAL GRADUATE INSTITUTE FOR POLICY STUDIES, JAPAN nhosoe@grips.ac.jp
HRISTU-VARSAKELIS, DIMITRIOS	UNIVERSITY OF MACEDONIA, GREECE dcv@uom.gr
HUANG, MICHAEL	GRIPS, JAPAN phd09009@grips.ac.jp
HUANG, YONGMING	INSTITUTE FOR DEVELOPMENT OF CENTRAL CHINA, WUHAN UNIVERSITY, CHINA hym@whu.edu.cn
HUBACEK, KLAUS	UNIVERSITY OF MARYLAND, UNITED STATES hubacek@umd.edu
IJTSMA, PIETER	UNIVERSITY OF GRONINGEN, NETHERLANDS p.a.ijtsma@rug.nl
INOMATA, SATOSHI	INSTITUTE OF DEVELOPING ECONOMIES JETRO, JAPAN satoshi_inomata@ide.go.jp
ITO, KEIKO	SENSHU UNIVERSITY, JAPAN keiko-i@isc.senshu-u.ac.jp
JAISWAL, RAJESH	NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH, INDIA jaiswal@ncaer.org
JAVIER, CASTAÑEDA	UNAM, MEXICO calj07@hotmail.com
JAVORSKÁ, EVA	UNIVERSITY OF ECONOMICS, PRAGUE, CZECH REPUBLIC ejavorska@seznam.cz
JIANG, XUEMEI	ACADEMY OF MATHEMATICS AND SYSTEMS SCIENCE, CHINESE ACADEMY OF SCIENCE, CHINA jiangxuem@gmail.com
JIANG, YONGKAI	SCHOOL OF ENVIRONMENT, TSINGHUA UNIVERSITY, CHINA thuyoungky@gmail.com
JIMENEZ, ERIK	UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO, MEXICO eaaronjimenezv@comunidad.unam.mx
JIMÉNEZ, SOFÍA	ZARAGOZA UNIVERSITY, SPAIN 588948@celes.unizar.es
JULIA, ROXANA	NEW YORK UNIVERSITY, UNITED STATES rj34@nyu.edu
KAGAWA, SHIGEMI	KYUSHU UNIVERSITY, JAPAN kagawa@en.kyushu-u.ac.jp
KAJITANI, YOSHIO	DISASTER PREVENTION RESEARCH INSTITUTE, KYOTO UNIVERSITY, JAPAN ykajitani@triton.ocn.ne.jp
KALIN, JANJA	STATISTICAL OFFICE OF THE REPUBLIC OF SLOVENIA, SLOVENIA janja.kalin@gov.si
KANCS, D'ARTIS	EUROPEAN COMMISSION, DG JOINT RESEARCH CENTRE, SPAIN dartis.kancs@gmail.com
KANEMOTO, KEIICHIRO	KYUSHU UNIVERSITY, JAPAN keiichiro.kanemoto@gmail.com
KARAGIANNI, STELLA	UNIVERSITY OF MACEDONIA, GREECE stelkar@uom.gr
KAVONIUS, ILJA	EUROPEAN CENTRAL BANK, GERMANY ilja_kristian.kavonius@ecb.int
KAY, DAVID	IMPLAN GROUP LLC, UNITED STATES david@implan.com
KELLY, SCOTT	4CMR, UNITED KINGDOM sjk64@cam.ac.uk
KENWAY, STEVEN	UNIVERSITY OF QUEENSLAND, AUSTRALIA s.kenway@uq.edu.au
KERN, PAUL	BUREAU OF ECONOMIC ANALYSIS, UNITED STATES paul.kern@bea.gov
KIKUCHI, YASUNORI	THE UNIVERSITY OF TOKYO, JAPAN kikuchi@platinum.u-tokyo.ac.jp
KIM, IGOR	THE HIGHER SCHOOL OF ECONOMICS (HSE), RUSSIAN igor_kim2000@yahoo.com

FULL NAME	INSTITUTION, COUNTRY, EMAIL
KIM, YUNHEE	OECD, FRANCE yunhee.kim@oecd.org
KO, JONG-HWAN	PUKYONG NATIONAL UNIVERSITY, KOREA, REPUBLIC OF jonghko@pknu.ac.kr
KOKS, ELCO	VU UNIVERSITY AMSTERDAM, NETHERLANDS elco.koks@vu.nl
KOLLER, WOLFGANG	-, AUSTRIA wolfgang.koller@wu.ac.at
KONDO, YASUSHI	WASEDA UNIVERSITY, JAPAN ykondo@waseda.jp
KONSTANTAKIS, KONSTANTINOS	NATIONAL TECHNICAL UNIVERSITY OF ATHENS, GREECE, GREECE konstantino.konstantaki@gmail.com
KRAMULOVA, JANA	UNIVERSITY OF ECONOMICS, PRAGUE, CZECH REPUBLIC jana.kramulova@vse.cz
KRATENA, KURT	WIFO-AUSTRIAN INSTITUTE OF ECONOMIC RESEARCH, AUSTRIA kurt.kratena@wifo.ac.at
KUBALA, JOZEF	UNIVERSITY OF ECONOMICS IN BRATISLAVA, SLOVAK REPUBLIC jozef.kubala@centrum.sk
KUBONIWA, MASAAKI	HITOTSUBASHI UNIVERSITY, JAPAN kuboniwa@ier.hit-u.ac.jp
KUNFU, ZHU	ACADEMY OF MATHEMATICS AND SYSTEMS SCIENCE, CAS, CHINA zhukunfu@163.com
KÜMMRITZ, VICTOR	THE GRADUATE INSTITUTE, GENEVA, SWITZERLAND victor.kummritz@graduateinstitute.ch
LÁBAJ, MARTIN	UNIVERSITY OF ECONOMICS IN BRATISLAVA, SLOVAK REPUBLIC martinlabaj@gmail.com
LABRÍN, FELIPE	CENTRAL BANK OF CHILE, CHILE flabrin@bcentral.cl
LAGER, CHRISTIAN	UNIVERSITY GRAZ, DEPARTMENT OF ECONOMICS, AUSTRIA christian.lager@uni-graz.at
LAHR, MICHAEL	RUTGERS UNIVERSITY, UNITED STATES lahr@rutgers.edu
LAN, JUN	UNIVERSITY OF SYDNEY, AUSTRALIA sonya.junlan@gmail.com
LAN, TIAN	ACADEMY OF MATHEMATICS AND SYSTEMS SCIENCE,CHINESE ACADEMY OF SCIENCES, CHINA tiankailan12@163.com
LANGARITA, RAQUEL	UNIVERSIDAD DE ZARAGOZA, SPAIN raquel_langarita@hotmail.com
LANKHUIZEN, MAUREEN	VU UNIVERSITY AMSTERDAM, NETHERLANDS m.b.m.lankhuizen@vu.nl
LATORRE, MARIA	UNIVERSIDAD COMPLUTENSE DE MADRID, SPAIN mmunozla@ucm.es
LECCA, PATRIZIO	FRASER OF ALLANDER INSTITUTE, UNIVERSITY OF STRATHCLYDE, UNITED KINGDOM patrizio.lecca@gmail.com
LEE, JIHYEON	THE BANK OF KOREA, KOREA, REPUBLIC OF leejihyeon@bok.or.kr
LEE, WOOKI	THE BANK OF KOREA, KOREA, REPUBLIC OF wooki@bok.or.kr
LEIJTING, JORRIT	PRE CONSULTANTS, NETHERLANDS leijting@pre-sustainability.com
LEJOUR, ARJAN	CPB NETHERLANDS BUREAU FOR ECONOMIC POLICY ANALYSIS, NETHERLANDS a.m.lejour@cpb.nl
LENZEN, MANFRED	ISA, AUSTRALIA m.lenzen@physics.usyd.edu.au
LEVERMANN, ANDERS	POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH, GERMANY anders.levermann@pik-potsdam.de
LEVINE, STEPHEN	TUFTS UNIVERSITY, UNITED STATES stephen.levine@tufts.edu

FULL NAME	INSTITUTION, COUNTRY, EMAIL
LEVY, ROB	UNIVERSITY COLLEGE LONDON, UNITED KINGDOM rob.levy.11@ucl.ac.uk
LI, DONGMEI	BEIJING RESEARCH CENTRE FOR SCIENCE OF SCIENCE, CHINA nihongfu_justin@126.com
LI, HUI	SCHOOL OF ECONOMICS, QINGDAO UNIVERSITY, CHINA lihuiamss@126.com
LI, NA	GRADUATE UNIVERSITY OF THE CHINESE ACADEMY OF SCIENCES, RESEARCH CENTER ON FICTITIOUS ECONOMY AND DATA SCIENCE OF CAS, CHINA lina@ucas.ac.cn
LI, SHANTONG	DEVELOPMENT RESEARCH CENTER OF THE STATE COUNCIL, CHINA shantong@drc.gov.cn
LIANG, SAI	UNIVERSITY OF MICHIGAN, ANN ARBOR, UNITED STATES liangsai09@gmail.com
LIMA, CARMEN	UNIVERSIDAD PABLO DE OLAVIDE, SPAIN mlimdia@upo.es
LIN, CHEN	THE CENTER FOR ECONOMIC RESEARCH, SHANDONG UNIVERSITY, CHINA c_lin@sdu.edu.cn
LIN, JIN-XU	DEPT. OF INTERNATIONAL BUSINESS, CHUNG YUAN CHRISTIAN UNIVERSITY, TAIWAN jxlin@cycu.edu.tw
LIN, SHIH-MO	CHUNG YUAN CHRISTIAN UNIVERSITY, TAIWAN shihmolin@gmail.com
LIU, MING	SHANDONG UNIVERSITY, CHINA lmll88@126.com
LIU, PENG	ACADEMY OF MATHEMATICS AND SYSTEMS SCIENCE, CHINA liupenglzu05@gmail.com
LIU, WEILIN	COLLEDGE OF ECONOMIC AND SOCIAL DEVELOPMENT,NANKAI UNIVERSITY, CHINA liuwlcn@163.com
LLOP, MARIA	CREIP, DEPARTAMENT D'ECONOMIA, UNIVERSITAT ROVIRA I VIRGILI, SPAIN maria.llop@urv.cat
LOPES, EMÍDIO	DGO, PORTUGAL emidio.lopes@dgo.pt
LOPES, JOÃO	UECE - ISEG/UNIVERSITY OF LISBOA, PORTUGAL jcflopes@iseg.utl.pt
LOPES, RICARDO	STATE UNIVERSITY OF MARINGA, BRAZIL rllopes@uem.br
LOPEZ, LUIS A.	UNIVERSIDAD DE CASTILLA-LA MANCHA, SPAIN luis.lsantiago@uclm.es
LOPEZ-MORALES, CARLOS	INSTITUTO GLOBAL PARA LA SOSTENIBILIDAD - INSTITUTO TECNOLÓGICO DE ESTUDIOS SUPERIORES MONTERREY, MEXICO caustica@gmail.com
LORENA, ANTÓNIO	INSTITUTO SUPERIOR TÉCNICO - UNIVERSIDADE DE LISBOA, PORTUGAL antonio.lorena@ist.utl.pt
LOS, BART	UNIVERSITY OF GRONINGEN, NETHERLANDS b.los@rug.nl
LUGOVOY, OLEG	ENVIRONMENTAL DEFENSE FUND, UNITED STATES olugovoy@hotmail.com
LUPTACIK, MIKULAS	XXX, AUSTRIA mikulas.luptacik@wu-wien.ac.at
LUTTER, F. STEPHAN	VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS, AUSTRIA stephan.lutter@wu.ac.at
LUTTER, STEPHAN	SUSTAINABLE EUROPE RESEARCH INSTITUTE (SERI), AUSTRIA stephan.lutter@seri.at
LUTZ, CHRISTIAN	GESELLSCHAFT FÜR WIRTSCHAFTLICHE STRUKTURFORSCHUNG MBH, GERMANY lutz@gws-os.com
MAHAJAN, SANJIV	OFFICE FOR NATIONAL STATISTICS, UNITED KINGDOM sanjiv.mahajan@ons.gsi.gov.uk
MAINAR CAUSAPÉ, ALFREDO JOSÉ	UNIVERSITY OF SEVILLA (SPAIN), SPAIN amainar@us.es
MALAGAMBA, ANA SOFÍA	UNAM, MEXICO asmalagamba@gmail.com

FULL NAME	INSTITUTION, COUNTRY, EMAIL
MALIK, ARUNIMA	THE UNIVERSITY OF SYDNEY, AUSTRALIA arunima_malik@hotmail.com
MANDRAS, GIOVANNI	UNIVERSITY OF SASSARI, ITALY giovannimandras@gmail.com
MANRESA, ANTONIO	UNIVERSITAT DE BARCELONA, SPAIN manresa@ub.edu
MARANGONI, GIANDEMETRIO	UNIVERSITY OF VERONA, ITALY giandemetrio.marangoni@univr.it
MARESCA, SANDRA	ITALIAN NATIONAL INSTITUTE OF STATISTICS, ITALY maresca@istat.it
MÁRIA, FORGON	HUNGARIAN CENTRAL STATISTICAL OFFICE, HUNGARY maria.forgon@ksh.hu
MARINI, MARCO	INTERNATIONAL MONETARY FUND, UNITED STATES mmarini@imf.org
MARKAKI, MARIA	NATIONAL TECHNICAL UNIVERSITY OF ATHENS, GREECE maniamarkaki@gmail.com
MARQUES, ALEXANDRA	FACULDADE DE CIÊNCIAS DA UNIVERSIDADE DE LISBOA, PORTUGAL apmarques@fc.ul.pt
MARQUES, MARTA	UNIVERSITY OF AVEIRO, PORTUGAL marta.marques@ua.pt
MARQUEZ, MARCO	FACULTAD DE ECONOMIA UNAM, MEXICO antoniomrqz@gmail.com
MÁRQUEZ ORDÓÑEZ, ELENA	STATISTICAL EXPERT, SPAIN elena.marquez78@gmail.com
MÁRQUEZ-MORANCHEL, CINTHIA	UNAM, MEXICO moraci_223@hotmail.com
MARTIN NUÑEZ, CESAR	JUNTA DE ANDALUCIA, SPAIN cesar.martin@juntadeandalucia.es
MARTÍNEZ, GILBERTO	EL COLEGIO DE LA FRONTERA NORTE, MEXICO gilberto_mtzs@hotmail.com
MARTINS, JOSÉ	UNIVERSITY OF AVEIRO, PORTUGAL jmm@ua.pt
MARY, SÉBASTIEN	EUROPEAN COMMISSION – JRC, SPAIN sebastien.mary@ec.europa.eu
MASAKOVA, IRINA	ROSSTAT, RUSSIAN imasakova@yandex.ru
MASTRONARDI, LEONARDO	UNIVERSIDAD ARGENTINA DE LA EMPRESA, ARGENTINA lmastronardi@uade.edu.ar
MATEI, NICOLETA ANCA	JRC-IPTS, ROMANIA nicoleta-anca.matei@ec.europa.eu
MATSUBAE, KAZUYO	TOHOKU UNIVERSITY, JAPAN matsubae@m.tohoku.ac.jp
MCDOUGALL, ROBERT	PURDUE UNIVERSITY, UNITED STATES rmcdougall@purdue.edu
MEADE, DOUGLAS	INFORUM/UNIVERSITY OF MARYLAND, UNITED STATES meade@econ.umd.edu
MENA RETANA, TAYUTIC	MINISTRY OF FOREIGN TRADE OF COSTA RICA, COSTA RICA tayutic.mena@comex.go.cr
MENG, BO	OECD/IDE-JETRO, FRANCE menghulu@yahoo.co.jp
MENG, BO	IDE-JETRO, JAPAN menghulu@gmail.com
MERLEVEDE, BRUNO	GHENT UNIVERSITY, BELGIUM bruno.merlevede@ugent.be
MI, RAYMOND	BAECONOMICS PTY LTD, AUSTRALIA raymondmi@baeconomics.com.au
MICHAELIDES, PANAYOTIS	NATIONAL TECHNICAL UNIVERSITY OF ATHENS, GREECE pmichael@central.ntua.gr
MICHEL, BERNHARD	FEDERAL PLANNING BUREAU, BELGIUM bm@plan.be

FULL NAME	INSTITUTION, COUNTRY, EMAIL
MILLER, RONALD	UNIVERSITY OF PENNSYLVANIA (EMERITUS), UNITED STATES remiller@sas.upenn.edu
MINX, JAN	TECHNISCHE UNIVERSITÄT BERLIN, GERMANY jan.c.minx@tu-berlin.de
MIROUDOT, SEBASTIEN	OECD, FRANCE sebastien.miroudot@oecd.org
MOLL, STEPHAN	EUROPEAN COMMISSION - EUROSTAT, LUXEMBOURG stephan.moll@ec.europa.eu
MONEM, KARIM	UNIVERSITY OF GRAZ, DEPARTMENT OF ECONOMICS, AUSTRIA karimmonem@gmx.de
MONSALVE, FABIO	UNIVERSITY OF CASTILLA-LA MANCHA, SPAIN fabio.monsalve@uclm.es
MORAN, DANIEL	UNIVERSITY OF SYDNEY, AUSTRALIA d.moran@physics.usyd.edu.au
MOREIRA, MARCELO	AGROICONE, BRAZIL marcelo@agroicone.com.br
MORENATE, MANUEL	UNIVERSIDAD DE CASTILLA-LA MANCHA, SPAIN manuel.morenate@alu.uclm.es
MORENO, LUCERO	EL COLEGIO DE LA FRONTERA NORTE, MEXICO luceroims@hotmail.com
MORETTO, ANTONIO	STATE UNIVERSITY OF LONDRINA - UEL, BRAZIL acmoretto@uel.br
MORI, SHUNSUKE	TOKYO UNIVERSITY OF SCIENCE, JAPAN sh_mori@rs.noda.tus.ac.jp
MORIOKA, RYOKO	NII, JAPAN morioka@nii.ac.jp
MORONES, LOURDES	EL COLEGIO DE LA FRONTERA NORTE, MEXICO lourdes_mc39@hotmail.com
MORTAZAVI KAKHKI, MORTEZA	UNIVERSITY OF ECONOMIC SCIENCES, IRAN mortazavi.k@gmail.com
MOTORIN, VLADIMIR	HIGHER SCHOOL OF ECONOMICS, RUSSIAN motoriny@gmail.com
MOUSAVI-NIK, HADI	PARLIAMENT RESEARCH CENTER OF I.R. IRAN, IRAN hadi.mousavy@gmail.com
MOYLAN, CAROL	BUREAU OF ECONOMIC ANALYSIS, UNITED STATES carol.moylan@bea.gov
MUKHOPADHYAY, KAKALI	MCGILL UNIVERSITY, CANADA kakali.mukhopadhyay@mcgill.ca
MUÑÁN, JORGE	EL COLEGIO DE LA FRONTERA NORTE, MEXICO jmunan20@gmail.com
MURRAY, JOY	UNIVERSITY OF SYDNEY, AUSTRALIA j.murray@physics.usyd.edu.au
MUSIL, PETR	UNIVERSITY OF ECONOMICS, CZECH REPUBLIC petr.musil@vse.cz
MÖNNIG, ANKE	INSTITUTE FOR ECONOMIC STRUCTURES RESEARCH - GWS, GERMANY moennig@gws-os.com
NAGASAKA, TETSUYA	TOHOKU UNIVERSITY, JAPAN t-nagasaka@m.tohoku.ac.jp
NAKAJIMA, KENICHI	NATIONAL INSTITUTE FOR ENVIRONMENTAL STUDIES, JAPAN nakajima.kenichi@nies.go.jp
NAKAMURA, SHINICHIRO	WASEDA UNIVERSITY, ECONOMICS, JAPAN nakashin@waseda.jp
NAKANO, KAZUYOSHI	CENTRAL RESEARCH INSTITUTE OF ELECTRIC POWER INDUSTRY, JAPAN k-nakano@criepi.denken.or.jp
NAKANO, SATOSHI	THE JAPAN INSTITUTE FOR LABOUR POLICY AND TRAINING, JAPAN nakano@sanken.keio.ac.jp
NAKANO, YUKINORI	SPS, KWANSEI GAKUIN UNIVERSITY, JAPAN z97033@kwansei.ac.jp
NAKAZAWA, EIICHI	MEIKAI UNIVERSITY, JAPAN a1.nkzw@gmail.com

FULL NAME	INSTITUTION, COUNTRY, EMAIL
NANSAI, KEISUKE	NAT. INST. FOR ENV. STUDIES (NIES), JAPAN nansai.keisuke@nies.go.jp
NARAYANAN, BADRI	PURDUE UNIVERSITY, UNITED STATES badri@purdue.edu
NEGI, GAUTAM	MANAV RACHNA INTERNATIONAL UNIVERSITY, INDIA negi_gautam@yahoo.com
NI, HONGFU	BEIJING RESEARCH CENTRE FOR SCIENCE OF SCIENCE, CHINA nihongfu@gsm.pku.edu.cn
NISHIMURA, KAZUHIKO	NIHON FUKUSHI UNIVERSITY, JAPAN nishimura@n-fukushi.ac.jp
NORDAS, HILDEGUNN	OECD, FRANCE hildegunn.nordas@oecd.org
NORDSTROM, HAKAN	NATIONAL BOARD OF TRADE, SWEDEN hakan.nordstrom@kommers.se
NOZAKI, MICHIYA	VISITING RESEARCHER, CHUO UNIVERSITY, JAPAN michi_post@kfx.biglobe.ne.jp
NUGROHO, ANDA	FISCAL POLICY OFFICE - MINISTRY OF FINANCE, INDONESIA anda.nugroho@depkeu.go.id
NYHUS, DOUGLAS	INFORUM, UNIVERISTY OF MARYLAND, UNITED STATES nyhus@econ.umd.edu
OHNO, HAJIME	TOHOKU UNIVERSITY, JAPAN fy11041@mail.kankyo.tohoku.ac.jp
OKAMOTO, SHUNSUKE	KYUSHU UNIVERSITY, JAPAN solitario_halcon_azul@yahoo.co.jp
OKUYAMA, YASUHIDE	UNIVERSITY OF KITAKYUSHU, JAPAN okuyama@naa.att.ne.jp
OOSTERHAVEN, JAN	UNIVERSITY OF GRONINGEN, NETHERLANDS j.oosterhaven@rug.nl
OROZCO-MORALES, ROBERTO CARLOS	UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO, MEXICO stradivari1768@yahoo.com.mx
ORTEGA, LUIS	UNAM, MEXICO lortegasegura@gmail.com
OSHITA, YUKO	KOBE UNIVERSITY, JAPAN y_oshita@maritime.kobe-u.ac.jp
OSORIO, GERMÁN	EL COLEGIO DE LA FRONTERA NORTE, MEXICO novela88@hotmail.com
OWEN, ANNE	UNIVERSITY OF LEEDS, UNITED KINGDOM a.owen@leeds.ac.uk
OZES, REYHAN	AKDENIZ UNIVERSITY, TURKEY reyhan_ozes@hotmail.com
PAGSUYOIN, SHEREE	UNIVERSITY OF WATERLOO, CANADA spagsuyo@uwaterloo.ca
PAIXAO, PAULO	DADOS&CENÁRIOS, BRAZIL paulopaixao@terra.com.br
PAL, BARUN	INSTITUTE FOR SOCIAL AND ECONOMIC CHANGE, INDIA palbarundeb@gmail.com
PARINGIT, ENRICO	UNIVERSITY OF THE PHILIPPINES, PHILIPPINES paringit@gmail.com
PARREIRAL, ANDRÉ	FACULTY OF ECONOMICS, UNIVERSITY OF COIMBRA, PORTUGAL acruzparreiral@gmail.com
PEI, JIANSUO	UNIVERSITY OF INTERNATIONAL BUSINESS AND ECONOMICS, CHINA jiansuo.pei@gmail.com
PEMPETZOGLOU, MARIA	DEMOCRITUS UNIVERSITY OF THRACE, GREECE mariap@socadm.duth.gr
PEON, RAUL	UNAM, MEXICO kovennanth@gmail.com
PEREIRA, HENRIQUE	GERMAN CENTRE FOR INTEGRATIVE BIODIVERSITY RESEARCH (IDIV) HALLE-JENA-LEIPZIG, GERMANY hpereira@idiv.de

FULL NAME	INSTITUTION, COUNTRY, EMAIL
PEREZ PEÑA, RAFAEL	EL COLEGO DE LA FRONTERA NORTE, MEXICO rafael_zerep@hotmail.com
PEROBELLI, FERNANDA	PPGEA-UFJF, BRAZIL fernandafinotti.perobelli@ufjf.edu.br
PEROBELLI, FERNANDO	FEDERAL UNIVERSITY OF JUIZ DE FORA, BRAZIL fernando.perobelli@ufjf.edu.br
PFISTER, STEPHAN	ETH, SWITZERLAND stephan.pfister@ifu.baug.ethz.ch
PIAGGIO, MATÍAS	INSTITUTO DE ECONOMÍA - UNIVERSIDAD DE LA REPÚBLICA, URUGUAY matias.piaggio@gmail.com
PIANTADOSI, JULIA	UNIVERSITY OF SOUTH AUSTRALIA, AUSTRALIA julia.piantadosi@unisa.edu.au
PIONTKOVSKI, DMITRI	NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS, RUSSIAN dpiontkovski@hse.ru
PLICH, MARIUSZ	UNIVERSITY OF LODZ, POLAND plich@uni.lodz.pl
PLOTTIER, MARIA	UNIVERSITY OF GRONINGEN, NETHERLANDS m.c.plottier@rug.nl
POLBIN, ANDREY	THE RUSSIAN PRESIDENTIAL ACADEMY OF NATIONAL ECONOMY AND PUBLIC ADMINISTRATION, RUSSIAN apolbin@gmail.com
POLO, CLEMENTE ANDRÉS	DEPARTMENT OF ECONOMICS AND ECONOMIC HISTORY, SPAIN clemente.polo@uab.es
POTASHNIKOV, VLADIMIR	THE RUSSIAN PRESIDENTIAL ACADEMY OF NATIONAL ECONOMY AND PUBLIC ADMINISTRATION, RUSSIAN potashnikov.vu@gmail.com
POTTERS, LESLEY	EUROPEAN COMMISSION - DG JRC - IPTS, SPAIN lesley.potters@ec.europa.eu
PRABHAKAR, AVANTIKA	NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH, INDIA avantikaprabhakar23@gmail.com
PRAKASH, SHRI	BIRLA INSTITUTE OF MANAGEMENT TECHNOLOGY, INDIA shri.prakash@bimtech.ac.in
PRELL, CHRISTINA	UNIVERSITY OF MARYLAND, UNITED STATES cprell@umd.edu
PRETAROLI, ROSITA	UNIVERSITY OF MACERATA, ITALY pretaroli@unimc.it
PRETAROLI, ROSITA	UNIVERSITY OF MACERATA, ITALY pretaroli@katamail.com
PRETO, MIGUEL	FEUC AND IN+/IST, PORTUGAL miguel.preto@gmail.com
PROMENTILLA, MICHAEL	DE LA SALLE UNIVERSITY, PHILIPPINES michael.promentilla@dlsu.edu.ph
PUCHET ANYUL, MARTÍN	UNAM, MEXICO anyul@unam.mx
RADEBACH, ALEXANDER	MERCATOR RESEARCH INSTITUTE ON GLOBAL COMMONS AND CLIMATE CHANGE (MCC), GERMANY alexander.radebach@mcc-berlin.net
RAMOS, CARMEN	UNIVERSIDAD DE OVIEDO, SPAIN cramos@uniovi.es
RAMOS, PEDRO	GEMF - UNIVERSTY OF COIMBRA, FACULTY OF ECONOMICS, PORTUGAL pnramos@fe.uc.pt
REICH, UTZ	MAINZ UNIVERSITY OF APPLIED SCIENCES (EM.), GERMANY utz.reich@gmail.com
RÉMOND-TIEDREZ, ISABELLE	EUROSTAT - EUROPEAN COMMISSION, LUXEMBOURG isabelle.remond-tiedrez@ec.europa.eu
RESURRECCION, JOANNA	UNIVERSITY OF THE PHILIPPINES, PHILIPPINES joanna71304@yahoo.com
REUTTER, BEATRIZ	THE UNIVERSITY OF QUEENSLAND, AUSTRALIA b.reutter@uqconnect.edu.au

FULL NAME	INSTITUTION, COUNTRY, EMAIL
REYES, RACHEL	DE LA SALLE UNIVERSITY, PHILIPPINES rachel.c.reyes@gmail.com
REYNOLDS, CHRISTIAN	THE UNIVERSITY OF SOUTH AUSTRALIA, AUSTRALIA christian.reynolds@unisa.edu.au
RIBEIRO, PAULO	3DRIVERS, PORTUGAL pribeiro@3drivers.pt
RITTER, LIANE	STATISTISCHES BUNDESAMT, GERMANY liane.ritter@destatis.de
RODRIGUES, JOAO	INSTITUTO SUPERIOR TECNICO, UNIVERSIDADE DE LISBOA, PORTUGAL joao.rodrigues@tecnico.ulisboa.pt
RODRIGUES, ROSSANA	STATE UNIVERSITY OF LONDRINA - UEL, BRAZIL rlott@uel.br
RODRÍGUEZ, OSCAR	NATIONAL AUTONOMOUS UNIVERSITY OF MEXICO, MEXICO ocr@ciencias.unam.mx
ROJAS-ROMAGOSA, HUGO	CPB NETHERLANDS BUREAU FOR ECONOMIC POLICY ANALYSIS, NETHERLANDS romagosa17@gmail.com
ROMERO, CARLOS	UNIVERSIDAD ARGENTINA DE LA EMPRESA, ARGENTINA cromero@uade.edu.ar
ROMERO RAMIREZ, VICTOR	FACULTAD DE ECONOMIA, UNAM, MEXICO romero.vic_@hotmail.com
ROSALES, VIVIANA	CENTRAL BANK OF CHILE, CHILE vrosales@bcentral.cl
ROSSIGNOLI, DOMENICO	DISEIS - UNIVERSITÀ CATTOLICA DEL SACRO CUORE MILANO, ITALY domenico.rossignoli@unicatt.it
ROSSUM, MAARTEN	STATISTICS NETHERLANDS, NETHERLANDS m.vanrossum@cbs.nl
ROUZET, DOROTHEE	OECD, FRANCE dorothee.rouzet@oecd.org
RUBÍNOVÁ, STELA	THE GRADUATE INSTITUTE OF INTERNATIONAL AND DEVELOPMENT STUDIES, IHEID, SWITZERLAND stela.rubinova@iheid.ch
RUEDA-CANTUCHE, JOSÉ	INSTITUTE FOR PROSPECTIVE AND TECHNOLOGICAL STUDIES (IPTS), SPAIN jmruecan@upo.es
RUIZ-NAPOLES, PABLO	UNIVERSIDAD NACIONAL AUTONOMA DE MEXICO, MEXICO ruizna@unam.mx
RUSSELL, MATTHEW	BUREAU OF ECONOMIC ANALYSIS, UNITED STATES matthew.russell@bea.gov
SAARI, MOHD YUSOF	UNIVERSITI PUTRA MALAYSIA, MALAYSIA mysaari@gmail.com
SABORIO, GABRIELA	BANCO CENTRAL DE COSTA RICA, COSTA RICA saboriomg@bccr.fi.cr
SAITO, MIKA	INTERNATIONAL MONETARY FUND, UNITED STATES msaito@imf.org
SALUJA, MANGAT	INDIA DEVELOPMENT FOUNDATION, INDIA mrsaluja@yahoo.com
SÁNCHEZ, NATALIA	MINISTERIO DE COMERCIO EXTERIOR, COSTA RICA natalia.sanchez@comex.go.cr
SÁNCHEZ CHÓLIZ, JULIO	UNIVERSITY OF ZARAGOZA, SPAIN jsanchez@unizar.es
SANTINI, FABIEN	IPTS, SPAIN fabien.santini@ec.europa.eu
SANTOS, JOOST	GEORGE WASHINGTON UNIVERSITY, UNITED STATES joost@gwu.edu
SANTOS, SUSANA	ISEG (SCHOOL OF ECONOMICS AND MANAGEMENT)/UTL - TECHNICAL UNIVERSITY OF LISBON; UECE – RESEARCH UNIT ON COMPLEXITY AND ECONOMICS, PORTUGAL ssantos@iseg.utl.pt
SARASA, CRISTINA	UNIVERSITY OF ZARAGOZA, SPAIN csarasa@unizar.es
SARGENTO, ANA	POLYTECHNIC INSTITUTE OF LEIRIA, PORTUGAL ana.sargento@ipleiria.pt

FULL NAME	INSTITUTION, COUNTRY, EMAIL
SAYAPOVA, ALSU	INSTITUTE OF ECONOMIC FORECASTING (RUSSIAN ACADEMY OF SCIENCE), RUSSIAN asajaf@mail.ru
SCHAFFARTZIK, ANKE	INSTITUTE OF SOCIAL ECOLOGY (SEC), IFF-VIENNA, ALPEN-ADRIA UNIVERSITY, AUSTRIA anke.schaffartzik@aau.at
SCHENAU, SJOERD	BUREAU OF STATISTICS, NETHERLANDS sscn@cbs.nl
SCHOER, KARL	SUSTAINABLE SOLUTIONS GERMANY - CONSULTANTS GMBH, GERMANY karl@schoer.net
SCHRÖDER, THOMAS	FORSCHUNGSZENTRUM JÜLICH, GERMANY t.schroeder@fz-juelich.de
SCHULT, HAUKE	MERCATOR RESEARCH INSTITUTE ON GLOBAL COMMONS AND CLIMATE CHANGE, GERMANY schult@mcc-berlin.net
SCHULTE IN DEN BAEUMEN, HAGEN	SCHOOL OF PHYSICS, UNIVERSITY OF SYDNEY, AUSTRALIA hagen@physics.usyd.edu.au
SCOTT, KATE	UNIVERSITY OF LEEDS, UNITED KINGDOM k.a.scott@leeds.ac.uk
SEABRA, JOAQUIM	FACULTY OF MECHANICAL ENGINEERING - UNIVERSITY OF CAMPINAS - BRAZIL, BRAZIL jeaseabra@gmail.com
SENGUPTA, ANINDITA	HOOGHLY WOMEN'S COLLEGE, INDIA asengupta15@yahoo.com
SENGUPTA, PRIYAM	INDIAN CHAMBER OF COMMERCE, INDIA priyamsenguptaster@gmail.com
SERRANO, MONICA	UNIVERSITY OF BARCELONA, SPAIN monica.serrano@ub.edu
SERRANO GONZÁLEZ, ANA	UNIVERSIDAD DE ZARAGOZA, SPAIN asergon@unizar.es
SEVERINI, FRANCESCA	UNIVERSITY POLITHECNIC OF MARCHE, ITALY f.severini@univpm.it
SEVERINI, FRANCESCA	UNIVERSITY OF MACERATA, ITALY francesca.severini@unimc.it
SFETSOS, ATHANASIOS	NATIONAL CENTER FOR SCIENTIFIC RESEARCH DEMOKRITOS, GREECE ts@ipta.demokritos.gr
SHARIFY, NOORADDIN	MAZANDARAN UNIVERSITY, IRAN nsharify@umz.ac.ir
SHARMA, AKHILESH	IEG, NEW DELHI, INDIA aksbhu2608@gmail.com
SHARMA, RITU	IMS, NOIDA, INDIA ritusharma_79@yahoo.com
SHI, MINJUN	GRADUATE UNIVERSITY OF CHINESE ACADEMY OF SCIENCES, CHINA mjshi@gucas.ac.cn
SHIBATA, TSUBASA	INSTITUTE OF DEVELOPING ECONOMIES, JAPAN TRADE ORGANIZATION (IDE-JETRO), JAPAN tsubasa_shibata@ide.go.jp
SHIGETOMI, YOSUKE	RESEARCH FELLOW OF JAPAN SOCIETY FOR THE PROMOTION OF SCIENCE, JAPAN / KYOTO UNIVERSITY / NATIONAL INSTITUTE FOR ENVIRONMENTAL STUDIES, JAPAN shigetomi.yosuke.46w@st.kyoto-u.ac.jp
SHIRONITTA, KAYOKO	KYUSHU UNIVERSITY, JAPAN kayoko.s137@gmail.com
SHIYUN, ZHANG	BEIJING RESEARCH CENTRE FOR SCIENCE OF SCIENCE, CHINA zhangshiyun@vip.sina.com
SIKDAR, CHANDRIMA	INDIAN INSTITUTE OF FOREIGN TRADE, INDIA sikdarc@rediffmail.com
SIMAS, MOANA	NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, NORWAY moana.s.simas@ntnu.no
SINGH, MANOJ	GOKHALE INSTITUTE OF POLITICS & ECONOMICS,PUNE, INDIA manoj@ceolution.com
SINHA, ANUSHREE	NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH, INDIA asinha@ncaer.org
SIROEN, JEAN	UNIVERSITÉ PARIS-DAUPHINE, FRANCE siroen@dauphine.fr

FULL NAME	INSTITUTION, COUNTRY, EMAIL
SIXTA, JAROSLAV	CZECH STATISTICAL OFFICE, CZECH REPUBLIC jaroslav.sixta@czso.cz
SKELTON, ANDREW	UNIVERSITY OF CAMBRIDGE, UNITED KINGDOM as858@cam.ac.uk
SOCCI, CLAUDIO	UNIVERSITY OF MACERATA, ITALY socci_claudio@unimc.it
SOTO-GONZÁLEZ, DAVID	UCLM ALBACETE, SPAIN davidsoto31@hotmail.es
SOUSA, TÂNIA	IST, PORTUGAL taniasousa@ist.utl.pt
SPRINGER, NATHANIEL	UC DAVIS, UNITED STATES nat.springer@gmail.com
SPRINGMANN, MARCO	UNIVERSITY OF OLDENBURG, GERMANY marco.springmann@uni-oldenburg.de
SQUARCIO, CARMELA	ISTAT, ITALY squarcio@istat.it
STADLER, KONSTANTIN	INDUSTRIAL ECOLOGY PROGRAMME, NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (NTNU), NORWAY konstantin.stadler@ntnu.no
STARITSYNA, ELENA	THE HIGHER SCHOOL OF ECONOMIES (HSE), RUSSIAN estaritsyna@gmail.com
STECKEL, JAN	TU BERLIN; MERCATOR RESEARCH INSTITUTE ON GLOBAL COMMONS AND CLIMATE CHANGE; POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH, GERMANY steckel@mcc-berlin.net
STEEN-OLSEN, KJARTAN	NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, NORWAY kjartan.steen-olsen@ntnu.no
STEENGE, ALBERT	UNIVERSITY OF GRONINGEN, NETHERLANDS a.e.steenge@rug.nl
STEHRER, ROBERT	THE VIENNA INSTITUTE FOR INTERNATIONAL ECONOMIC STUDIES - WIIW, AUSTRIA robert.stehrer@wiiw.ac.at
STONE, SUSAN	OECD, FRANCE susan.stone@oecd.org
STRASSNER, ERICH	BUREAU OF ECONOMIC ANALYSIS, UNITED STATES erich.strassner@bea.gov
STREICHER, GERHARD	WIFO, AUSTRIA gst43@gmx.at
STÖVER, BRITTA	GWSMBH, GERMANY stoever@gws-os.com
SU, BIN	ENERGY STUDIES INSTITUTE, NATIONAL UNIVERSITY OF SINGAPORE, SINGAPORE subin@nus.edu.sg
SUÁREZ, LEIDY	EL COLEGIO DE LA FRONTERA NORTE, CUBA leidybqs@gmail.com
SUGIYARTO, GUNTUR	ASIAN DEVELOPMENT BANK (ADB), PHILIPPINES gsugiyarto@adb.org
SUH, SANGWON	UNIVERSITY OF MINNESOTA, UNITED STATES sangwon@umn.edu
SUH, SANGWON	UNIVERSITY OF CALIFORNIA, SANTA BARBARA, UNITED STATES suh@bren.ucsb.edu
SUN, LAIXIANG	XXX, UNITED KINGDOM ls28@soas.ac.uk
SUN, YA-YEN	NATIONAL CHENG KUNG UNIVERSITY, TAIWAN yysun@ncku.edu.tw
SYRTLANOV, ISKANDER	MOSCOW STATE UNIVERSITY, RUSSIAN syrtlanov_iv@mail.ru
TABORDA, JENNIFER	UNU-MERIT, MAASTRICHT UNIVERSITY, NETHERLANDS taborda@merit.unu.edu
TACERO, MILAGROS	UNIVERSIDAD AUTONOMA DE MADRID, SPAIN milagros.dones@uam.es
TAGHINEZHAD OMRAN, VAHID	MAZANDARAN UNIVERSITY, IRAN omran@umz.ac.ir

FULL NAME	INSTITUTION, COUNTRY, EMAIL
TAGLIONI, DARIA	WORLD BANK, UNITED STATES daria.taglioni@graduateinstitute.ch
TAKASE, KOJI	+81-54-238-4561, JAPAN jktakas@ipc.shizuoka.ac.jp
TAMESUE, KAZUKI	UNIVERSITY OF TSUKUBA, JAPAN tamesue.kazuki@sk.tsukuba.ac.jp
TAN, RAYMOND	DE LA SALLE UNIVERSITY MANILA, PHILIPPINES raymond.tan@dlsu.edu.ph
TARANCON, MIGUEL-ANGEL	UNIVERSITY OF CASTILLA - LA MANCHA, SPAIN miguelangel.tarancon@uclm.es
TASDOGAN, CELAL	GAZI UNIVERSITY, TURKEY tasdogan@hotmail.com
TEMURSHOEV, UMED	EUROPEAN COMMISSION, JOINT RESEARCH CENTRE, INSTITUTE FOR PROSPECTIVE TECHNOLOGICAL STUDIES, SPAIN umed.temurshoev@ec.europa.eu
TERAN-VARGAS, JOSE	INEGI, MEXICO ppteran@gmail.com
THISSEN, MARK	PBL NETHERLANDS ENVIRONMENTAL ASSESSMENT AGENCY, NETHERLANDS mark.thissen@pbl.nl
THOMASSIN, PAUL	MCGILL UNIVERSITY, CANADA paul.thomassin@mcgill.ca
TIMMER, MARCEL	UNIVERSITY OF GRONINGEN, NETHERLANDS m.p.timmer@rug.nl
TOBARRA-GOMEZ, MARIA A.	UNIVERSIDAD DE CASTILLA - LA MANCHA, SPAIN mariaangeles.tobarra@uclm.es
TOFFOLI, LORENZO	UNIVERSITÀ CATTOLICA DEL SACRO CUORE, ITALY lorenzo.toffoli@unicatt.it
TOHMO, TIMO	UNIVERSITY OF JYVÄSKYLÄ, FINLAND timo.tohmo@jyu.fi
TOHNO, SUSUMU	KYOTO UNIVERSITY, JAPAN knansai@ybb.ne.jp
TOKUTSU, ICHIRO	KOBE UNIVERSITY, JAPAN tokutsu@port.kobe-u.ac.jp
TSUDA, KOJI	NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY, JAPAN koji.tsuda@aist.go.jp
TSUKUI, MAKIKO	TOKYO INTERNATIONAL UNIVERSITY, JAPAN makiko@tiu.ac.jp
TUKKER, ARNOLD	TNO BUILT ENVIRONMENT AND GEOSCIENCES, NETHERLANDS arnold.tukker@tno.nl
TYSHCHUK, TETYANA	INSTITUTE OF ECONOMISC AND FORECASTING, UKRAINE tetyana-tyshchuk@yandex.ru
TÖBBEN, JOHANNES	FORSCHUNGSZENTRUM JÜLICH GMBH, GERMANY j.toebben@fz-juelich.de
USTINOVA, NATALIA	ROSSTAT, RUSSIAN ustinova@gks.ru
VALE, VINICIUS	FEDERAL UNIVERSITY OF JUIZ DE FORA, BRAZIL vinicius.a.vale@gmail.com
VALINEJAD AHANGAREE, TAHEREH	UNIVERSITY OF MAZANDARAN, IRAN valinejad59@yahoo.com
VALLE, ELISABETH	UNIVERSITY OF BALEARIC ISLAND, SPAIN elisabeth.valle@uib.es
VALLÉS FERRER, JOSÉ	UNIVERSITY OF SEVILLE, SPAIN jvalles@us.es
VAN DEN CRUYCE, BART	FEDERAAL PLANNING BUREAU, BELGIUM bv@plan.be
VAN DER LINDEN, ANN	VITO NV, BELGIUM ann.vanderlinden@vito.be
VARGA, EVA	HUNGARIAN CENTRAL STATISTICAL OFFICE, HUNGARY eva.varga2@ksh.hu

FULL NAME	INSTITUTION, COUNTRY, EMAIL
VÁZQUEZ LÓPEZ, ITZEL	UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO, FACULTAD DE ECONOMÍA, MEXICO itzax14@gmail.com
VÁZQUEZ-BRAVO, FERNANDO	UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO (UNAM), MEXICO fando.vazquez@gmail.com
VEENENDAAL, PAUL	CPB NETHERLANDS BUREAU FOR ECONOMIC POLICY ANALYSIS, NETHERLANDS p.j.j.veenendaal@cpb.nl
VELAZQUEZ, MARIANA	POSGRADO DE ECONOMÍA/UNAM, MEXICO marianaunamiiec@gmail.com
VENEGAS, JOSÉ	BANCO CENTRAL DE CHILE (UNTIL FEB-28-2014), CHILE jovenegas@gmail.com
VERCALSTEREN, AN	VITO, BELGIUM an.vercalsteren@vito.be
VERSPAGEN, BART	UNU-MERIT, NETHERLANDS b.verspagen@maastrichtuniversity.nl
VIERHAUS, INGMAR	ZUSE INSTITUTE BERLIN, GERMANY vierhaus@zib.de
VIVANCO, JOSÉ	UNAM, MEXICO trinidad.vivanco@gmail.com
VLTAVSKA, KRISTYNA	UNIVERSITY OF ECONOMICS, PRAGUE, CZECH REPUBLIC kristyna.vltavska@vse.cz
WALTER, ARNALDO	FACULTY OF MECHANICAL ENGINEERING - UNIVERSITY OF CAMPINAS - BRAZIL, BRAZIL awalter@fem.unicamp.br
WAN, LIYANG	CENTER FOR EARTH SYSTEM SCIENCE, TSINGHUA UNIVERSITY, CHINA wlycool@foxmail.com
WANG, HAIKUN	NANJING UNIVERSITY, CHINA wanghk@nju.edu.cn
WANG, HUIJUAN	SCHOOL OF STATISTICS AND MATHEMATICS, CENTRAL UNVIERSITY OF FINANCE AND ECONOMICS, CHINA huijuan-wang@163.com
WANG, YAFEI	INSTITUTE OF NATIONAL ACCOUNTS, BEIJING NORMAL UNIVERSITY, CHINA ywang@bnu.edu.cn
WARGADALAM, VERINA	MINISTRY OF ENERGY AND MINERAL RESOURCES, INDONESIA verinawargadalam@yahoo.com
WASSHAUSEN, DAVID	U.S. BUREAU OF ECONOMIC ANALYSIS, UNITED STATES david.wasshausen@bea.gov
WATSON, PHILIP	UNIVERSITY OF IDAHO, UNITED STATES pwatson@uidaho.edu
WEBB, COLIN	OECD, FRANCE colin.webb@oecd.org
WEINZETTEL, JAN	CHARLES UNIVERSITY ENVIRONMENT CENTER, CZECH REPUBLIC weinzettel@seznam.cz
WENZ, LEONIE	POTSDAM-INSTITUTE FOR CLIMATE IMPACT RESEARCH, GERMANY leonie.wenz@pik-potsdam.de
WERLING, JEFFREY	INFORUM/UNIVERSITY OF MARYLAND, UNITED STATES werling@econ.umd.edu
WIEBE, KIRSTEN	GESELLSCHAFT FÜR WIRTSCHAFTLICHE STRUKTURFORSCHUNG MBH, GERMANY wiebe@gws-os.com
WIEDENHOFER, DOMINIK	INSTITUTE OF SOCIAL ECOLOGY (SEC), IFF-VIENNA, ALPEN-ADRIA UNIVERSITY, AUSTRIA dominik.wiedenhofer@aau.at
WIEDMANN, THOMAS	UNSW, AUSTRALIA t.wiedmann@unsw.edu.au
WILLNER, SVEN	POTSDAM-INSTITUTE FOR CLIMATE IMPACT RESEARCH, GERMANY sven.willner@pik-potsdam.de
WILLS, WILLIAM	CENTROCLIMA/COPPE/UFRJ, BRAZIL wills77@gmail.com
WILTING, HARRY	PBL NETHERLANDS ENVIRONMENTAL ASSESSMENT AGENCY, NETHERLANDS harry.wilting@pbl.nl
WIRKIERMAN, ARIEL	UNIVERSITA' CATTOLICA DEL SACRO CUORE, ITALY ariwirkierman@gmail.com

FULL NAME	INSTITUTION, COUNTRY, EMAIL
WOLTER, MARC	GESELLSCHAFT FÜR WIRTSCHAFTLICHE STRUKTURFORSCHUNG GWS, GERMANY wolter@gws-os.de
WOOD, RICHARD	NTNU, NORWAY richard.wood@ntnu.no
WU, HARRY	INSTITUTE OF ECONOMIC RESEARCH, HITOTSUBASHI UNIVERSITY, JAPAN harry.wu@ier.hit-u.ac.jp
WU, SANMANG	SCHOOL OF HUMANITIES &ECONOMIC MANAGEMENT; CHINA UNIVERSITY OF GEOSCIENCES; BEIJING, CHINA wusanmang@sina.com
XIA, YAN	INSTITUTE OF POLICY AND MANANGEMENT, CAS, CHINA xiayan@amss.ac.cn
XU, MING	UNIVERSITY OF MICHIGAN, UNITED STATES mingxu@umich.edu
XU, YAN	UNIVERSITY OF GRONINGEN, NETHERLANDS yan.xu@rug.nl
XUE, JINJUN	GRADUATE SCHOOL OF ECONOMICS, NAGOYA UNIVERSITY, JAPAN xuejj1010@gmail.com
YADAV, BHUPESH	INDIA DEVELOPMENT FOUNDATION, INDIA itsbhupesh@rediffmail.com
YAMADA, MITSUO	CHUKYO UNIVERSITY, JAPAN yamada@mecl.chukyo-u.ac.jp
YAMANO, NORIHIKO	OECD, FRANCE yamano.norihiko+iioa@gmail.com
YANG, CUIHONG	ACADEMY OF MATHEMATICS AND SYSTEMS SCIENCE, CAS, CHINA chyang@iss.ac.cn
YANG, HONG	SWISS FEDERAL INSTITUTE OF AQUATIC SCIENCE AND TECHNOLOGY, SWITZERLAND hong.yang@eawag.ch
YANG, LIANLING	ACADEMY OF MATHEMATICS AND SYSTEMS SCIENCE, CHINESE ACADEMY OF SCIENCES, CHINA yanglianling@163.com
YANO, TAKASHI	INSTITUTE FOR GLOBAL ENVIRONMENTAL STRATEGIES (IGES), JAPAN yano@iges.or.jp
YAZAN, DEVRIM MURAT	UNIVERSITY OF TWENTE, NETHERLANDS d.m.yazan@utwente.nl
YOUSEFI, MOHAMMADGHOLI	ALLAME TABATABAI UNIVERSITY, IRAN mohammadgholi.yousefi@gmail.com
YU, KRISTA DANIELLE	DE LA SALLE UNIVERSITY - MANILA, PHILIPPINES krista.yu@dlsu.edu.ph
YUAN, JIANQIN	GRADUATE UNIVERSITY OF CHINESE ACADEMY OF SCIENCES, CHINA yuanjianq0708@yahoo.com.cn
YÜCER, AYÇıL	UNIVERSITY OF DOKUZ EYLÜL & IRD, UMR225, DIAL, TURKEY aycily@gmail.com
ZAFRILLA, JORGE	UNIVERSITY OF CASTILLA-LA MANCHA, SPAIN jorge.zafrilla@uclm.es
ZAKERI, ZAHRA	MAJLIS(PARLIAMENT) RESEARCH CENTER, IRAN zakeri.zahra@gmail.com
ZBRANEK, JAROSLAV	UNIVERSITY OF ECONOMICS IN PRAGUE, CZECH REPUBLIC jaroslav.zbranek@vse.cz
ZEMANEK, STEVEN	BUREAU OF ECONOMIC ANALYSIS, UNITED STATES steven.zemanek@bea.gov
ZHANG, HAIYAN	NANJING UNIVERSITY, CHINA yanzizhy@gmail.com
ZHANG, SHIYUN	BEIJING RESEARCH CENTER FOR SCIENCE OF SCIENCE, CHINA 10023387@qq.com
ZHANG, YANXIA	SCHOOL OF THE ENVIRONMENT, NANJING UNIVERSITY, CHINA zhangyanxiaabc@126.com
ZHANG, YAXIONG	STATE INFORMATION CENTER, CHINA, CHINA zhangyx@mx.cei.gov.cn
ZHANG, ZHUOYING	ACADEMY OF MATHEMATICS AND SYSTEMS SCIENCE, CHINESE ACADEMY OF SCIENCES, CHINA joyingsay@gmail.com

FULL NAME	INSTITUTION, COUNTRY, EMAIL
ZHENG, YI	BEIJING RESEARCH CENTER FOR SCIENCE OF SCIENCE, CHINA zhengyihk@126.com
ZHOU, JING	CHONGQING UNIVERSITY, CHINA jz.mirror@gmail.com
ZHOU, XIN	INSTITUTE FOR GLOBAL ENVIRONMENTAL STRATEGIES, JAPAN zhou@iges.or.jp
ZI, YUAN	THE GRADUATE INSTITUTE, GENEVA (IHEID), SWITZERLAND yuan.zi@graduateinstitute.ch
ŠIMKOVÁ, MARTINA	UNIVERSITY OF ECONOMICS, PRAGUE, CZECH REPUBLIC martina.simkova@vse.cz