



International Input-Output Association

PO Box 202, A-1031 Vienna, Austria

Fax: +43 2244-30210, Website: <http://www.iioa.org>

President: Faye Duchin

Vice-Presidents: Jan Oosterhaven, Norihisa Sakurai

Secretary: Norbert Rainer

Treasurer: Josef Richter

Editor of the Journal: Erik Dietzenbacher

BOOK OF ABSTRACTS

15th International Input-Output Conference

Beijing, China P.R.

27 June – 1 July, 2005

Renmin University of China

Run Run Shaw Conference Center

Local Organizing Committee:

Professor Yanyun Zhao, Center for Applied Statistics, Renmin University of China

(Website: <http://www.applstats.org/english/io/index.htm>)

Dr. Xianchun Xu, National Bureau of Statistics, China

TABLE OF CONTENTS

Monday, 27 June

Plenary Session 1	1
Parallel Sessions I.1 (14:00-15:30)	5
Parallel Sessions I.2 (16:00-17:30)	24
Evening Courses on Monday	40

Tuesday, 28 June

Parallel Sessions II.1 (9:00-10:30)	43
Parallel Sessions II.2 (11:00-12:30)	62
Parallel Sessions II.3 (14:00-15:30)	84
Parallel Sessions II.4 (16:00-17:30)	107
Evening Courses on Tuesday	127

Thursday, 30 June

Parallel Sessions IV.1 (9:00-11:00)	128
Plenary Session 2 (11:15-13:00)	150
Parallel Sessions IV.2 (14:30-16:00)	152
Evening Courses on Thursday	165

Friday, 1 July

Parallel Sessions V.1 (9:00-10:30)	166
Parallel Sessions V.2 (11:00-12:30)	182
END	194

PLENARY SESSION 1 (Monday, 10:00-12:30)
President's Address and Keynotes
Chair: Karen R. Polenske
(Room: Conference Hall 1 at the Run Run Shaw Conference Center)

□□□□

President's Address

Faye Duchin
President of International Input-Output Association
Rensselaer Polytechnic Institute

Input-Output Economics and the Physical World

Evaluation of strategies for economic development, especially those concerned with reducing impact on the environment, must deal not only with incomes, costs, and prices but also with physical resources including land, water, minerals and pollutants. This paper argues that physical resources constitute the fundamental area of overlap between the interests of input-output economists and those of environmental scientists, notably industrial ecologists, who are increasingly engaged in incorporating input-output models of the economy into their analyses. Three misconceptions about input-output economics obscure the bridging role of resources and obstruct productive collaboration between the two communities. The misconceptions are the failure to recognize and utilize distinct quantity and price input-output models, the view that value-added is a monetary concept only, and the belief that all input-output models assume a linear relationship between output and final deliveries and between prices and factor costs. To dispel these misconceptions the paper presents a quantity input-output model with resources measured in physical units and the corresponding price model with both resource prices and product prices. Use of the model for analysis is demonstrated with a numerical example of a hypothetical economy that makes use of a mineral ore and analysis of a scenario where that economy is subsequently obliged to extract a lower grade of ore. Then two other input-output models are discussed a dynamic model and a model of the world economy. Unlike in the basic model, in these models output quantities are non-linear in final deliveries and goods prices are non-linear in factor costs. At the same time, the models retain the fundamental characteristics of the basic (i.e., static, one-region) input-output model that have made it the economic model of choice for many industrial ecologists and other environmental scientists. A much more clearly defined representation of resources and utilization of an extendable family of models provide the basis for collaborative, multidisciplinary analysis of more probing and comprehensive scenarios.

□□□□

Keynote Address 1

Lester Lave, Chris Hendrickson, and Scott Matthews
Carnegie Mellon University

Economic Input-Output Life Cycle Analysis Making Life Cycle Analysis Practical

The key to understanding the implications for environmental quality and sustainability of a design, product, or service is a life cycle examination of the material and energy inputs as well as the desired and undesired outputs, from extraction of raw materials to end of life disposal. Life cycle analysis has been dominated by a process oriented approach that constructs materials and energy balances for each relevant process. Unfortunately, this approach has been so expensive and time consuming that few analyses are done. In addition, design has often changed before the analysis is complete. Following Leontief's 1970 suggestion, we have appended to the US IO table, government data on environmental discharges, energy use, employment, and safety. The resulting Economic Input-Output Life Cycle Analysis (EIOLCA) software gives a good approximation to the process oriented analysis in an afternoon at negligible cost. The software, available free at www.eiolca.net, has been used more than 250,000 times by numerous universities, government agencies, and individuals in many nations.

Recent augmentations of the software include modifying the analysis to accept detailed process analyses of critical steps, disaggregating to a regional analysis, and disaggregating sectors to allow a detailed examination of a particular sector and technology of interest, e.g., electricity production by various fuels and technologies. We present a wide range of applications of the tool.

Life cycle analysis has heightened interest in IO. The basic model has been replicated in Canada, the Netherlands, Germany, Japan, and elsewhere, leading to requests for more detailed IO tables, together with more data by IO sector on energy and water use, and other areas. Making the IO tables available on a free website has stimulated interest in IO, allowing many people to discover the advantages of this tool. The software has stimulated useful discussions about the desired level of aggregation, nature of IO assumptions, and the advantages of "green" design.

□□□□

Keynote Address 2

J. Steven Landefeld

Director of the Bureau of Economic Analysis, Department of Commerce

Input-Output Accounting: The Partnership Between Users and Producers

This talk will review the evolution of input-output analysis paying special attention to the role of analytical users and statisticians in guiding the development and uses of I-O accounts. Relevance is the hallmark of good economic information. In one respect, input-output accounting meets that criteria. Over its history --from Leontief and war planning to today's interest for "homeland security" planning --I-O accounts have evolved to meet the needs of economic policy. In another respect, however, I-O accounts have not meet that criteria. At times, the accounts have not been sufficiently timely or accurate to meet policy needs. On other occasions they have grown outdated, been too narrowly defined, or inadequately integrated to address policy concerns. Our challenge for the future is to rekindle our partnership with users and work to assure that our I-O accounts are up-to-date and meet their needs.

□□□□

Keynote Address 3

Chen Xikang

Academy of Mathematics and Systems Science, Chinese Academy of Sciences

Chinese Economic Development and Input-Output Extension

There are three parts in this paper. In the first part we summarily introduce the application of input-output analysis in China, including construction of national input-output table, regional input-output table, input-output table for special sectors and enterprise input-output table and their use in economic practice of China. Particularly, on the basis of input-output model in 1992 the National Bureau of Statistics made a suggestion for increasing additional 40 billion RMB yuan of the investment in capital construction to the State Council of China, the proposal was accepted by the Chinese government.

In the second part we discuss extended input-output model with assets occupancy. The main characteristic of the model is that it allows us to examine all held assets used in production, not only machinery and construction but also the labor force (or human capital), land, etc., and their requirements are specified for each sector. They thus provide a better alternative to capital stock matrices in the standard Systems of National Accounts. In this paper we will comprehensively introduce its methods and applications. We specify term of asset occupancy, extended input-output table with assets occupancy and its main characteristics, method of calculation of total input coefficient with input of fixed assets, total occupancy coefficient, dynamic extended input-output model, etc.

In the final part we introduce the application of extended input-output model with assets occupancy in China, for example, constructing of the Extended IO Table for Urban and Rural Economics of China, constructing of Extended IO Table on Water Conservancy of 1999 for China and Drainage Areas of China's Nine Big Rivers, constructing the Extended IO Table of Xinjiang Uygur Autonomous Region of China, constructing the Extended IO Table on Shanxi Water Resource, and constructing Extended IO Table on Township and Village Enterprises for China and Shanxi Province.

Particularly, the model was successfully applied in yearly grain output prediction of China 1980-2004. Since 1980 this approach has been used in China. Every year at the beginning of May we send annual report of yearly national grain output prediction to the governmental agencies and top leaders of China. From 1980 to 2003 the main results are as follows

First, predicted bumper, average and poor harvests are correct every year;

Second, the lead-time of prediction is more than half a year. Since 70% of China grain is reaped in fall and harvest is ended in November, such prior forecasting report at the end of April helps responsible governmental agencies with enough time to arrange grain consumption, storage, imports and exports.

Third, forecasting is accurate (under 3% error) for 19 years out of 23. Error rates for 8 years are lower than 1%, for 6 years are between 1-2%, for 5 years are between 2-3%, for 2 years are between 3-5%, and for 2 years are between 5-8%. Overall, average error rate over 23 years is only 1.9% compared to statistical reports from sample surveys.

Therefore, this forecasting has supported some important policy decisions. The top leaders of China, relevant departments of Chinese government, such as State Grain Administration,

Ministry of Agriculture, Research Department of State Council, National Development and Reform Commission, and others paid much attention and gave excellent evaluation to the prediction.



Monday, June 27, 2005

PARALLEL SESSIONS I.1 (14:00-15:30)

Session I.1.1, Monday, 14:00-15:30
Room: Conference Hall 2 at Run Run Shaw Conference Center
World Input-Output Models I
Organizers Emilio Fontela Montes and José M. Rueda-Cantucho
Chair: Antonio Pulido San Román

□□□□□

Anders Hammer Strømman, Glen Peters, Edgar G. Hertwich and Faye Duchin

The Global Value Chain Impacts of Increased Chinese Demand on Aluminium

The economic and environmental repercussions of increased Chinese demand of Aluminum are investigated. The analysis is performed using a World Trade Model based on comparative advantage with bilateral trade. The model is formulated as a linear program minimizing global factor costs and determines regional prices, scarcity rents and bilateral trade flows for m regions, n goods and k factors. The change in the international division of labor along the aluminum value chain, from bauxite mining via alumina production, aluminum production up to end use is assessed. Further the environmental dimension of production in various regions is explored and implications of emission constraints are investigated.

□□□□□

Faye Duchin and Roxana Juliá

Adapting to Climate Change: Global Agriculture and Trade. A Structural Approach

This paper evaluates the role of trade as a mechanism of economic adjustment to the impacts of climate change on agriculture. The study uses a new methodological framework, an input-output model of the world economy that is able to reflect changes in comparative advantage. We use this framework to test the hypotheses that trade in food crops can assure that, first, satisfying global agricultural demand will not be jeopardized, and, second, general access to food will not decrease. The hypotheses are tested for three alternative scenarios of climate change. Under each scenario, regions adjust to the climatic assumptions by changing the land areas devoted to agriculture and the mix of crops on each category of land, two of the major mechanisms of agricultural adaptation. We find that trade makes it possible to satisfy today's world demand for agricultural crops under the changed physical conditions. However, access to food decreases in some regions of the world, in the sense that the prices of food crops rise relative to labor earnings. Other patterns also emerge that indicate areas of concern in relying on trade as a mechanism for the adjustment of agriculture to likely future changes in climate.

□□□□□

Bernd Meyer

Modeling Opportunities and Limits for Restructuring Europe towards Sustainability (MOSUS)

No abstract available.



Session I.1.2, Monday, 14:00-15:30
Room: Meeting room 4 at Run Run Shaw Conference Center
Physical Input-Output Analysis Conceptual Questions and Possible Applications I
Organizers: Helga Weisz and Sangwon Suh
Chair: Helga Weisz



Erik Dietzenbacher

Waste Treatment in Physical Input-Output Analysis

When compared to monetary input-output tables (MIOTs), a distinctive feature of physical input-output tables (PIOTs) is that they include the generation of waste as part of a consistent accounting framework. As a consequence, however, physical input-output analysis thus requires that the treatment of waste is explicitly taken into account, because otherwise the results will be grossly underestimated. The treatment of waste has recently led to an interesting methodological debate. This paper reviews the discussion and introduces a new alternative. This alternative reconciles the existing methods and enables us to obtain additional information that cannot be derived from the other methods.



Yuichi Moriguchi, Keisuke Nansai, Seiji Hashimoto, Shinsuke Murakami, Shigekazu Matsui and Shigesada Takagi

Multi-Dimensional Physical I-O Tables (MDPIOT) for Japan Framework, empirical data and applications

A framework of Multi-Dimensional Physical Input Output Tables (MDPIOT) has been designed and improved to meet various environmental policy concerns. In the MDPIOT, physical flows of natural resources from the environment to the economy, those of environmental burdens (pollutants and wastes) from the economy to the environment, hidden flows associated with these flows, as well as those of commodities (e.g., energy carriers, iron and steel) among economic sectors are described..

Based on the framework, empirical data for 1990 and 1995 were compiled according to four major resource categories, namely, fossil fuels, metals, minerals, and biomass. In addition, detailed emission inventories of CO₂ and traditional air pollutants by 400 industrial sectors were compiled for 1990 and 1995. They have been provided for public use as a data book and via website.

Calculation of the environmental and resource efficiency indicators is one of the most

Session I.1.3, Monday, 14:00-15:30
Room: Room 1503 at Teaching Building No.1
New Developments in Compiling Input-Output Tables I
Input-Output Tables and National Accounts – U.S. Experience
Organizers: Jiemin Guo and Mark Planting
Chair: Sumiye Okubo

□□□□

Jiemin Guo, Mark A. Planting, Mikael Mortensen, and Yvon Pho

Integrating U.S. Input-Output Tables with SNA An Assessment Study

The 1993 System of National Accounts (SNA93) recommends that the input-output (I-O) tables be an integral part of national accounting system. The I-O accounts should “serve as a coordinating framework for economic statistics, both conceptually for ensuring the consistency of the definitions and classifications used and an accounting framework for ensuring the numerical consistency of data draw from different sources.” (System of National Accounts 1993, pp 343) The recommended I-O framework includes the supply and use tables, and the symmetric I-O tables. It also introduces basic prices as the measure of gross output and the valuation of transactions in the symmetric tables. Many countries, including those in the European Union, Australia, and Canada among others, have adopted the SNA and the basic price valuation for their I-O tables. The U.S. I-O tables have not yet adopted the SNA93 recommended format for these tables. The purpose of this paper is to investigate the feasibility of presenting the U.S. I-O tables following the SNA93 recommended format, which will 1) enable international comparability of US I-O accounts, 2) improve presentation and usability of source data, and 3) provide basic value measures of industry value added and output.

□□□□

Ann Lawson

A Post-Mortem on the Method Used to Integrate the U.S. Industry Accounts

As part of its continuing efforts to improve the system of industry accounts, the Bureau of Economic Analysis (BEA) has initiated a series of strategic initiatives with the goal of full integration of the industry accounts for the United States, including integration of the annual input-output (I-O) and benchmark I-O accounts with the gross-domestic-product- (GDP) -by-industry accounts, and integration of the industry accounts with the national income and product accounts (NIPAs) . Although full achievement of this goal will require several years, in mid-2004, BEA completed the first major step by merging the annual GDP-by-industry and I-O accounts.

A probability-based method was used to merge the GDP-by-industry and I-O accounts. This method allowed for both objective and subjective information about the relative strengths of the underlying source data to be combined before establishing a single estimate of value added for each industry in 1997—the starting point for the time series of integrated accounts.

learning; and b) qualitative capabilities of human resources.

An alternative method of factor/principal component analysis has been used to determine objectively a system of weights to be assigned to different factors/variables used in HDI. The method incorporates a) rank correlation analysis; b) concordance analysis; and c) rank sums. Empirical part is based on 115x115 input output table for the year 1993-94. The table has been compress into 46x46 sectors.

For clustering variables into factors and determination of weights attached to a) variables, or b) factors for incorporation into index. Variables used pertain to output estimates based on the consumption of i) food, and ii) clothing, iii) health care and health services, and education in proportion to sectoral employment of a) uneducated, b) professional under qualified, and c) professional qualified personnel in individual sectors.

□□□□

Shalini Sharma

Determining Values of Product and Company Brands in Input Output Framework As Outcomes of Intellectual Property Rights

The globalized Indian economy now conforms to WTO's laws of protection of intellectual property rights, though the economy faces greatly intensified price and non price competition. Patents make imitation and reverse engineering difficult.

IPRs are used for protecting, projecting, propagating and positioning of brand image of companies and their products. Branding facilitates the acquiring and subsequent maintaining of market share, and/or acquisition or retaining of leadership in oligopolistic markets. This paper analyzes and integrates brand positioning and brand valuation, associated with IPRs, in input output framework.

This study distinguishes the concepts of product and company brands. Economic Value Added, (EVA) and Residual Value Added, net of pure profits, (RVA) are hypothesized to determine economic value of 'Product and Company Brands'. Empirical results show that value of both product and company brands vary sharply between sectors, though most sectors show low values of brands. But low values dominate company brand more than the product brand. Value of product brand is a decisive determinant of the value of company/sector brand. Input output table of Indian Economy for 1994 has been used as the data base.

□□□□

Shri Prakash and B. Balakrishnan

Input Output Modeling of Employment and Productivity as Base of Growth

The paper has developed a simple decomposition model to determine employment and productivity components of growth. Whereas Input Output model has been used to evaluate the overall impact of growth of income on employment, decomposition model segregates labour displacement effect from productivity augmenting effect of movement of the economy from one to another point on its growth path. Results highlight whether the growth of income is employment neutral, employment enhancing or employment displacing.

The model is empirically prognosticated with Input Output tables of Indian economy for 1988-89 and 1993-94. The results also show the relative contribution of growth of productivity and

of time into two sub-periods and applied different approach to construct the benchmark tables used in the compilation of the time series of input-output tables.

For the period from 1987 to 2000, there are 3 benchmark tables (1987, 1992 and 1997) . Although these tables were compiled in a SNA framework, they are different in terms of classifications of sectors, definitions used and other aspects. In the first stage we constructed 3 current price benchmark input-output tables including A tables and V tables, which are consistent with the coverage and definitions of the 1997 benchmark I-O table and scaled to the latest GDP series.

For the period before 1987 there is a MPS type input-output table for 1981 which can provide limited information for the compilation of time series of tables. In the second stage we constructed 1981 current price benchmark I-O table using the information in 1987 I-O table and the direct input coefficients compiled based on the information in 1981 and the differences found between the technological coefficient between 1981 and 1987.

Following to the Kuroda approach the 1981-2000 current price U tables time series were constructed based on the 4 benchmark current price U tables derived from the benchmark A and V tables.

We compiled the time series of sectoral commodity price indices based on the historical price data. We also constructed a time series of V tables from 1981 to 2000 in order to convert commodity price indices to industry price indices. Based on the current price tables and price indices, the constant price time series of table can be derived which can provide all data for the productivity analysis and comparison.

A detailed description of procedure used in the compilation of time series of tables was given in the paper. The data sources, approach applied and adjustment made in the study were also discussed in the paper.

□□□□

Ruoan Ren

Industry Level TFP Growth in China

The strong growth performance of China and China's integration into the international trade has led to new attention for the study on the sectoral international competitiveness. The detailed study on the sectoral total factor productivity can help us to analyze the sectoral international competitiveness and quantify the sources of economic growth at the industry level. We estimate sectoral total factor productivity growth rates based on the estimation of capital input index, labor input index and intermediate input index consistently with the time series of input-output tables. The various assumptions and adjustments made on the data and estimation implementation in our study were discussed.

■■■■■■■■■■

Session I.1.6, Monday, 14:00-15:30
Room: Room 1505 at Teaching Building No.1
History of Input-Output Analysis I
Organizer and Chair: Olav Bjerkholt

□□□□

Heinz D. Kurz and Neri Salvadori

Input-Output Analysis as Seen from a Higher Standpoint

The paper deals with approaches to the theory of production, distribution and value that start from two central concepts (i) that of "physical real cost" which is closely associated with that of "social surplus" and (ii) that of "production as a circular flow". Both ideas are encountered in Leontief's early writings. They can be traced back to William Petty who had assumed a "physician's" outlook'. It is shown that "physicalist" approaches surfaced in the writings of several authors whose reasoning was typically informed by the natural sciences. We then deal with the difficulties these approaches faced and the way different authors tried to overcome them. These difficulties surfaced once the problem of the distribution of the surplus between workers, capital owners and land owners had to be tackled and the relationship between income distribution and relative prices in an economic system characterized by conditions of free competition - the familiar workhorse of much of economic analysis - had to be analyzed.

The paper draws on material contained in the hitherto unpublished papers by Piero Sraffa which are kept in Trinity College Library, Cambridge, and which are currently prepared for publication on behalf of Cambridge University Press.

□□□□

Albert E. Steenge and Richard van den Berg

Input-Output à la Quesnay a Fuller Economic Vision

Various attempts have been made to transcribe the Tableaux économiques of François Quesnay using Input-Output (I-O) methodology. However, most authors making such attempts were unsuccessful in reproducing the economic processes that Quesnay sought to illustrate using his arithmetical schemes. This has often been seen as indicative of faulty logic of the Tableaux.

An alternative view is that the problem rather lies with the standard I-O framework. If one uses standard I-O or one of its variants, one neglects two essential aspects of Quesnaian reasoning. These are 1) the peculiar physiocratic notion of productivity. To Quesnay 'productivity' was the potential for the generation of surplus income, a 'future' quantity that was anticipated in rent contracts; 2) the notion of follower and imitation behaviour on the part of farmers and artisans. An I-O model that incorporates these notions differs significantly from the standard Leontief approach. For example, one cannot use the multiplier to solve the model. In fact, solving the model requires a new type of algorithm.

Not only does our new I-O model reproduce precisely the numerical examples presented by Quesnay (showing there to be no 'faulty logic') it also opens the way for the analysis of contracts and other institutional arrangements in an I-O context.

□□□□

Gilbert Abraham-Frois and Emeric Lendjel

“Father” Potron’s Early Contributions to Input-Output Analysis

“Father” Maurice Potron (1872-1942), a french jesuit polytechnician with a PhD in mathematics, published major, but surprisingly fully unknown, mathematical economic results between 1911 and 1941. Among his writings, three major results must be considered

In mathematics, he demonstrated as early as 1911 the existence of solutions of non-negative matrixes (or “linear substitutions” as he called them) before Frobenius in 1912. In 1908 and 1909, Perron and Frobenius had only demonstrated theorems related to strictly positive matrices.

Potron also laid in 1912 the foundations of the future input-output analysis. Indeed, he used matrices to describe the economic interdependency between products and branches. The concept of “technical coefficient” is used in 1912 to promote a central planning office whose mission would be to organize the economy according to social catholic church’s doctrine. This concept appears also in a 1936 didactic paper called “the Hebrew’s manna”. Potron used there a small input-output model with several goods such as the manna’s “gomor” and a kind of fuel called “chomer”. Thus, invention of input-output matrices is undoubtedly due not to Leontief but to Potron.

Furthermore, Potron was the first to apply Perron-Frobenius theorems on such Leontief-type model in order to demonstrate the possibility of the existence of an economic equilibrium (a “satisfying economic regime” in Potron’s words) . As far as we know, nobody used this theorem in economics before the second World War, even in Sraffa’s seminal book *Production of Commodities by Means of Commodities*.

Taking account of “Potron’s paradox”, i.e. such fundamental insights from a completely unknown author in the history of economic thought, the present paper contains three sections we shall first of all briefly present Potron’s theoretical model and his use of the Perron-Frobenius theorem. In the second section, Potron’s empirical application of the model will be developed through one of the first input-output models in the history of economic thought. In the third section, the paper tackles with Potron’s biography in order to understand his approach of economic problems and the reason that led him to put forward an input-output analysis.



Session I.1.7, Monday, 14:00-15:30
Room: Meeting room 4 at Run Run Shaw Conference Center
Complexity and Interrelatedness
Chair: Debdas Bandyopadhyay



João Ferreira do Amaral, João Dias and João Carlos Lopes

Complexity as Interrelatedness An Inter-Sectoral Approach

In this paper we make a first attempt to link two subjects with a potentially useful connection, as yet not conveniently explored the study of complexity and the (Leontief) input-output analysis. It is

well-known the difficulty in obtaining a comprehensive and universal definition of complexity. But it appears to emerge as one of the most prominent characteristics of this notion, common in several systems (physical, biological, social or economical) , the interaction between different components (or agents) of a whole. In this sense we consider economic complexity as interrelatedness between the parts or sectors of an economy, here represented by an input-output system. With particular importance to the economic approach on this subject, we begin by noting the convenience of distinguishing the (objective) complexity for someone outside the system and having all the relevant information about it, from the (subjective) complexity for those inside and having only partial information about the system. Under this second perspective, the complexity for an agent immersed in the system is a decreasing function of his autonomy degree. In an input-output system, the “individual agent” is a sector composed of (usually) many firms producing a similar output. It seems reasonable to assume that they know each other well, so that the transactions within the sector are an indicator of autonomy and the transactions with other sectors an indicator of complexity (as inter-relatedness) . One interesting question emerges in this context, namely should we expect to find a natural move to higher complexity as the economy grows and develops? And a related one is a larger economy necessarily more complex than a smaller one? In a first attempt to answer these questions we propose a new measure of complexity as interrelatedness that combines a network effect and a dependency effect. In the empirical part of the paper we apply this measure of complexity to the inter-industry tables of several OECD countries, and discuss some interesting findings.

□□□□

J. C. Lopes, J. F. Amaral and J. Dias

A New Interrelatedness Indicator to Measure Economic Complexity, with an Application to the Portuguese Case

This paper is about economic complexity, treated as interrelatedness between the parts or sectors of an economy, particularly one represented by an input-output system. After briefly presenting the difference between the (objective) complexity for someone outside the system and having all the relevant information about it and the (subjective) complexity for those inside, having only partial information about the system, it is argued that the second perspective is more useful for an economic notion of complexity. So, a new indicator is proposed in order to capture two relevant features of interrelatedness that can be separately measured a dependency effect and a network effect. This new indicator is compared with some other interrelatedness measures, discussing its relative merits and drawbacks. The paper ends with an empirical application to the Portuguese Case.

□□□□

Debdas Bandyopadhyay and Prasanta Mandal

Statistical Analysis of Complexity in Productive Structure of Indian Economy 1984-1996

In this paper we estimate the change in complexity in productive structure of Indian economy during the period 1984–96, and identify its major sources, using two multivariate techniques viz. dummy variable regression technique and dual scaling technique. The analysis is carried out in the

two stages. In the first stage we use log-linear regression with row and column dummies to identify cells in input – output table with high row-column dependence. In the second stage we use dual scaling technique to decompose the internal row-column association of an input–output table into hierarchical loops. Our analysis reveals that there has been an increase in complexity in the productive structure of Indian economy during the period 1984 to1996. However, the increase is moderate in comparison with those of developed countries like USA and Canada. It is also seen that the increase in complexity in productive structure has been gradual and hence can not be decomposed into finite number of major stages of economic exchanges that has been found for developed economies Moreover, the change in economic complexity in productive structure of Indian economy is accompanied with significant change in technological and /or market conditions faced by different sectors of Indian economy Allied Agriculture and Services being the two sectors of Indian economy having undergone tremendous changes in both the aspects.



Session I.1.8, Monday, 14:00-15:30
Room: Meeting room 3 at Run Run Shaw Conference Center
R&D Spillovers, Productivity and Employment
Chair: Petr Hanel



Nuria Gómez Sanz, Luis Antonio López Santiago and María Ángeles Tobarra Gómez

R&D Spillovers and Industrial Employment the Case for Spain in 1993-2002

Economic growth for industries is related to own's R&D effort and technical improvements due to others R&D effort. The aim of this paper is to estimate the effects of R&D on employment for 28 manufacturing sectors, using a wide range of technological variables. These variables are based on information from Input-Output tables, including R&D stock in the sector; economy-wide stock of knowledge; total R&D spillovers; spillovers from sectors intensive in R&D; and spillovers from sectors related to information and communications.

These spillovers are calculated combining information from the non-symmetrical input-output table for four years and sectoral R&D stocks. In particular, the absorption of technology is obtained from the R&D stock for the different sectors weighted by their relative importance as inputs providers for the considered sector. All this information is combined with traditional production factors to build a labour demand function in a dynamic panel data framework.

In particular, we use SYS-GMM techniques more appropriate for this type of analysis. Our results indicate that there is a positive effect from absorbed R&D spillovers on manufacturing sector employment, that becomes most significant when considering spillovers from R&D intensive sectors. The use of these intensive-R&D inputs seems to be complement to employment, rather than labour-saving. We compare our results to other studies on the topic.



Joze P. Damijan and Mark Knell

Measuring Spillovers between Industries through the Use of Input-Output Matrices

Knowledge spillovers can occur both within and between industrial sectors. Most studies capture the intra-industry spillovers gained through competitive pressure and only unintentionally pick up some of the inter-industry effects gained through cooperation with upstream suppliers and downstream users. This paper aims at measuring inter-industry spillovers through the use of input-output matrices when using a panel of individual firms. Our own attempt to integrate input-output matrices into a panel of firms provides the starting point for the paper. The main objective of the paper is to extend this methodology by examining alternative ways to integrate input-output matrices into a panel of firms and different levels of aggregation at the industrial level. Using firm level data on gross output that can be identified with a two- three- and four-digit industry, we test the robustness of results. In addition to measuring knowledge spillovers, capital, labour, intermediate inputs, and absorptive capacity are estimated by means of a Basu and Fernald production function.

□□□□

Petr Hanel and Bilkis Khanam

Total Factor Productivity Growth and the R&D Expenditures of Canadian Manufacturing and Services Industries Contribution of Inter-Industry and International spillovers, 1973-2000

The paper provides new econometric evidence on the relationship between total factor productivity growth and the R&D expenditure of Canadian manufacturing and services industries in the presence of inter-industry and international spillovers of technology. This is the first study that examines the nexus between TFP and R&D for Canadian service industries. The Canadian patent weighted flows of R&D both within Canada and between Canada and other G7 countries provide interindustry spillover proxies for over thirty two digit manufacturing and service industries. The inter-industry flows of R&D in manufacturing are modeled on an Input-Output type of matrix of patents. The flows between service industries are based on Input-output matrices. The principal channels of transmission of new technology are foreign direct investment and international trade.

■■■■■■■■■■

Session I.1.9, Monday, 14:00-15:30
Room: Room 1506 at Teaching Building No.1
SAM based Modeling and Analysis I
Chair: Maurizio Ciaschini

□□□□

Alexandra Manuela Gomes and Pedro Ramos

A Social and Regional Accounting Matrix for Portugal Focussing on Income Distribution

This paper describes the construction of a Social and Regional Accounting Matrix (SrAM) for the Portuguese economy for the year of 1999. A SrAM is an analytical framework in which social, economic and regional data are integrated. Regional data concern only the households income and expenditure and not the production technology. Nevertheless, it is given special emphasis on social aspects, namely on the distribution of income among different groups of households, which are disaggregated both by the residence region and by the main source of income. The main objective is quantifying the inter-regional and inter-social distribution of income and to put in evidence as well which regions and groups of households benefit more of that distribution. After the presentation of the general framework adopted we focus therefore on the process of income distribution. With this purpose, we analyse the effects resulting from an exogenous change in the income of a household from a specific region and social group in the other social and regional groups of households, using the SrAM-based accounting multipliers.

□□□□

Andrés Blancas

The Inter-Institutional Linkage Analysis: A SAM Approach

By analogy with the interindustrial analysis, this paper addresses the interinstitutional linkage analysis through an accounting multiplier approach derived from a social accounting matrix for an eighteen-sector economy. Such an analysis provides a useful tool to quantify processes of structural change in terms of productive and financial backward and forward linkage indices derived from the accounting multipliers. As an example, we identify and measure the structural performance of the Mexican economy (from 1980 to 1993) through such linkage indices. The results can also help to the quality of policy decisions by identifying key and un-linkage accounts or institutions and by giving a better understanding of how an impact of an initial exogenous injection travels within a complex economic structure. The inter-institutional linkage analysis provides indices from the different multiplier matrices that proof the existence and magnitude of a dual financial problem: financial disintermediation and financial fragility.

□□□□

Maurizio Ciaschini and C. Soggi

Linkages in Social Accounting Matrix Backward and Forward Dispersion Approach

The aim of the paper is to apply a new Backward and Forward dispersion approach, starting from original Rasmussen definition that can give a further insight into the interactions between industries and institutional sectors for Italian economy. An application based on a Social Accounting Matrix (SAM) for Italy illustrates how macro multipliers ruling the multi-sector and multi-industry interactions can be defined and evaluated. This feature greatly helps in showing the impact of the structure of macroeconomic variables since all the possible behaviours of the economy are determined by those multipliers either those patterns that have emerged, because have been activated by the actual shock, and those that have kept latent. The identification of macro multipliers allows for the consistent definition of forward and backward dispersion, a tool especially efficient in the study of propagation since it is not confined to predetermined structures of macroeconomic variables and allows for the determination of "summary" measures of dispersion through industries

information diffusion. The final section (section 6) suggests some directions for future research about the outsourcing of service activities and the tendency towards a new economy characterized by services and intangible goods.

□□□□

Rita Bhowmik and Dilip Halder

Importance and Expansion Potentiality of Service Sector in Indian Economy, 1968-69 – 1993-94

The objective of this paper is to measure the importance and the expansion potentiality of service sector in Indian economy during the period 1968-69 – 1993-94. For this purpose, an index of vertical integration has been constructed which provides a dimension-free measure of the multiplier of each industry on the basis of value-added originating from the service sector. It also makes an assessment of the importance of the service sector in the economy by measuring direct-indirect requirements of value added of this sector to produce gross output of each industry in the economy. Empirical part of this study shows that Trade, Other services, Banking, Railway Transport, Other Chemicals and Construction played as a role of key industries throughout the study period of Indian economy by providing strong stimulus and by inducing greater value addition to other industries than their own. In general, service industries appear to be the highly growth-inducing sector in so far as it helps higher value addition to other industries.

□□□□

Robert Stehrer and Waltraud Urban

Comparisons of IO Structures in the Transition Countries

This paper discusses the availability and comparability of IO tables based on ESA 95 for five Central and Eastern European countries (Czech Republic, Hungary, Poland, Slovak Republic, and Slovenia) in the transition period. In this respect a comparison of the IO data and the National Accounts data is also provided. In a second part the IO tables are used for comparisons across countries – based on standard calculations - with respect to structural indicators (e.g. share of particular sectors in intermediate consumption, energy use in different industries, industrial structures of value added, use of intermediate inputs, etc.) which are then also compared to selected ‘old’ EU member states. A special emphasis should be given to the use of ‘services’ as intermediate inputs. Further we discuss the components of value added and derive conclusions with respect to sectoral factor intensities. Finally, calculation of output-multipliers allows us to identify key-industries (and also leading and basic industries by differentiating between forward and backward linkages).

■■■■■■■■■■

Session I.1.11, Monday, 14:00-15:30
IDE's Projects on the Asian Industrial Structure
Room: Conference Hall 1 at Run Run Shaw Conference Center

Organizer: Ikuo Kuroiwa
Chair: Hiroshi Kuwamori

□□□□

Nobuhiro Okamoto and Takeo Ihara

Spatial Structure and Regional Development in China

According to the recent studies on regional development in China, we have already recognized that regional disparity has become one of the significant problems, and hence many policy-makers as well as researchers have paid attentions to such issues as how we should develop the underdeveloped regions, say, an interior region in China. But it should be noted that most of their approaches so far have mainly focused on a certain specific region itself, without taking any account of interregional interdependency at all. Therefore, in order to extend something worthwhile to their previous study-works, we keenly feel the necessity for us to clarify the interregional feedback effects and/or spatial interactions quantitatively, if we focus on the actual process of regional developments in China. This was the main reason why we compiled the full-scale interregional input-output model for China as the most useful analytical tool of space economy. In addition, we have also analyzed the current regional economy in China based upon this sort of an interregional input-output approach. As a result, we are to clarify some important fact-findings and also discuss how to utilize the conventional interregional input-output model more effectively.

□□□□

Nobuhiro Okamoto, Satoshi Inomata and Takao Sano

Estimation Technique of International Input-Output Model by Non-survey Method

IDE has compiled Asian International Input-Output Tables for the years, 1975, 1985, 1990 and 1995, which includes ten economies as endogenous regions in the model, but excludes China and Taiwan for 1975 due to the limitation of the data (Institute of Developing Economies [1982, 1992, 1998, 2001]).

The Asian International I/O table has a format of non-competitive import type or so called Isard-type, which indicates the transaction of commodity by country of origin. Therefore, it is necessary to conduct a special survey to investigate input structures of imported goods, and the compilation of the Asian International I/O tables needs a lot of time, work and personnel.

Under the limitation of data and time (personnel and budget as well), we attempt to clarify the accuracy and efficiency of the Chenery-Moses type estimation method by using foreign trade statistics and input-output accounts of Asian countries (competitive imports type).

□□□□

Ikuo Kuroiwa

Formation of Inter-Country Production Networks in East Asia: Application of International

Input-Output Analysis

This paper analyzes trade in East Asia and inter-industry linkages over the borders, i.e. spatial linkages, with use of the Asian international input-output tables. As a result of analysis, it was shown that intra-regional trade within the eight East Asian countries, the U.S and Japan has been driven by the intermediate goods trade. At the same intermediate goods, especially those of the material and machinery industries, increased their proportion of intra-industry trade. On the other hand, although the structures spatial linkages were more or less similar to those of domestic industries, the Electric Machinery industry had strong spatial forward linkage effects. Also it was shown the percentage of intra-industry spatial linkages increased, particularly in the Electric Machinery industry, implying that the international division of labor between different stages of production or fragmentation had progressed rapidly. Finally, machinery industry clusters, especially those of the Motor Vehicles and Electric Machinery industries, expanded significantly, and the production network of the Electric Machinery industry had expanded with industries in Japan, East Asia, and the U.S. respectively located in the upstream, midstream, and downstream of roundabout production.

Monday, June 27, 2005

PARALLEL SESSIONS I.2 (16:00-17:30)

Session I.2.1, Monday, 16:00-17:30
Room: Conference Hall 2 at Run Run Shaw Conference Center
World Input-Output Models II
Organizers: Emilio Fontela Montes and José M. Rueda-Cantuche
Chair: Faye Duchin

□□□□

T. Barker, P. Dewick, S. de Ramón, J. Koehler, Haoran Pan

Long-term technological change in input-output coefficients for a global model E3MG 1970-2100

No abstract available.

□□□□

Glen Peters and F. Duchin

Tariffs and comparative advantage in global trade

Despite the accumulated knowledge about tariffs, debate still continues on the implications of tariffs for welfare and the environment. From a global perspective, tariffs preclude the allocation of production according to comparative advantage. Tariffs may have a systematic impact on the distribution of wealth among regions and possibly on the distribution of environmental degradation. One practice that stands out is tariff escalation, where the size of tariffs increases with the level of processing. This paper describes the incorporation of tariffs into the World Trade Model and investigates the impact of tariff escalation on the bauxite-alumina-aluminum global value chain.

■■■■■■■■■■

Session I.2.2, Monday, 16:00-17:30
Room: Meeting room 2 at Run Run Shaw Conference Center
Physical Input-Output Analysis Conceptual Questions and Possible Applications II
Organizers: Helga Weisz and Sangwon Suh
Chair: Sangwon Suh

□□□□

Helga Weisz and Peter Fleissner

Conceptual Differences between Physical and Monetary IO Models

This paper investigates how the computation of total (direct and indirect) physical factor

requirements to satisfy a given bill of final deliveries is affected by the choice of different units of measurement of the IO table on which the model is based.

A physical IO model makes use of a coefficient matrix derived from an IO table in physical units of any dimension (joule, tonnes, pieces, hours etc.). A monetary IO model makes use of a coefficient matrix derived from an IO table in monetary units.

The conceptual relations between input-output models in physical units and in monetary units will be developed by use of an idealized primal I-O scheme in units of goods or services, in mass units, and a non-standardized empirical I-O scheme in monetary units under varying (gradually less restrictive) assumptions. The appropriateness of the different assumptions will be discussed conceptually and empirically, using data for Denmark (Pedersen 1999).

By this procedure we attempt to specify why and how much the static open IO model is affected by the chosen units of measurement including a prove of the insensitivity of the standard model towards different units of measurement under standard assumption (i.e. that a basic static input-output model with the coefficient matrix derived from a monetary input-output table is equivalent to one where the coefficient matrix is derived from an input-output table in physical units (singly or mixed units) provided that the assumption of a homogeneous sectoral price is satisfied see Weisz and Duchin 2004).

Pedersen, Ole G.(1999) Physical Input-Output Tables for Denmark. Products and Materials 1990. Air Emissions 1990-92. Kopenhagen Statistics Denmark
Weisz, Helga and Duchin, Faye (2004) Physical and monetary input-output analysis What makes the difference? Rensselaer Polytechnic Institute

□□□□

Jan Christoph Minx and Giovanni Baiocchi

Time Use and Sustainability An Input-Output Approach in Mixed Units

This paper argues that time use data can help to improve quantitative sustainability research. It stresses its unique properties, which allow to model social and behavioural issues more comprehensively. Data frameworks in monetary, physical and time units are proposed as an ideal starting point for sustainability studies. The richness of the approach is demonstrated in an analysis of household activities based on a unique set of input-output tables in monetary, physical and time units.

□□□□

Stephan Moll

Physical Input-Output Analyses Some Experiences from Ongoing Research

Only a limited number of national statistical offices have published physical input-output tables (PIOTs) in the framework of integrated environmental and economic accounting. For Germany, PIOTs have been published for the years 1990 and 1995 and Germany is thereby one of the pioneering countries with this respect. However, limited experience has been made with analytical applications of PIOTs so far.

The objective of this paper is to shed some light on the analytical potentials of physical input-output tables. Experiences from ongoing research reveal a number of difficulties in applying simply the “traditional” input-output models – developed for monetary input-output tables – to PIOTs. Most relevant are issues like which of the many PIOTs sub-tables have to be combined with which analytical model and for which research question. The paper gives some illustrative examples.



Session I.2.3, Monday, 16:00-17:30
Room: Room 1503 at Teaching Building No.1
New Developments in Compiling Input-Output Tables II: Time Series and Coefficients
Changes
Organizers: Jiemin Guo and Mark Planting
Chair: Charles Bowman



Charles Bowman

Coefficient change in input-output forecasting models

Input-output techniques are widely used in economic forecasting models that combine economy-wide scope with a high degree of industrial detail. One of the problems that arise in such models is the treatment of coefficient change. Can coefficients be treated as fixed or do they change systematically over time? If they are changing, is the variation sufficiently large to affect forecasts of industrial output, employment and the like? Finally, what approaches are available to forecast coefficient change if this is warranted?

In the first part of the paper we utilize annual input-output tables developed by the U.S. Bureau of Labor Statistics to examine empirically both coefficient stability and the potential contribution of coefficient change to forecast accuracy. We then examine various techniques that have been developed to deal with coefficient change in input-output models. We conclude with an evaluation of these techniques and suggest factors that might influence the choice of technique in specific applications.



Zhibiao Wang

Nonlinear Direct Input Coefficient When Technological Progress Takes place

Direct input coefficient is the base of input-output analysis, which reflects the quantitative relation between output and direct input. Direct input coefficient matrix is viewed as exterior variable matrix in general study. This hypothesis is convenient to calculation, but distorts the dynamic changeable characteristic of direct input coefficient. This paper discloses nonlinear characteristics which direct input coefficients show in the long-term analysis, overcomes the limitations that some previous

nonlinear input-output models couldn't apply to do with real problems, and improves nonlinear input-output analysis. It discusses relative factors affecting input coefficients such as technological progress, product structure, cost function, resource accumulation, and so on. Then based on time series input-output tables of China, it adopts main coefficient method to construct main input coefficient functions, in which technological progress is viewed as the only exterior variable when constructing functions, i.e. $A=A(T)$, where A is indirect input coefficient matrix and T is technological progress. Then indirect input coefficients have been nonlinear.

□□□□

Filippo Moauro and Riccardo Corradini

Volume Measures of Input-Output Table in a Time Series Perspective a Proposal for Italy

The paper proposes a data panel model to obtain volume estimates of input-output tables. The method applies when the matrixes are compiled following a sequential approach, i.e. compilation at current prices followed by deflation and it focuses on estimation of the matrix of intermediate uses. The model uses the production price index to deflate domestic uses and the unit value index for imports, under the hypothesis that the annual differences of these indicators are not significantly dissimilar among industries. The model combines the estimates for uses with those related to total inputs, coming from a different source. First results of the application on this method for Italy are finally discussed.

■■■■■■■■■■

Session I.2.4, Monday, 16:00-17:30
Room: Room 1506 at Teaching Building No.1
Compiling Supply and Use Tables (SUT) and Input-Output Tables (IOT) I
Organizer and Chair: Csák Ligeti

□□□□

Liv Hobbelstad Simpson

Experience with Supply and Use and Input-Output Tables for Constant price Estimation of Annual National Accounts

This paper focuses on the Norwegian methodology for implementing detailed Supply and Use Tables (SUT) in all types of valuation in current and constant prices, following SNA93/ ESA95 recommendations.

Statistics Norway has a long tradition compiling national accounts with SUT in current and constant prices integrated in the regular national accounts production process. When SNA93/ ESA 95 was implemented by Statistics Norway in 1995, the full SNA93 matrix was used as the framework for the revised National Accounts system with integrated SUT.

In this paper the data sources, the technology for compiling the detailed valuation matrices in the SUT frame (VAT, product taxes, product subsidies, trade and transport margins) and the

balancing of the product flows in current and constant prices are described. The paper also covers the consistent and integrated set of price and volume measures compiled within the framework of SUT and the experience with constant price estimation of value added by "double deflation".

Compilation of tourist satellite accounts integrated in the SUT in current and constant prices is also described. The paper also covers the methodology used for compiling annual "Industry format" Input-Output tables (IOT) in current and constant prices by "the market share assumption".

Finally, experience from introducing Supply and Use Tables in countries with different types of economies and with different types of data sources are described. The goal of these international projects has been to improve the quality of the countries annual national accounts by integrating SUT and IOT in current and constant prices in the ordinary compilation process by an efficient and well-documented production process.

□□□□

Marek Rojicek

Use of the Supply and Use Tables in the Process of Constant Prices Estimation

The main objective of national accounts is to provide comprehensive data, which can be used for analysing and evaluating the performance of an economy, mainly about the major economic flows such as production, household consumption and capital formation. Contrary to data at current prices, data at constant prices cannot be directly observed. Decomposition of value changes into price changes and volume changes is an important aspect of the compilation of national accounts. Supply and use tables (SUT) provide an excellent compilation framework for constant price estimates. Special attention must be paid to GDP as the most important balancing item. GDP can be calculated from the production and expenditure side and SUT framework enables to deflate it in a systematic way. The keystone of the deflation of the national accounts aggregates is using as detailed commodity breakdown as possible. Then it is necessary to decompose the use side into the individual matrices according to different price indices (domestics, imports, trade and transport margins, taxes, etc.) . After applying the correct price indices for the decomposed SUT, backward aggregation of the deflated figures is carried out.

□□□□

Janja Kalin

Establishing the compilation of Supply and Use and Input - Output Tables at Constant Prices in Slovenia

In recent years at the Slovenian Statistical Office we have begun with the supply and use tables work. During this time we have established the compilation of SUT and IOT and began with annual compilation of the tables at current prices. Supply and use tables formed a basic core of the major GDP revision and the Statistical Office started to prepare regularly annual supply and use tables and input output tables at current prices from 2000. Up to now tables at constant prices haven't been compiled yet for Slovenia. In 2004 we have started with their preparation and we plan to have first preliminary results in 2005. In the paper we will present our recent work on the tables at constant

prices, data sources, methods and techniques used. We will discuss strong and weak parts of the data and the compilation process and expected further developments of the compilation.



Session I.2.5, Monday, 16:00-17:30
Room: Room 1505 at Teaching Building No.1
Recycling Systems and Waste Management
Chair: Shigemi Kagawa



Kazuyo Yokoyama and Tetsuya Nagasaka

Development and Evaluation of An Model for Estimating Material and Energy Recovery from Landfilled Waste

Waste disposal with production and consumption activities is translated into environmental emission after appropriate treatment. In Japan, most of municipal waste are separated and go to incineration system. Incineration residual is mainly landfilled. Under our geographical condition, we have narrow space for final disposal site, and it is difficult to find new space for final disposal. Fig.1 shows residual capacity of landfill site in Japan. It is important for us to reduce quantity of final disposal and to save existing final disposal space. However more conservation of landfill site seems to be difficult only in existing treatment.

Under these conditions, recovering of material and energy from final disposal space is promoted by material industry, which plays a key role. Relandfill activity, which means digging up landfill waste and recovering resources, can remove the material having been landfilled, and will free up the land to be reused as new landfill space. Today relandfill activity examined in Japan (ex. Niigata, Mie prefecture) is that gasification-melting furnace system receives waste including municipal waste, incinerator ash and landfill waste. Metals contained in the waste like aluminium, copper and iron, can be recovered as mixed metal and slag through that system.

In many method of environmental assessment by using input-output model, final disposal site is not considered to be an object of material recovery. The purpose of this study is the development of methods to evaluate environmental burden and analysis economic effects considering with relandfill activity. This model mainly follows Waste Input-Output model (WIO). WIO, which was developed by Nakamura (1999), is based on SNA input-output table and extended from the view point of material recycling, energy recovery and landfill consumption. WIO table has the information of waste material flow between sectors, and describes inter-relationship between production sectors and waste treatment sectors (Fig.3). Yokoyama (2004) extended WIO which is a static model dynamically.

To consider material and energy recovery from landfill site, we need to modify the definition of waste generation Wot . Wot is the sum of wastes with production activity, wastes generated from discarded durables and waste material recovered from landfill.

In environmental emission, landfill consumption Elt is defined as the quantity that deducted Eqt from the sum of Ept and Ert . Eqt is the quantity of landfill waste dug up, Ept is landfill consumption with production activity, and Ert is landfill consumption with material and energy recovery activity.

By using scenario analysis, we evaluate the effect with respect to the requirements for

landfill capacity and energy. In this study, we consider three scenarios. Scenario A is control, in scenario B, all the municipal waste is received by gasification-melting furnace system, and re-landfill activity is not assumed. In scenario C, all the municipal waste is received by gasification-melting furnace system, and re-landfill activity is assumed. A quantity of landfill waste which dug up is assumed 5% of final disposal waste of a year, and it is assumed to continue for ten years. In the summary of results, under scenario B, decreasing effects on the level of landfill volume were seen by 13.62% compared with Scenario A. Scenario C reduced landfill consumption by 17.13%.

□□□□

Kazuhiko Nishimura

Instability in Autonomous Recycling Systems with Design Effect and Its Internalization

We consider recycling systems in which the primary producer and the monopoly recycler are independent agents, while the design of the product determined by the primary producer affects the recycler's productivity. This design effect could be internalized within the economy if the monopoly recycler announces/charges the imputed price of waste of different designs according to the marginal revenue. Nevertheless, the stability of the equilibrium could be affected by the function of the design effect on the recycler. We examine the case when diversity in waste quality, and thus, in recycle design has negative effect on the monopoly recycler's productivity, and demonstrate instability of the efficient equilibrium.

□□□□

Shigemi Kagawa

Input-Output Analysis, Consumption Structure, and the Household Production Structure

The standard waste input-output models for single region and multi-regions do not endogenously treat the dependent relationship between income distribution (household consumption) and household waste generation. As in Miyazawa and Masegi (1963), I introduce the propagation process of income distribution and household waste generation into the extended input-output analysis. From the empirical analysis, we find that the contribution of industrial and household waste treatment and recycling activities to the 1995 Japanese economy was about one trillion yen (0.1% of the gross domestic output), considering the endogenous income propagation effects induced by the consumption behaviour of labors engaging in the waste treatments. We also find the endogenous income propagation effect resulting from the household waste treatments induced by unit household consumption (one million yen) was only a 220 yen and remarkably small, comparing with that for ordinary commodity productions (753 thousand yen).

■■■■■■■■■■

Session I.2.6, Monday, 16:00-17:30
Room: Room 1504 at Teaching Building No.1

Yazd is one of the twenty eight provinces located in the centre of Iran with high tourism attraction due to the existence of historical, religious monument buildings and sightseeing. The inflow of tourists in this region has certain positive impacts on the socio-economic structure of the region which have not been analyzed so far. The main focus of this paper is to quantitatively analyze these issues. For this purpose we use the recently constructed Regional Input-Output Table of Yazd to estimate the impacts of tourism on production activities, income and employment in the Yazd region.

□□□□□

Tianhu Fan and Jan Oosterhaven

Impact of International Tourism on the Chinese Economy

Since 1990, like the rest of the Chinese economy, international tourism has grown tremendously. The impact of international tourism on the Chinese economy will be investigated for 1997, the last year for which both an input-output table, a social accounting matrix and tourism satellite accounts are available with some sectoral detail. With these data a so-called Type II input-output model is built, which enables to estimate the direct, the indirect and the induced impact of international tourism on the Chinese economy. According to the model 1.64% of GDP, 1.40% of household income, and 1,00% of total Chinese employment is dependent on international tourist expenditures. The differences between these impacts are explained by the sectoral composition of international tourist expenditures on the one hand, and by differences in Chinese sectoral capital/labour ratios, labour productivities and backward linkages on the other hand.

■■■■■■■■■■■

Session I.2.9, Monday, 16:00-17:30
Room: Meeting room 3 at Run Run Shaw Conference Center
Structural Decomposition Analysis
Chair: Bart Los

□□□□□

Liu Baojun

The Cause of China's Industrial Structure Evolution A Systematic Analysis

A nation's industrial structure can indicate the distribution of production elements among that nation's economic sectors and their inter-relationships. It is then an important active factor for economic growth, because a positive transformation of the structure contributes a lot in promoting the aggregate economic volume increase of that country. The cause, or the mechanism that brings about such a transformation in the development of a country's economy, becomes an essential part in the research of industrial structure issues.

The evolution of industrial structure depends on the inner adjusting of its components and on its exchanging of energy with outer relevant elements. This paper explores them both in a systematic

way.

Through the Structural Decomposition Analyses, this paper develops four kinds of models for the purpose of tracing the evolution process of industrial structure. They are the outer element influential models (two groups), the inner determining element model, the economic growth effect model with reference to demand structure, and the economic growth effect model with reference to supply structure. With these models as the systematic analysis tools, we can study the impact on the change of industrial structure by the demand and supply mode shift, the transition mechanism as well as the degree of such an impact. We noticed the difference caused by the demand/supply mode shift and industrial structure change upon economic growth, and differentiated the aggregate influence and structural influence statistics; hence we combined these two indicators in one model organically.

With the outer element influential models, we can investigate the influence by demand mode shift upon industrial structure and upon economic growth at three levels, i.e., the aggregate demand structure level, the final demand structure level, and the sector structure level of a certain final demand.

With the inner determining element model, we can analyze the effect upon industrial structure and economic growth by the allocation shift of each production element among various sectors, the aggregate input change. In this way, we can answer the questions as to whether the inner-flow of production elements among different sectors really promotes economic growth, and how this inner-flow affects the output level, so as to evaluate and predict the effect of industrial structure adjustment.

According to the serial input-output tables of a few running years in comparable price, we analyzed the cause for the economic growth and the development of industrial structure in China, the major source for driving the economic growth and the development of services sector in China. This was done through adopting the outer element influential model, the economic growth effect model with reference to demand structure.

□□□□

Esteban Fernandez Vazquez, Bart Los and Carmen Ramos Carvajal

Using Additional Information in Structural Decomposition Analysis

Structural decomposition analysis (SDA) is a well-known methodology to assess the relative importance of effects that together constitute a change in the variable of interest. A widely recognized problem of SDA is that the results often depend strongly on the specific decomposition formula chosen, whereas numerous formulae are equivalent from a theoretical point of view. This non-uniqueness problem is often solved rather pragmatically, by reporting an average of (a subset of) all possible formulae. In this paper, we propose a method that uses entropy-based econometric techniques to incorporate additional information to choose a specific decomposition formula. We illustrate the method empirically by investigating the sources of change in sectoral real labor costs in Spain, 1980-1994.

Notes

¹ Elements in matrix A_t are calculated as ratios of the elements of Z_t to the sum of the corresponding row, so they add up to one by the row. Accordingly, the elements of B_t are the ratios of the elements of Z^*_t to the sum of the corresponding column, so they add up to one by the column.

□□□□

Kiyonori Matsuki, Shigemi Kagawa, and Hajime Inamura

A Spatial Structural Decomposition Analysis of the International Fragmentation

The standard inter-regional and international input-output models don't capture the recent international fragmentation and the world-wide process innovations, because the standard models depend on the commodity technologies and mask the microscopic production processes. The present paper proposes the production processes-based international input-output system and derives the spatial structural decomposition analysis. The empirical analysis is applied to the 1995 China-Japan inter-national input-output table focusing on the automobile production processes.

■■■■■■■■■■

Session I.2.10, Monday, 16:00-17:30
Room: Conference Hall 1 at Run Run Shaw Conference Center
China's Economic Growth and Input-Output Analysis I
Organizer and Chair: Chen Xikang

□□□□

Xiuli Liu

CPE-IHO Model to Calculate the Direct, Complete and Conjunct impact of Dumping or Subsidy on Import Country's Economy

For a long time, Chinese scholars pay more attention on how to deal with abroad antidumping surveys in China. They have no strong consciousness and experiences to decide whether put antidumping into practice for the abroad producers' dumping action or not. With the 'Antidumping and anti-subsidy ordination of People's Republic of China' issued, China begun to make antidumping survey formally. Until the year end of 2001, there had declared 20 appealed antidumping cases. To evaluate the impact of dumping products on correlative industry and economy system in China is an important reference to make antidumping appeal, to have trade negotiation and set down trade policies.

The paper presents CPE-IHO (countable partial equilibrium--input-holding-output) model. Merits of partial equilibrium module, partial close input-output module and input-holding-output analysis theory are used in the model. With CPE-IHO model, not only direct impact but also complete impact, conjunct impact of unfair importation on the importer country's industries and whole economy system can be calculated, which can't be once done by other models.

The basic assumption of CPE-IHO model is as follows. (1)The supply curve of domestic products inclines upwards. (2) Domestic consumable is divided into domestic product, fair imported product and unfair imported product which means dumping or subsidized product. (3) All markets are entire There are many factors that impact the industrial total output and employment.

To research the effect of unfair importation on domestic industries, anti-fact method is used to compare the change of the same indexes in two cases that unfair importation happen and unfair importation doesn't happen with any other factors unchanged.

The validity of the model is verified by numerical test. Results are compared and analyzed. Based on these, political suggestion is provided.

□□□□

Hongxia Zhang

The Optimal Education Funds Input in China an Analysis of Multi-Sector Endogenous Growth Based on the Extended Input-Output Model on Education (EIOME)

Education and human capital accumulation are very important for economic growth. The development of the education sector must be in tune with economic development. The increase of education must be consistent with the growth of other sectors. In order to analyze the optimal input of educational funds, in this paper, a multi-sector endogenous growth model is constructed, based on the extended input-output model on education (EIOME), which is built by Zhang & Chen (the paper is accepted by the special issue of Economic Systems Research for China).

The model is divided into two categories continuous and discrete. The continuous model is dynamic optimization analyzing by Hamilton system, based on continuous dynamic EIOME. Theoretically, it is used to study the factors that affect the optimal proportion of the educational funds to total output of other sectors. The discrete model is based on discrete dynamic EIOME. It is a nonlinear optimization model and used to analyze the rational input of educational funds, according to the growth of the whole economy. Its objectives are social utility maximization, unemployment of new graduate minimization, and growth stability. The subject conditions consist of dynamic EIOME equations and non-negative conditions.

The 2000 Chinese extended input-output table on education is compiled on the base of the 2000 Chinese input-output table compiled by the National Bureau of Statistics (NBS). Empirical analysis is done based on the table, using the discrete model. We compute the total output of three industries, Primary Industry (Agriculture), Secondary Industry and Tertiary Industry (except for education), and the educational funds of the four educational levels, primary education, junior high school education, senior high school education and higher education. It is shown that when the average growth rate of the three industries are 7.2%, 7.7% and 9.2% separately, the growth rate of educational funds of the four educational levels are 15.5% for primary education, 16.4% for junior high school education, 23.6% for senior high school education, and 18.8% for higher education. In general, if the total output of other sectors grows at the rate of 8%, the education funds in total should increase at the rate of 18.4%. Comparing with the historic information, it shows that education investment should be strengthened further.

□□□□

Fu Xue

Chinese Education Structure for Sustainable Development a Multiyear Lag Education-Economy Extended I-O Model with Assets Occupancy

Education plays an important role in a country's sustainable development strategy. It is crucial for Chinese government to integrate sustainable development into education system at all levels in order to promote education as a key agent for change. This paper develops a multiyear lag

education-economy extended I-O model with assets occupancy, and addresses the reasonable education structure in favor of sustainable development strategy in China. The characteristics of this model are that it adopts modifications-by-step method to deal with various nonlinear coefficients in I-O model and solves the relative model by difference equation in case of multiyear lag of human capital and physical capital because the lagged time of human capital is even longer and more important than that of physical capital. We compile 2000 Extended I-O Model with Assets Occupancy and Human Capital, estimate the required quantity of increased human capital at all levels in various sectors of national economy, discusses the improvement of education structure for sustainable development.



Session I.2.11, Monday, 16:00-17:30
Room: Meeting room 1 at Run Run Shaw Conference Center
Key Sector Analysis
Chair: Manfred Lenzen



Cid L. Terosa and George Manzano

Application of the Analytic Hierarchy Process Technique (AHP) in Input-Output Key Sector Analysis

Forward and backward output linkage measures have been used as the traditional benchmarks for identifying and ranking key sectors. Industries with high output linkage measures are usually singled out as key sectors in the economy. The ranking of sectors according to linkage measures, however, becomes confusing when additional criteria such as employment and household income linkages are taken into account. In most cases, industries with high output linkages have low employment and household income linkages, and vice-versa. Thus, there is a need for a technique that would identify and rank key sectors based on multiple criteria.

This study treats the identification and ranking of key sectors as a multicriteria decision problem. It uses the analytic hierarchy process technique (AHP) to identify and rank key sectors in a rapidly developing region in the Philippines based on output, employment, and household income linkages. The AHP is a qualitative multicriteria decision-making technique that decomposes a complex problem into a hierarchy. Although the AHP depends on qualitative comparisons, this study modifies the application of this technique by taking into account actual quantitative output, employment, and household income linkage measures.



M. Alejandro Cardenete and Ferran Sancho

The Missing Link in Key Sectors Analysis

In general terms key sectors analysis aims at identifying the role, or impact, that the existence of a productive sector has in the economy. Quite a few measures, indicators and methodologies of varied complexity have been proposed in the literature, from multiplier sums to extraction methods, but not without debate about their properties and their information content. All of them, to our knowledge, focus exclusively on the interdependence effects that result from the input-output structure of the economy. By so doing the simple input-output approach misses critical links beyond the interindustry ones. A productive sector's role is that of producing but also that of generating and distributing income among primary factors as a result of production. Thus when measuring a sector's role, the income generating process cannot and should not be omitted if we want to better elucidate the sector' economic role. A simple way to make the missing income link explicit is to use the SAM (Social Accounting Matrix) facility. This is what we do in this note. Using a standard extraction methodology we compare lost output with and without the missing link and observe the substantial differences in the measure of lost output associated to any given sector.

□□□□

M. Alejandro Cardenete and Gaspar J. Llanes

Keysectors Analysis Using Social Accounting Matrices An Alternative Approach

First author is grateful to research projects SEC2003-05112 from MCYT and SGR2001-0164 from DURSI. Stated opinions are those of the authors and therefore do not reflect the viewpoint of the supporting institutions. This paper is divided in three parts. In the first one we review briefly the different methods to detect keysectors, with relevant incidence in those which we are going to use in the empirical application. In the second section, we show the proposal to detect keysectors using a combination of techniques and databases. In the third part, we present the SAM for Spain 2000, used in the empirical approximation with this new proposal. We finish with a resume of the main conclusions obtained.

■■■■■■■■■■

Evening Courses on Monday 19:00-21:00

Room: Room 1505 at Teaching Building No.1

Course 1A:

Yusuf Siddiqi

The Role of I-O Tables in the System of National Accounts

This session provides a background on the international System of National Accounts Manuals, the use of the manuals in producing and estimating input-output accounts, with special focus on Canadian national and regional input-output tables.

or

Room: Room 1506 at Teaching Building No.1

Course 1B:

Ezra Davar

Prices in Input-Output System Models

In this evening course, the relationship between two types of prices in Input-Output systems models is considered the first type of price is money (absolute) prices, which, according to theoretical Input-Output System analysis, is when physical quantities and absolute (money) prices are separately presented; the second type is latent prices, which, according to empirical Input-Output System analysis, is in money terms.

The deep crisis of modern economic theory derives from the “rift” between theory and reality. This is because modern theory is characterized not only by the unrealistic assumptions of Walras (free competition, uniform prices, and so on) which may have been relevant in his time, but also by irrelevant and unrealistic modern assumptions (non – classical free goods conception – Walras’ law) , as formulated by post-Walras’ economists which makes the theory absurd. In contrast, economic reality is characterized by mixed competition, prices discrimination, unemployed factors and unsold commodities, with rigorous positive prices for employed factors and commodities sold.

Input-Output was called upon to play the central role in the process of approximation between theory and reality. However, until today, unfortunately, this has not happened. And this, because, Leontief’s attempt to establish the link between the Theoretical (Walras’) and Empirical (Marx’s) approach to input-output was incomplete and therefore, until now there is considerable confusion between these systems. In addition, these system models differ from the actual economic activities.

Theoretical input-output is characterized (1) by the interdependence between quantities and prices for both primary factors and goods; (2) two types of prices for goods – supply (cost

of production) and demand – such that in the state of equilibrium, equality between them is required; and (3) that all prices are real (money commodity or any other numeraire) and uniform. It is necessary to stress that in the modern input-output theory, the demand prices of goods are missing and therefore, the coordination between supply and demand prices of goods was not discussed at all.

Empirical (Marx-Leontief's approach) input-output is characterized by “quantities” in the monetary terms. Here prices and quantities are not separated, but rather, are amalgamated in one magnitude. Therefore, empirical input-output has a uniform measurement, not only for goods, but also for primary factors and categories of final uses. On the one hand, this creates some problems in the using it for planning and analysis; on the other hand it allows us to extend a scope of analysis by the formulation of additional models (vide infra) .

Since each element of monetary I-O, in general, includes two components quantity and price, a change in its magnitude might be result of changing either of each component separately, or both simultaneously. Hence, in the case of monetary I-O, it is necessary to make clear beforehand what kind of assumptions should be taken into account in relation to quantity and price. With regard to quantity there is another minor problem, because “quantity” in money terms is understood, as in other terms. Moreover I-O in physical terms includes some sectors whose quantities are measured in money terms, for example, some sectors of industry, financial and services sectors and so on.

The serious problem arises when one desires to analyze monetary I-O from the point view of prices, because these prices (money) are already included (presented). So, a new price system for monetary I-O should be take into account this fact, that is the pre-existing money prices, and they have to be dealt with as supplementary to them, but not replacing them, as sometimes they are interpreted. What this means is that these two prices systems actually coexist. So, new prices for monetary I-O must be related to money prices alike, as quantity in money terms is related to quantity in real (physical) terms.

At the same time, monetary I-O has a certain advantage. The dual character of each element of monetary I-O and the uniformity of their measurement allows us to consider special system of prices (1) not only prices of commodities for production and for final uses (according to rows) from the side of factors (supply prices) , but also prices of commodities and factors (according to columns) from the side of categories of final uses (demand prices) ; (2) in addition, since, the demand of a certain category for the different commodities in monetary I-O becomes homogenous, this allows us to determine a price to the relation of unit expenditure of a certain category, when the structure of demand of this category does not change, and it is also determined by both sides, supply and demand.

In the literature of I-O analysis, there is no agreement on the character and interpretation of a new additional price system. Firstly, many authors consider only prices for goods, and if the prices for factors are considered, then they are dealt with without distinguishing between prices from the supply side and prices from the demand side in one system models. Secondly, these prices are interpreted in various forms 1) unit prices; 2) relative prices; 3) index prices; and 4) eigenprices. Finally, it seems that these prices substitute for absolute (money) prices because the connection between them is not discussed.

The common failure of these interpretations is that prices are considered without any measurement. However, since monetary I-O is characterized by the quantities in money terms, prices should be determined in relation to unit flows in money terms, and therefore, the measure of such prices should be the measure of money per unit of measure of money, for example \$ per 1\$; and this is uniform for commodities, factors and categories. Since, in I-O in monetary terms there is no clear (direct) relation to the real (physical) quantities and their prices, I suggested calling them latent prices (Davar, 1989 and 1994) . They are determined in the following form

$\lambda - [\lambda_k]$ – is the row vector $(1*m)$ of the latent prices of primary factors, and it has two meanings 1) it is given and is determined from the supply side of factors identical to their supply money prices; and is used for the determination of the latent supply prices of commodities for production, and consequently for determination of the latent supply prices of categories; in this case it is called the latent supply price of primary factors and notated as λ_s ; in the case of general equilibrium state (included the base year I-O table) λ_s is a unit vector (vide infra); 2) it is unknown, and it is obtained by means of the latent demand prices of commodities for production, determined on the base of the latent demand prices of categories; in this case it is called the latent demand prices of primary factors and notated as λ_d ;

$\mu - [\mu_r]$ – is the column vector $(R*1)$ of the latent prices of categories, and it also has two meanings 1) it is given and is determined from the demand side of categories; and is used for the determination of the latent demand prices of commodities for intermediate (production) uses and consequently for determination of the demand supply prices of primary factors; in this case it is called the latent demand price of categories and notated as μ_d ; in the case of general equilibrium state (included the base year I-O table) μ_d is a unit vector (vide infra); 2) it is unknown, and it is obtained by means of the latent supply prices of commodities for intermediate (production) uses determined on the base of the latent supply prices of primary factors; in this case it is called the latent supply prices of categories and notated as μ_s ;

$\pi - [\pi_{i,j}]$ – is either the column vector $(n*1)$ or the row vector $(1*n)$ of the latent prices of commodities for intermediate (production) uses and they are obtained by two directions 1) by means of the latent supply prices of primary factors and it is called the latent supply prices of commodities and notated as π_s and it is row vector; 2) by means of the latent demand prices of categories and notated as π_d and it is column vector.

In this session, therefore, we consider the relationship between two types of prices – money (absolute) prices, according to the theoretical Input-Output System, where physical quantities and absolute (money) prices are separately presented; and latent prices, according to the empirical Input-Output System in the money terms.

1. Introduction Prices'role in Economic Theory (General Equilibrium Theory)
2. Absolute (Money) prices in IO system where quantities (in physical terms) and prices are separately appeared
3. Latent prices in IO system in monetary terms
4. Linkage between these two system of prices

Recommended Readings

- Brody, A. (1970) Proportions, Prices and Planning, Amsterdam, North-Holland
- Davar, E. (1994), The Renewal of Classical General Equilibrium Theory and Complete Input-Output System Models, Avebury, Aldershot, Brookfield USA, Hong Kong, Singapore, Sydney
- Dietzenbacher, E. (1997) 'In Vindication of the Ghoch Model A Reinterpretation as a Price Model', Journal of Regional Science, Vol. 37, No. 4
- Leontief, W. (1941) The Structure of American Economy, 1919-1929. >Cambridge, (mors) Harvard University Press, (Second Ed. 1951, New York, Oxford University Press).
- Leontief, W. (1966) Input-Output Economics, New York, Oxford University Press.
- Leontief, W. (1986) 'Technological Change, Prices, Wages, and Rates of Return on Capital in the USA Economy, Input-Output Economics, Second Edition, New York, Oxford University Press.
- Oosterhaven, J. (1996) 'Leontief versus Ghochian Price and Quantity Models', Southern Economic Journal, Vol. 62, 750-9.

Tuesday, June 28, 2005

PARALLEL SESSIONS II.1 (9:00-10:30)



Session II.1.1, Tuesday, 9:00-10:30
Room: Conference Hall 2 at Run Run Shaw Conference Center
World Input-Output Models III
Organizers Emilio Fontela Montes and José M. Rueda-Cantuche
Chair Emilio Fontela Montes



Bernd Meyer, Christian Lutz and Marc Ingo Wolter

The Impact of Chinas Investment Growth on Economic Growth and Resource Consumption in the World. Results of Simulations with the Global Model GINFORS

The rapid economic expansion in China is accompanied by the accumulation of a huge capital stock, which means a strongly rising import of investment goods – especially machinery. In the first stage there is a rise in machinery production concentrating on countries like Japan, Taiwan, Germany and the USA. In these countries the steel inputs and the general economic activities expand and this causes higher energy demand and CO₂- emissions in the steel producing countries and the extraction of ore and fossil fuels in the oil, coal, gas and ore producing countries.

The paper presents the Multi-Country/Multi-Sector Model GINFORS and shows its application to calculate the just described economic and environmental effects in deep sectoral and country detail.

Sam Cole

Integrating Culture into Global Scenarios and Models

No abstract available.



Emilio Fontela and José M. Rueda-Cantuche

Linking Cross-Impact Probabilistic Scenarios to World Social Accounting Models

Since the pioneering contribution by W. Leontief in his 1973 Nobel Prize lecture (Leontief, 1974) input-output models have been often associated to world models attempting to estimate global environment impacts of economic growth. Leontief, Carter and Petri (1977) introduced also the concept of scenarios regarding possible future developments of the world economy, and used their input-output models to quantify the environmental impacts and related economic consequences. In this context, scenarios were somewhat connected with expert opinions, which quite often lack of solid scientific knowledge. However, if a major objective of social science is to improve decision-making processes related to social issues, we need methods for integrating these expert opinions about the global systems with the knowledge of the functioning of given subsystems of the same reality. In this sense, cross-impact analysis becomes an embryonic method of potential

interest.

This paper is concentrated on the possibility of linking cross-impact methods for probabilistic scenarios with world social accounting models including environmental issues, with the main purposes of improving global decision-making processes towards sustainable development and other issues that are placed at the centre of society's concerns, and of being capable to advance future events and future impacts of human activity on the global economy and society at large. At a first stage, it is focused on a preliminary estimation of a World SAM.



Session II.1.2, Tuesday, 9:00-10:30
Room: Meeting room 2 at Run Run Shaw Conference Center
Physical Input-Output Analysis Conceptual Questions and Possible Applications III
Organizers Helga Weisz and Sangwon Suh
Chair Helga Weisz



Sangwon Suh

Attribution Principles in Linear Systems - the Role of Units

In the recent discussions of Physical Input-Output Table (PIOT), various models have been suggested and examined (Hubacek and Giljum 2003; Suh 2004; Dietzenbacher 2004; Giljum et al. 2004; Giljum and Hubacek, 2005; Dietzenbacher et al., 2005; Weisz and Duchin, 2004) . What was lacking in these discussions perhaps is the physical meaning hidden behind the formulae, where the rationale of attribution principles is at its core. The rationale of attribution principles used by these studies are examined under 3 conditions (1) one and unique, homogeneous product per sector with homogeneous price over consuming sectors, (2) one and unique, homogeneous product per sector with inhomogenous price over consuming sectors, and (3) inhomogenous product per sector with inhomogeneous price over consuming sectors. An input-output calculus can be viewed as a set of principles on how to attribute primary inputs and direct requirement of a sector to its output and subsequently to the consuming sectors. In the case where the first conditions apply, there is obviously no difference between using PIOT and Monetary Input-Output Table (MIOT) both monetary and physical values are good indicators that convey the underlying principles of causality. When it comes to the case under the second conditions, a question on the rationale of attribution principle and appropriate indicator that can better reflect the underlying principles of causality arise. For the third, it is shown that neither PIOT nor MIOT is able to appropriately calculate the I-O relationships. With these series of analysis, it is argued underlying attribution principles and corresponding physical meaning of formulae needs to be carefully considered. Besides, it is argued that the level of aggregation and homogeneity of an IO statistics play important roles in validating the attribution principles.

Discussion Comments by discussants, general discussions, and conclusions



Session II.1.3, Tuesday, 9:00-10:30
Room: Room 1503 at Teaching Building No.1
New Developments in Compiling Input-Output Tables III
Interregional and Multiregional I-O
Organizers Jiemin Guo and Mark Planting
Chair Jiemin Guo



Oliver Fritz, Erwin Kolleritsch and Gerhard Streicher

Compiling a multiregional input-output table for Austria A discussion of methods and conceptual issues

In the process of developing a multiregional econometric input-output model for Austria, a multiregional table for all nine states was compiled for the year 2000. The table is based on a make-use system and is fully consistent with the national input-output accounts. In its compilation we made extensive use of primary and secondary regional data bases; for interregional trade we did not rely on standard estimation techniques (e.g., a gravity approach) but carried out a survey among regional establishments in various industries.

The paper describes the most important steps in compiling the multiregional make-use system. It also discusses various conceptual issues that arose during the compilation process; this concerned, for instance, consequences from the application of the domestic concept. Finally we present some results and compare regional and national input-output accounts.



Bjarne Madsen and Chris Jensen-Butler

Spatial accounting methods and the construction of spatial Social Accounting Matrices

The paper examines adaptations to regional accounts used to construct regional and interregional Social Accounting Matrices (SAMs). Balancing procedures for commodities and factors are transferred from National to Regional accounts and procedures to construct spatial data on interaction are also included in the data-building process. Both involve a novel approach using the geographical concepts of place of production for production activities, place of residence for institutions, market place for commodities and market place for factors. The use of these concepts permits accounting balances to be calculated at the spatial level. It is argued that as the size of basic areal unit used in studies declines, more traditional accounting approaches are no longer satisfactory. The theoretical basis of the spatial regional accounting model is presented and an example of the construction of a Danish Interregional SAM (SAM-K) is examined, where particular attention is given to data requirements, showing that these are much more modest than generally assumed.



Session II.1.4, Tuesday, 9:00-10:30
Room: Conference Hall 1 at Run Run Shaw Conference Center
China's Economic Growth and Input-Output Analysis
Organizer and Chair Chen Xikang

□□□□

Jinghua Li

A Weighted Structural Decomposition Analysis of Coke in China

Metallurgical coke is a global and strategic industrial sector. China is becoming the key world producer and exporter of coke. In order to identify the sources of the growth of coke sector in China during 1992 to 1997, we study the coke sector by Input-Output techniques. Over the past two decades, structural decomposition analysis (SDA) has developed into a major analytical tool in the field of input-output techniques, but the method was found to suffer from one or more of the following problems. The decomposition forms, which are used to measure the contribution of a specific determinant, are not unique due to the existence a multitude of equivalent forms, irrational due to the weights of different determinants do not match, inexact due to the existence of large interaction terms. In this paper, the basic principles for a decomposition are proposed, and a weighted average decomposition method is derived, then we prove that the result of this approach is equal to the Shapley value in cooperative game, so, some properties of the method are obtained. By the weighted SDA, we found that China coke growth during this period came about primarily by production technology change, and then export demand.

□□□□

Yang Cuihong

Analysis of Human Capital Contribution to the Chinese Economy

Human capital is one of the most important technological supporters, its accumulation has been the main way to increase labor productivity. Research shows that human capital has contributed three-fourth to the economic growth. In China, after finishing primary physical capital accumulation and with the rapid growth of Chinese economy, the contribution of human capital is becoming more and more remarkable.

In our past research based on data of 30 provinces or autonomous regions in 1990, we found that the net income per capita of peasants has close linear correlation with education level of the farmers. In this paper we will investigate the contribution of human capital from two aspects by using econometric model and extended input-output model with assets. First, using time-series data of China, especially since 1980, we will study the changes of contribution of human capital and its ratio in economic growth. Second, based on the cross section data of 31 provinces, we would investigate the correlation between average education level and GDP growth. Then, with selection of data for particular years, comparison analysis among different regions will be addressed.

□□□□

Xiuli Liu and Chen Xikang

The Nonlinear Important Coefficients Input-Holding-Output Model

In this paper nine input-holding--output tables at current price and constant price with 18 sectors for China during 1973-1999 are designed and compiled. Field of influence method is used to choose 47 important coefficients from nine Chinese input-holding-output tables. Using per employee occupied original value of fixed assets as independent variable, the nonlinear expression of each main coefficient is obtained by nonlinear regression method. The numeric experiment shows the prediction error of the models is smaller than RAS method.



Session II.1.5, Tuesday, 9:00-10:30
Room: Room 1505 at Teaching Building No.1
Trade and Employment
Chair: Bart Los



Gustav Dieckheuer

External Trade, Value Added and Employment Studies with an Input-Output-Model for Germany

In the export-oriented industries of the older EU-member countries above all of Germany input coefficients for imported primary goods have been continually rising and value added per unit of industry output has been continually declining over the past 15 years. By extrapolating this development some economists come to the conclusion that those countries and especially Germany are going to mutate to a “bazaar-economy” where additional exports have only small employment effects. The “bazaar-economy”-thesis is based on a restricted look at export sectors and neglects the intersectoral transactions within the whole economy. Based on an input-output model for Germany in simulations for 1991 to 2000 as well as in a projection up to 2005 it is shown that additional exports have still substantial inter-industry-effects and hereby substantial macroeconomic effects on employment and total value added. By this result the “bazaar-economy”-thesis will be rejected – at least at the time being.

Germany is still renowned for its remarkable export strength. Between 1991 and 2003 its real exports increased by nearly 80%. However, Germany’s export strength is matched by only moderate GDP growth and persistent high unemployment levels. Obviously, the economic impulses of increased exports on the domestic economy are comparatively weak. And the positive effects of increased exports on domestic labour markets seem to be negligible as well. The difference between the developments of the domestic economy on the one hand and exports on the other hand has continually increased within the past years. Between 1971 and 1980 the growth rate of real exports averaged 5.2% and was matched by a real GDP growth rate of only approx. 2.75%. During the periods 1981-1990 and 1991-2002 the average export growth rate was still at 5.2%, whereas the real GDP growth rate in the first period was only 2.2% and then further declined to an average of 1.4% between 1991 and 2002.

This development is caused by relatively strong growth in labour productivity within export oriented industries as well as increased import intensity, especially in export sectors. Both of

these facts explain the near absence of impulses from exports on the domestic labour market and the only limited stimulus on domestic economic activity. Moreover, these facts contain an important explanation for the export sectors' decreasing share of value added with respect to the output value of the particular sectors and also with respect to the entire value added in Germany. These developments provide the basis for the thesis that Germany turns into a bazaar-economy which is controversially discussed at present.

Looking at these developments the paper applies an empirical input-output analysis to investigate the following questions

In which way do changes in overall export demand with constant export structure and changes in export demand in selected sectors affect GDP and employment and how do these effects develop over time?

How does value added of export- and home-market oriented industries change with respect to inter-sectoral input linkages in case of overall and sector-specific increases in export demand?

In which way do sectoral import intensities and their increase affect impulses on the domestic economy and the development of sectoral and overall import demand?

Is Germany on its way toward a "bazaar-economy", in which only little domestic value added is generated due to the fact that large fractions of domestic demand and exports are supplied by imports?

Based on an input-output-model for Germany the impact of economy-wide and sector-specific export increases on sectoral variables (e. g. value added, labour input and imports of intermediate inputs) and macroeconomic variables (such as GDP, employment and import demand) are investigated. The analysis uses data on intersectoral transactions as well as sectoral employment and import structures in Germany for the period 1991-2000. Based on these data trend calculations until 2005 were carried out to generate input-output tables for sectoral input coefficients with respect to domestically supplied, imported and labour inputs on the one hand and for the structure coefficients of final demand components, such as consumption, investment and exports, as well as input imports for product groups on the other hand.

The impact of additional overall and sectoral exports on GDP and overall employment clearly decreased between 1991 and 2000. Trend calculations until 2005 indicate that this decrease is still persistent. The main reasons for these findings are the comparatively high growth rates in labour productivity in certain sectors as well as the steady increase in the import share of sectoral inputs plus the increase in direct imports for final demand.

The multiplicative impact of export increases on GDP and employment is strongly dependent on the specific sector of the economy in which the increase occurs. In Germany productivity growth and the increase in import intensities are most pronounced in the major export industries so that additional exports of these industries – most importantly in the automobiles sector – only generate (compared to additional exports of sectors that are more home-market oriented) relatively small and over time even decreasing effects on GDP and employment.

The multiplicative effects of export increases in typical German export sectors – automobiles, machines and appliances in particular – on value added and labour input within the respective sectors weakened particularly sharp between 1991 and 2000 and in the trend until 2005. It is the aforementioned reason again strong increases in labour productivity and import intensity. Because of the strong linkages between these sectors and industries that are more home-market oriented, export increases have a substantial indirect impact on value added and labour input in the home-oriented industries. Due to the fact that these industries realized only moderate increases in labour productivity and import intensity they benefit from sizeable positive effects on value added and labour input.

The import structure reveals that the increase in Germany's export sectors' import intensities took place in particular in intra-industry imports. Therefore additional exports of these sectors caused relatively high increases of intra-industry imports. Direct imports gained importance since 1991 especially in the context of overall export demand. Additional exports have a direct import multiplier of 0.2% in 2005 according to the trend. Due to this development the net impulse of additional exports on the domestic economy is significantly reduced.

The value added multiplier of an increase in overall exports in 2005 is still at 1.3, but it has decreased by around 30% between 1991 and 2005. In case of an increase in exports of the automobiles sector (which is one of the strongest German export sectors) the overall value added multiplier amounts to a value of just above 1 in 2005 and has decreased approx. 45% since 1991. The resulting reduction of the share of value added in German exports in connection with the concomitant increase in the import share in intermediate and final goods provides the starting point for the thesis that Germany is on its way towards a "bazaar-economy". These facts evidently do exist. However, the analysis in the paper makes clear that Germany is still far away from the state of being a "bazaar-economy". The following reasons even suggest that the thesis has to be rejected also with respect to future developments

The reduction of value added effects of additional exports is not only caused by the increase in import intensities, but also – oftentimes even predominantly – by sizeable increases in labour productivity in certain sectors. There is little doubt that these developments were accelerated through differences in labour costs between Germany and its competitors in international export markets. Without these productivity increases Germany would not have been able to defend its supreme position in world exports. In light of these facts it can be assumed that the domestic share of value added in exports would have been higher without these increases, however, both real exports and overall value added would have been smaller in absolute terms.

Growth rates of German imports are still not exceeding (temporarily they are even below) the growth rates of German exports, so that – starting from a positive balance of trade – noticeable trade surpluses can be generated also in the future. This implies continuing positive effects on GDP and value added as well as positive effects on – although to a more limited extent due to productivity gains – employment.

For the sake of a positive development of the world economy growth rates of imports have to move in parallel with growth rates of exports. This is true especially for large trading countries such as Germany that benefit to a large extent from global effects. The positive economic impulses in foreign countries resulting from German imports are an important basis for further export growth in Germany. Possibly Germany's share in world exports would be larger if globalization was less advanced, but at the same time it is adequate to assume that German exports would be smaller in absolute terms and unemployment problems would be even larger.

German economic and wage policies are without any doubt partly responsible for the fact that value added and employment effects of additional exports have been decreasing for many years. If the reference to a German "bazaar-economy" lead to an improvement of these conditions then the principally wrong thesis would at least be a means for a good purpose. With respect to external trade and production data in Germany and regarding a globally positive and balanced economic development this thesis does not make much sense.

□□□□□

Yinglee Tseng, and Guang Yang

An Estimate of the Impact of Textile Quotas Elimination on China

Due to the approaching of textile quotas expiry in 1 January 2005, increasing debate on the impact of the phasing out of quota has been mostly concerned with the expansion of China's world market shares. The WTO report predicts that China will not dominate the world's textile market despite the concerns of other countries about the disruptive threat from China. According to the WTO, China's future world market share in the textiles and clothing will surely increase and benefit the most from the quotas expiry. However, the removal of quotas system is not the last scenario. Under the special provision China signed upon with its entry of the WTO, countries still can implement tariff and quota on Chinese import until 2013 if they consider the import harmful to their domestic industries. In this regard, will China really be able to enormously expand its exports of textile and clothing and dominate the world market as predicted? What will China actually gain from quota elimination? What issues will Chinese textile and clothing industry face in the new phase? This study provides a comprehensive evaluation of the impact of the removal of textile quotas expiry on China. A simulation using general equilibrium model is conducted to estimate relative gains to China. This study also researches potential protection measures and other related policy issues in future trade liberalization. It illustrates a realistic picture for responding to the skepticism of textile quotas removal through the examination of China's case, the predicted largest textile exporting country after the elimination of textile quotas in 2005.



Session II.1.6, Tuesday, 9:00-10:30
Room: Room 1104 at Teaching Building No.1
Input-output and Environmental Accounting Introducing the System of Integrated
Environmental and Economic Accounting 2003 (SEEA-2003) II
Environmental Accounting for Water
Organizer and Chair Glenn-Marie Lange
Chair Robert Smith



Alessandra Alfieri and Ilaria Dimatteo

The SEEA Framework for Water Accounts and Its Relationship to Other Water Management Databases

The paper will present the water accounting framework, focusing mainly on the flow accounts, which are based on the supply and use framework of the SNA93. The paper will first discuss the different physical flows for water, namely ion, use, returns, and reuse of water by industries, households and government. The paper will then discuss how the physical accounts are linked to monetary accounts for water. The paper will also discuss practical issues in the compilation of the accounts and linking the accounts to input-output tables.



Manfred Lenzen and Dr. Barney Foran

Australia's Water Accounts - Structure and Applications

Water is a unique resource in the sense that there is a general lack of adequate monetary valuation in the market, and a paucity of water use statistics. In an economy with important agricultural sectors such as Australia, water is of key importance for policy making. In addition, Australia is of the driest continents, and experiences a spatially and temporally highly variable rainfall, recurring droughts, leading to a relatively unpredictable water supply.

International efforts directed at incorporating resources and pollution into traditional accounting have resulted in a number satellite accounts in physical units (NAMEA - National Accounting Matrix including Environmental Accounts). In order to integrate environmental and economic data, Australian Water Accounts have been developed in parallel to energy, greenhouse gas, mineral and fish accounts, following the guidelines in the United Nations' Integrated Environmental and Economic Accounting framework, which is a complement to the System of National Accounts (SNA).

Based on these Water Accounts, a dissection of Australia's 1994-95 water use of 22,000 GL using input-output techniques, shows that 30% of Australia's water requirement was devoted to domestic food production and a further 30% to exports, compared with 7% required for direct consumption by households. Australia has a net annual trade deficit in embodied water of approximately 4,000 GL.

□□□□

Glenn-Marie Lange

Managing Water in Botswana and Namibia an Accounting Approach

Water is often cited as one of the major constraints to development in Namibia and Botswana. Much of the two countries consist of desert, arid, and semi-arid land. Rainfall is very low in both countries and extremely variable, with droughts a common occurrence. Water use has grown rapidly over the last 25 years as a result of population and economic growth, increasing the pressure on this scarce resource. Water scarcity has international repercussions because both Botswana and Namibia rely extensively on international rivers shared with many neighbors.

In response to increasing water scarcity and mounting water supply costs, policy makers have called for use of water that is economically efficient, equitable, and environmentally sustainable. But, in the past, there has been insufficient information to assess water use, especially from an economic perspective. Botswana relied on data collected for a Water Master Plan in the early 1990s; very aggregate information is published annually by the bulk water provider in which end-users are classified by billing categories that do not correspond to industries in the national accounts. A similar situation existed in Namibia—a major water resources assessment was undertaken in the late 1990s, but no information was compiled in a manner that would allow linking water information with economic information. In response to the new policy needs, water accounts that were linked to the national accounts were constructed in both countries.

The water accounts presented here for Botswana, Namibia provide a unique perspective on the economics of water supply and use, which can enable policy makers to monitor not only the physical, but also the economic implications of water supply and water allocation. The water flow accounts have been integrated with SAMs for Namibia and Botswana in a NAMEA framework to analyse the driving forces for water use.



Session II.1.7, Tuesday, 9:00-10:30
Room: Meeting room 4 at Run Run Shaw Conference Center
Applications of Multisectoral Models
Chair: Oscar De-Juan

□□□□

Wang Jiamo

A Feasible Dynamic Nonlinear Input-Output Model

Standard Leontief dynamic Input-output model has two major shortcomings firstly, it does not combine the input with output; secondly, average investment coefficients and capital coefficients instead of marginal investment coefficients and capital coefficients were used in model. Above disadvantages caused the following how-do-you-do dynamic input-output model was researched only in theoretical level and seldom was applied to empirical study. The paper will use dynamic investment coefficients based on the both investment curve and total output curve (macro concepts) to construct a new dynamic Input-output model. The model can be calculated in practice only depending on the input-output table and investment data in Statistical Yearbook and its coefficients varied with time. So, it can be called feasible non-linear dynamic Input-output model.

□□□□

Debdas Bandyopadhyay

Growth-equity Trade-Off A Case Study of India

The paper estimates and compares the growth-equity trade-off for Indian economy using a "closed-loop" multisectoral input-output model. The model captures two-way dependence between growth and distribution on the basis of structural as well as socioeconomic factors typically found in a developing economy viz. i) duality in price and output in agriculture and industry ii) high skill difference among laborers resulting in high wage inequality iii) short run output constraint in agricultural sector of the economy etc Endogenous determination of income distribution, poverty and growth considering both structural as well as socioeconomic factors is the novelty of our model which, to the best of our knowledge, have so far not been used for estimating growth-equity trade-off for Indian economy. Simulation of the model with frequently used growth and redistributive policies show i) while there exist substantial growth-equity trade-off for Indian economy, the growth-poverty trade-off is absent or minimal negating the hypothesis of poverty increasing effect of growth ii) extent of growth-equity trade-off is policy specific and thus there exist scope of policy intervention for promoting "growth with equity", iii) extent of growth-equity trade-off is more for growth oriented policies than the distribution oriented policies for removal of poverty and iv) higher share of agricultural investment with protected minimum wage for agricultural labor have minimum growth-equity trade-off with maximum poverty reducing effect in the class of growth and redistributive policies considered in the present study.

□□□□

Oscar De-Juan and Eladio Febrero

A Giant with Clay-Feet. (Non-equilibrium Prices in AGE models)

The flexibility of relative prices stands out as one of the major contributions of Applied General Equilibrium Models (AGE) over the traditional analysis derived from input-output tables (IOT) and social accounting matrices (SAM). But are the price functions coherent with the competitive equilibrium they are supposed to describe? Even if we assume that the prices embedded in the original SAM reflect a full competitive equilibrium, this may be not the case after a wage increase or a tariff reduction (to give a couple of typical “impacts”). The new set of prices do ensure the equality between supply of and demand for commodities and factors, but not the equality of the rate of return across industries, as competition requires. Any coherent AGE model should take such long-term equilibrium condition into account and introduce the required mechanisms moving the economy towards it.

■■■■■■■■■■

Session II.1.8, Tuesday, 9:00-10:30
Room: Meeting room 1 at Run Run Shaw Conference Center
SAM based Modeling and Analysis II
Chair: Susana Santos

□□□□

Gazi Özhan

A Two-Region SAM for Turkey The Marmara Region and the Rest of Turkey, 2003

The Marmara Region which consists of the 11 provinces out of 81 has the largest per capita income in Turkey among seven regions. The provinces contained in the region are Balıkesir, Bilecik, Bursa, Çanakkale, Edirne, İstanbul, Kırklareli, Kocaeli, Sakarya, Tekirdağ, and Yalova.

With some 17 million population in 2000 the region inhabits one quarter of whole nation. In addition the size of the economy is more than one-third of national income (37.1 percent). Furthermore per capita income is almost fifty percent (48.4 percent) higher than the national average. The table below shows these disparities and polarization of the whole economic activities between the Marmara region which is centered around Istanbul and the rest of the country.

To me this structure of regional disparities in Turkey signals some social and political problems as well as national disasters. One example of such disaster (an earth quake) occurred in August 1999 in this heavily industrialized region, and as a result the Turkish economy slumped by 8 percent in that year.

The aim of the paper is to build a two region SAM for Turkey one being the Marmara region and the other being the rest of Turkey. Within the framework of this SAM, employment structure, income distribution, and production structure of the whole economy will be analyzed. A multiplier decomposition for of the SAM multiplier matrix M_a will be calculated and policy

□□□□

Yun-kwong Kwok and Eden S. H. Yu

Leontief Paradox in Global Factor Trade the Role of Factor Intensity Measurement

In examining the factor content of trade, Leontief (1953) found that the capital-labor ratio embodied in the US exports is smaller than the capital-labor ratio embodied in the US competitive import replacements. This phenomenon seems contradict the prediction of the Heckscher-Ohlin (HO) theorem. The HO theorem predicts that a country will export the commodity that uses its relatively abundant factor more intensively than the commodity it will import. Since the US is believed to be the leading capital abundant country, its exports is expected to have a much higher capital-labor ratio than it imports. The reverse finding by Leontief was surprising and is then well known as the Leontief paradox. In Leontief's analysis, the measured factor content of US imports is computed based on the assumption that all countries are using the US factor intensity techniques. Although the validity of this assumption is doubtful, relaxing this assumption is not easy. To relax the assumption of internationally identical factor intensity techniques, we need *both* detailed input-output tables and factor usage data for *all* countries engaged in global trade. Nevertheless, the lack of these data for many countries, especially the developing countries, makes it difficult to compute the actual factor intensity techniques used in different countries. Instead of collecting input-output tables and factor usage data of all countries, this paper takes an alternative approach by using an inferring method. The method infers the factor intensity techniques of different countries based on our knowledge about the US factor intensity techniques and the international relative factor price differences. The rationale of this method is, whichever country they are in, industries will employ factors to a level such that the marginal rate of substitution in production equals the relative factor price in that country. Thus, by observing the US factor intensity techniques chosen by US industries in response to the US relative factor prices, we should be able to infer the factor intensity techniques chosen by other countries' industries in response to other countries' relative factor prices. There are two contributions of introducing this factor intensity technique inferring method. First, it provides an alternative way of estimating factor intensity techniques used in different countries when collections of detailed input-output tables and factor usage data were not carried out. Second, even for countries that publish *both* input-output tables and factor usage data, this inferring method is still important in tracing the determinants of different factor intensity techniques across countries. This paper infers the factor intensity techniques of 59 countries and re-investigates the Leontief's paradox. The paradoxes are found to be either disappeared or eased. This shows that the assumption of identical factor intensity techniques plays an important role in causing the Leontief paradox and the international relative factor price differences offers a good explanation for it.

□□□□

Chul Chung

Industry-specific Factor Abundance and Factor Content of Trade Heckscher-Ohlin-Vanek Theorem Revisited

The Heckscher-Ohlin-Vanek (HOV) theorem states that a country's factor content of trade equals the factor endowment of the country minus its share of world factor consumption. Given factor endowment information, the theory easily predicts whether a country will be a net exporter of services of a certain factor or a net importer of services of the factor and the volume of the factor content of trade. According to Trefler (1995, AER), however, most of factor content of trade is missing in data. Meanwhile, Davis and Weinstein (2001, AER) found a strong evidence in favor of HOV. One of their valuable contributions is that they constructed actual technology matrices for 10 OECD countries using input-output tables unlike other studies in the literature that applied the United State's technology matrix to other countries with some adjustments for cross-country productivity differences. This paper first discusses potential problems associated with treating the consumption share term as a constant in HOV, which assumes homothetic preferences. If preferences are *not* homothetic, a country's share of world consumption in a particular industry depends on the country's income level and the income elasticity of consumption in the industry. *Industry-specific factor abundance* is then defined by using the country's endowment usage at the industry level and *industry-specific* consumption shares. Unlike HOV, industry-specific factor abundance and consumption shares can generate more detailed implications for the factor content of trade at the industry level. This paper uses Davis-Weinstein's actual technology matrices to investigate empirically how these implications differ from the traditional HOV theorem and whether the industry-specific information helps explain trade patterns.

□□□□

Zahra Afshari, Iman Sheibani and Maryam Afshari

An Input-Output Model for Assessing the Alternative Growth Strategies in Iran

Application of a multisectoral input-output model of Iranian economy, this paper has examined the ability of different sectors of economy to create jobs per unit of output as well as capital. The results reveal that there is no conflict in a growth strategy that simultaneously attempts to improve efficiency i.e. reallocating production to sectors with low DRCs, equity and job creation. Although sectoral performance on these measures is not perfectly correlated, but in general we find good performance on equity associated with a relatively high degree of efficiency.

The results of this paper lend some interesting insights into the debate regarding distributive impact of structural adjustment in Iran. If Iran move closer to free trade regime with undistributed relative prices, it is reasonable to expect that the sectoral allocation of production would be altered in favor of these sectors in which Iran has comparative advantage. The measures of efficiency, domestic resource cost (DRC), provide an important benchmark for measuring comparative efficiency.

■■■■■■■■■■

Session II.1.10, Tuesday, 9:00-10:30
Room: Meeting room 3 at Run Run Shaw Conference Center
Energy Consumption and Input-Output
Chair: Debesh Chakraborty

□□□□

Viera Hajnovicova and Jirina Lapisakova

The Analysis of Energy Consumption in the Slovak Republic

Nowadays, the exploitation of energy resources appears as one of crucial factors for a sustainable economic development of the economy. Taking into account the temporary utilisation of fossil energy resources, limitation of natural sources, excessive environmental burden and protection of human beings, it is vital to enforce the application of more energy-saving technologies into working process and to increase the share of renewable resources.

The aim of the presented report is to analyse energy consumption in the Slovak economy and to reveal its main determinants. The main attention is devoted to the analysing of requirements of individual industries on consumption of energy as well as to quantification of different energy shares in produced final commodities.

The analysis is based on data from Supply and Use Tables and Symmetric Input-Output Tables of the Slovak Republic for the year 2000. Specially, for the purposes of this analysis, data concerning energy commodities were separated into 4-digit CPA classification and shown in more detailed classification than the other commodities. Simultaneously, the rows for energy commodities in physical units, derived from the Slovak Energy Balance, were added.

In the analysis, the Input-Output techniques as well as Leontieff linear model based on Symmetric Input-output table were used. Social accounting matrix, in which Input-Output table was included, is used to simulate the impacts of changes in energy consumption on particular categories of final use.

□□□□

Kakali Mukhopadhyay and Debesh Chakraborty

Energy Intensity in India during Pre-Reform and Reform Period – An Input-Output Analysis

India annually consumes about three percent of the world's total energy. The country is the world's sixth largest energy consumer. Indian domestic energy resources are highly utilised and the economy is a net energy importer particularly of petroleum products.

The energy requirement of an economy is sensitive to the rate of economic growth and energy intensity of producing sectors. The energy intensity is the function of technological progress and it varies from sectors to sectors. Continued economic development and population growth are driving energy demand faster than India can produce it. India's electricity sector currently faces capacity problems, poor reliability, and frequent blackouts. Moreover, industry cites power supply as one of the biggest limitations on progress. The shortfall means the country will increasingly have to look to foreign sources of energy supplies, transported mostly via ship and pipeline. The Ministry of Power estimates that to support government targets for 8% annual GDP growth, the electric power supply will have to increase by more than 10% annually, which seems highly unlikely. Substantial foreign investment would be needed to achieve that kind of growth, and foreign investors have had substantial difficulties making projects happen in India. The India government has focussed much attention on coal as the means to generate half of its future electricity demands.

Oil and natural gas have been downplayed somewhat because of uncertainty in global supply and price, and because heavier reliance on these two sources would require even greater imports. Thus it is not easy to increase the supply of energy. In this context it is important to analyse sectoral energy intensity in the Indian economy.

The present paper uses a static input output framework to estimate the intensity of energy of different sectors in Indian economy during 80's and 90's. The paper uses four consecutive input output tables (1983-84, 1989-90, 1993-94 and 1998-99) to calculate direct and total (direct + indirect) energy intensities. The basic purpose is to capture the pre reform as well as reform period performance in energy sector as Govt. of India has initiated few stalwart strategies for energy sectors in the year 1991-92 (on the eve of the reforms). The paper reports the findings and finally suggests proper policies.



Session II.1.11, Tuesday, 9:00-10:30
Room: Room 1506 at Teaching Building No.1
Waste Management and Life Cycle Assessment
Chair: Jesper Munksgaard



Keisuke Nansai, Rokuta Inaba, Shigemi Kagawa, Yuichi Moriguchi, Seiji Hashimoto and Minoru Fujii

Classifying Goods and Services as a Simple Indicator for Sustainable Consumption

For the study of sustainable consumption, examination of the ideal consumption pattern that achieves a sustainable balance between economic gain and environmental mitigation is helpful to illustrate the direction that consumption should take. That ideal consumption pattern may elucidate which commodities' consumption should be reduced for better environmental conservation and which commodities' consumption should be increased to achieve economic goals. Classification of commodities into those two types would provide a benchmark for consumer choices. Nevertheless, various practical environmental issues are related to consumption. They engender the fear that an ideal consumption pattern that reduces one environmental load would increase other environmental loads. This study is intended to analyze differences of ideal consumption patterns depending upon the manner in which the environmental burden is minimized. We propose a simple indicator that represents the desirable direction of demand for goods and services. That indicator identifies common consumption patterns in any preferential reduction of environmental burdens with the current economic level.

This method calculates optimal consumption patterns of Japanese households using a linear programming model based on the Japanese input-output table. It incorporates some environmental loads that are related to household consumption. The model determines an optimal consumption pattern – the optimal demand level for each good and service – that minimizes an environmental burden under the following constraints the demand level for each good and service, except for those of key commodities (foods, medical services, and so on), is changeable within a defined range against the current level; GDP is greater than the current level; and capital stock and

labor cannot exceed current levels. The environmental burdens considered herein were energy consumption, CO₂ emissions, industrial and municipal wastes, air pollutant emissions (NO_x, SO_x, and particulate matter), chemicals (benzene), and water pollutants including (BOD (biochemical oxygen demand), COD (chemical oxygen demand), T-N (total nitrogen), T-P (total phosphorus), and SS (suspended solids)). Use of this model demonstrates different optimized consumption patterns that vary according to the type of environmental burden to be minimized. Moreover, this study classifies goods and services into three types according to the direction (increase or decrease) of optimized demand for a good or service in the household (1) a good or service for which optimal demand should be decreased in all cases of reducing various environmental burdens; (2) a good or service whose optimal demand should be increased in all cases; and (3) a good or service whose optimal demand depends on the type of environmental burden. These three classifications of goods and services are useful as easy-to-understand indicators to guide the balance of economy and environment goals. Regulation of goods and services that are categorized as types 1 and 2 would constitute an important step toward sustainable consumption.

□□□□

R. R. Tan and L. Pascual-Aquino

Predicting Direct and Indirect Greenhouse Gas Emissions of Biofuel Use with Life Cycle Assessment and Input-Output Analysis

Growing concerns about global climate change has stimulated research on renewable energy sources for both mobile and stationary applications. These alternative fuels include liquid biofuels for use as substitutes for petroleum products such as diesel fuel and gasoline. In the Philippines, there is considerable interest by both the national government and the private sector in coconut methyl ester (CME), a diesel substitute derived from locally produced coconut oil. Large scale use of CME offers the promise of significant reductions of greenhouse gas emissions; the prospect is now made all the more attractive by the prospect of carbon trading under the Kyoto Protocol. However, prediction of the emission reductions is not a trivial task. This paper presents estimates of the reduction of greenhouse gases resulting from CME utilization, using hybrid computational techniques involving life cycle inventory assessment (LCI) and input-output analysis (IOA). Different scenarios are explored in the model, with the effect of the following parameters being analyzed substitution level; land availability; industrial processing yields; and the extent of utilization of agricultural waste as fuel. The model results indicate dramatic reductions in greenhouse gas emissions per unit of diesel fuel replaced with CME; however the extent of substitution is severely limited by the availability of agricultural land for coconut farming.

□□□□

Jesper Munksgaard, Line Block Christoffersen, Mette Wier, Trine S. Jensen, Ole Gravgaard Pedersen and Hans Keiding

Indexing the Environmental Pressure of Consumption – an Approach combining Input-Output Analysis, DEA and Damage Costs

Within a life-cycle context a lot of research studies have investigated the environmental pressure of consumption by using input-output analysis. The development of national accounts integrating economic flows and physical emissions to the environment has increased the possibility to analyze on product level the environmental embodiments of several pressure types. By using input-output modeling we will estimate on product level the embodiments of six types of emissions CO₂, CO, SO₂, NO_x, CH₄ and N₂O. In order to compare products with different environmental embodiments (profiles) we use DEA (Data Envelopment Analysis) to estimate a relative environmental performance index on product level. In estimating these indices, we include a priori restrictions on the weights to be set endogenously by DEA. These restrictions are based on the damage costs specific to each pressure type. Damage cost estimates will be based on literature survey and will take into consideration the uncertainty in the cost estimates by implementing a valid range of damage cost for each pressure type. Consequently, the aim of the paper is twofold First, to demonstrate how to implement information on environmental damage costs within a life-cycle context combining input-output and DEA analysis, and second, to estimate an environmental performance index on commodity level by using Danish input-output and environmental data from 1997.



Tuesday, June 28, 2005

PARALLEL SESSIONS II.2 (11:00-12:30)

Session II.2.1, Tuesday, 11:00-12:30
Teaching Input-Output Modeling: Experiences, Current State and Prospects
Room: Conference Hall 1 at Run Run Shaw Conference Center
Organizers: Gulay Gunluk-Senesen, Ronald E. Miller and Peter D. Blair
Chair: Gulay Gunluk-Senesen

□□□□

Gulay Gunluk-Senesen

I-O Teaching in the 2000s

The purpose of this session is to provide a snapshot of the current state of I-O teaching in undergraduate and graduate programs, of the extent of impact of recent I-O research on I-O teaching, and also provide a basis for projections for the future of I-O based research.

The session is planned to be of a brainstorming nature. There will be a background paper, several discussants and open floor discussion.

The I-O model is a tool (like econometrics) for some of us attempting to answer research questions (e.g. employment, energy, innovation...). The I-O model is an end goal (like econometrics) for some others, contributing to the I-O model (e.g. multipliers, decomposition, dynamics...). These two groups are not strictly mutually exclusive of course, thus can be brought under a heading like I-O based research. The current state of I-O based research can be readily traced from related research literature.

On the other hand, our knowledge on the current state of teaching of I-O modeling mostly rests upon our own experiences. The impression is that I-O modeling (unlike econometrics) is hardly present in economics and related university curriculums. It might as well be true that, it is covered in courses like mathematical economics.

This paper is an attempt to assess the current state of teaching I-O modeling. Findings based on a questionnaire survey to be conducted with IIOA members and other colleagues will be reported, with a focus on the classification of submitted course outlines and reading lists. This assessment of the extent and content of I-O teaching is also expected to provide implications for the future of I-O based research.

□□□□

Ronald E. Miller and Peter D. Blair

Miller and Blair II, "Input-Output Analysis Foundations, Extensions and Frontiers"

In 1985, we published a fairly comprehensive, for the time, introductory textbook on the basic framework of input-output modeling and analysis, which also included a review of many of the key methodological dimensions of the input-output model and some of the most developed extensions and applications at the time. This book, *Input-Output Analysis Foundations and Extensions* (Prentice-Hall, Englewood Cliffs, NJ, 1985) was intended primarily as an introductory graduate text, which we used for a series of courses at the University of Pennsylvania, but proved also to be quite suitable for advanced undergraduates. Over the last two decades, the text has also come often to be used as a kind of "desk reference" for many in the input-output research and applications

community. We had anticipated this use somewhat in preparing the original text, particularly by our former students, but perhaps not to the degree it seems to have happened. However, much has changed in the world of input-output analysis since 1985, so many colleagues and acquaintances in the input-output community have periodically suggested that it would be very worthwhile for us to update and revise our text for both the purposes to which the original work has been utilized, i.e., university text and desk reference.

A “revised Miller and Blair” project has been on both our “to do” lists for nearly a decade, but only recently has the structure and much of the content regally begun to take shape. In 2001 we carried out an informal survey of many colleagues, which has guided us to where we are in our revision project. Nonetheless, since so much has happened in input-output analysis, we are eager to tune the new work as carefully as possible to current needs in an educational text on the subject, to coverage of the most important developments and applications relevant today, and, once again, to features that would enhance the use of the text as a continuing desk reference for input-output professionals involved in applying input-output models in research, planning, and policy analysis. At this point it would be helpful to hear reaction from those interested from the input-output community to our planned approach, outline, and perhaps especially to some of the new content for our revised text. In the proposed conference session, we plan to present a detailed outline of the planned text, summarize our approach to organizing and developing many chapters, perhaps focusing on the key changes since the 1985 volume, and invite feedback on our outline and approach.

Commentator: Faye Duchin

(Floor Discussions)



Session II.2.2, Tuesday, 11:00-12:30
Room: Meeting room 1 at Run Run Shaw Conference Center
Enterprise Input-Output Analysis
Chair: Erik Dietzenbacher



Zhang lingling and Tong rencheng

Study on Relationship between ERP Logic and Consume Coefficient of Manufacture Enterprise I/O Table

The paper analyzes necessity and possibility of integrating ERP with Input-Output technology (I/O) . It studies relationship between ERP logic and the direct consume coefficient of manufacture enterprise I/O table, proves that it is feasible to convert basic data of ERP to direct consume coefficient and entire consume coefficient of enterprise I/O table. It also proves that it is convenient to use ERP basic data to make manufacture enterprise I/O table, to analyze and improve decision making.

□□□□

Frank Felder, Michael Lahr, Nancy Mantell, and Scott Weiner

The Potential Economic Effects of an Enhanced Renewable Portfolio Standard for Electric Utilities in New Jersey

Despite the current viability of some renewable power generation technologies, the market has been slow to embrace them for many reasons. Renewable portfolio standards (RPSs) appear to be just the champion needed to advance their use. An RPS, which is typically specified by states in the U.S., requires that a certain percentage of electric power, either produced or sold, must derive from renewable resources. Specific technology types may even be designated. Using an analysis that uses both a structural econometric time-series model and an input-output model of the State of New Jersey, we identify and quantify, where possible, the incremental costs and benefits of a 20% RPS compared to the existing RPS for the State of New Jersey. We find that this alternative RPS would cause electricity rates to edge upward but that the rise in rates would have little effect on the overall growth of the New Jersey economy. Moreover, using scenario analysis, we find evidence that possible fossil-fuel price rises would have greater adverse effect upon New Jersey's economy than would a more aggressive RPS

□□□□

Vito Albino, Silvana Kühtz, Chaoying Zhou and Ganli Peng

Energy and Materials Use in Italian and Chinese Tile Manufacturers a Comparison Using an Enterprise Input-Output Model

Recent approaches to sustainable development leave much room for policies at local level. In fact, it is becoming evident that targets such as increasing resource productivity, preserving natural cycles, or extending the present level of welfare, are best pursued within the confines of a local area. In particular, environmental changes caused by industrial systems are best brought about by considering local systems of firms as cornerstones of co-operative strategies and by using data on materials and energy use in physical terms.

In Italy, industrial districts represent an important socio-economic pivot of local development and in China similar industrial clusters are developing. This paper is based on an enterprise input-output approach applied to the supply chains (sc) of industrial clusters (Albino et al., 2002, 2003a; Albino and Kühtz, 2003b, 2004) in terms of material/energy flows, so to describe energy use and consequent pollution emissions and indicate alternative solutions to meet local sustainability requirements.

In particular, the production activity of an Italian tile manufacturer and a similar Chinese one will be compared and described as local supply chains of processes that procure raw materials, transform them into intermediate goods and then final products.

To do this, input-output techniques based on processes will be used and specific models developed and applied to real cases Sassuolo in Italy and ceramics city at Foshan in China. For each case and referring to a representative process network, the main processes are recognised and described, the comparison is then focussed on the energy and water use to produce the unit quantity of tiles. Differences in input output coefficients are related to technical and organizational

factors and can suggest possible improvements in both aspects.

In terms of sustainable development of a local area these models can help improve design and management of supply chains evaluating how one can change the input mix or the imports rate (for instance of energy sources) and still respect environmental constraints (e.g., to reduce pollution, keeping other output flows constant), or help plan local development strategies to render more green and/or efficient the supply chain under investigation, else support the supply chain management so that the different firms negotiate a common policy for the best use of resources, such as energy and environment, and for the management of wastes. Also, they can help analyse relationships among industrial activities and the ecosystem, determine the processes that contribute more to environmental pollution, support investment decisions when substituting traditional energy technologies in favour of sustainable ones.



Session II.2.3, Tuesday, 11:00-12:30
Room: Meeting room 4 at Run Run Shaw Conference Center
Interregional Models and Applications
Chair: Kazumi Hitomi



Dirk Stelder

Endogenous agglomeration in an interregional I-O framework

This paper examines the options for modeling endogenous agglomeration at the subregional level of an interregional I-O model. The implementation options are specific for the case of provinces in the Netherlands, but the policy relevance is more general. If the I-O model is used for making regional forecasts or simulations, can we transfer the endogenous results by region and sector to the main agglomerations inside the regions? In addition what can be the reverse feedback of agglomeration modeling to the regional level? In the paper a prototype model is presented that combines the interregional I-O approach with an NEG model for the main agglomerations. It is shown that such a model can provide useful insights for regional policy, in particular when - as is the case in the Netherlands - this policy is increasingly focussing on concentrating economic development in specific industrial areas and agglomeration zones.



Kwangmoon Kim

Comparative Analysis of the Economies of Asian MEGA Cities Based on the Inter-Regional Input-Output Model Tokyo, Manila, and Ho Chi Minh.

Some of the current major problems facing Asian Mega city policies are persistence of increasing urban population, urban unemployment and under-employment, environmental pollution, among others. These phenomena are characteristic examples that are prevalent in urban areas of developing

Chair: Manfred Lenzen

□□□□

Hassan Farsijani

Aligning Production Management Strategy for Managing Input-Output and Competitive Advantages

The importance of the overview of earlier management theory and thought is the recognition of scholars contributions and impacts on modern managerial practices. Competitive advantages strategy is one of the most talked about business management approaches of the 1987 and will be a major management focus and trend in the 21s century. The concept of global world-class production (WCP) has become the single most motivating theory in many major industries for international market. It is realized a major change in the technological basis of manufacturing or even all production processes. Formal and empirical studies have verified a significant increase in productivity of manufacturing processes by intraorganizational applications of modern technologies for competitive advantages.

Therefore, this change has a high influence on operations management. While Competitive advantages of manufacturing concepts such as Lean Production, and Agile Manufacturing inevitably disregard this development, new production concepts arise that fundamentally consider the application of world-class manufacturing technologies on the shop floor. However, from a business management perspective, industrial firms have to accomplish new operating requirements deriving from this technological change. However, the range and sophistication of these techniques places dynamic competitive advantages status beyond the aspirations and competence of many industries. Companies progress by stages toward the desired goal of global competitiveness manufactures will have to achieve world-class production status to compete effectively in global markets society.

The new concept of products for global markets society has emerged in the 21 century. The design of global products for global markets entails a major shift in both marketing and design philosophies for most manufacturing companies. Manufacturers worldwide are having to adapt to new conditions of world market society and to new definitions of dynamic world-class performance. Managers recognised that the correct choice could create enormous advantages by being able to do what was previously not possible, and overcome uncertainty in dealing with new challenges.

Global competitive advantages are a management philosophy that emphasizes the need to meet external and internal customers needs and expectations and the importance of doing things right for world market society. Competitive advantages offers a consistent and rigorous problem-solving framework for identifying the scope of the problem eliciting participant views about problem causes and system connections and identifying policy levers. Reliability, quality and cost are linked, higher quality being associated with higher reliability. The reliability of items, products and facilities is an important consideration of design by world-class Production techniques. WCP techniques have an important role to play in dynamic world market society. WCP techniques are a competitive strategy involving continuous improvement of products, processes and services to improve quality, reduce costs, increase productivity and increase total customer satisfaction.

This paper studies the impact of production management strategy concepts on production competence for managing competitive advantages. The research analyses how quality, cost supply chain and improvement programmes have been utilised, and how their disciplined approaches can

provide valuable mechanisms for enhancing production competence. The question in this paper is which problems the production management may encounter when it wants to organize the global competitive advantages more systematically for world market society. These problems such as, determining dynamic world-class production norms, developing a dynamic production management methodology for world market society, the demonstrability of world-class production. The paper uses a case study to illustrate its findings based on company experiencing both rapid growth and increasing international competition.

□□□□□

Deepak Iyengar, Joseph P. Bailey and Philip T. Evers

An Input-Output Analysis of Supply Chain Structure

This research presents findings from an Input-Output analysis of supply chain structure. Unlike previous supply chain management literature that focuses on relatively short supply chains consisting of two or three supply chain members, Input-Output analysis allows for an analysis of supply chains with many more members. In our paper, we examine supply chain lengths that may include up to eight members, though this constraint may be relaxed for examinations of even longer supply chains. The application of Input-Output analysis in this context is of particular interest as some of the biggest recent advances in supply chain management involve coordination beyond a supply chain member's nearest neighbor. With the help of Input-Output tables, researchers can now measure the length of entire supply chains and use historical data to examine their changing structure. Furthermore, the data on incremental value contributed by each member of the supply chain will likely give researchers great insight into the forces that change the structure of supply chains. In our paper, we use the 1982, 1987, 1992 and 1997 U.S. Input-Output data published by the Bureau of Economic Analysis to analyze supply chains. In so doing, we not only provide insight into how supply chain structures are changing but also offer a sample methodology for other researchers interested in using Input-Output analysis for further supply chain management research.

□□□□□

Blanca Gallego and Manfred Lenzen

Sharing the Responsibility for Industrial Production Impacts A General Model

There is a trend towards reporting and accountability for the environmental and socio-economic impacts deriving from the activities of companies and other organisations. This trend has been driven by compliance of governmental obligations as well as by request for transparency from stakeholders, consumers, insurers, employees or the media. Associated with this trend there is a need for a comprehensive, objective, and transferable method for the allocation of responsibility of the adverse impacts of industrial production such as water use or greenhouse gas emissions.

This work uses generalized input/output theory to create a quantitative method for allocating responsibility for production impacts consistently amongst all agents throughout supply and demand chains in a way that reflects their contribution to the production process. The input/output framework provides an ideal analytical tool since it allows for the computation of the

production impact embedded in the purchases (or investment) of the entity under consideration by the following of monetary flows up (down) its supply (demand) chain. That is, each transaction in a production system represented by an input/output table is associated with a part of the resources used or pollution caused by the supplying industry. The responsibility for this part can be retained in the industry (producer responsibility) or passed on either towards downstream using industries and final consumers (consumer responsibility) or towards upstream supplying industries and providers of primary inputs (worker-investor responsibility).

In our work, the responsibility associated with each industrial transaction is assigned partly to the supplier and partly to the recipient of the commodity. Introducing the concept of a responsibility share we enable the division of responsibility into mutually exclusive and collectively exhaustive portions that are assigned to the different industries, and that become consistently smaller as we move away from the location of the impact within the supply or demand chain system. The choices of the responsibility shares may vary depending on the accounting goal. The result is a general formulation that can be used as the backbone of sustainability reporting.



Session II.2.5, Tuesday, 11:00-12:30
Room: Conference Hall 2 at Run Run Shaw Conference Center
Reducing CO₂ and SO_x Emissions in China
Chair: Hikaru Sakuramoto



Satoshi Nakano, Hirofumi Kito and Yuji Sakai

Measures to Reduce SO_x Emissions in a Coal-Dependent Area Case Study of Shenyang, Liaoning Province

Developing countries that depend primarily on coal as an energy source are plagued with SO_x emissions resulting from the sulfur contained in coal. China has achieved rapid economic growth in recent years, and energy consumption (mainly coal consumption) is increasing as a result. However, in many developing countries, desulfurization technology has not been introduced, but a lot of SO_x emissions are discharged by coal consumption. This not only causes acid rain, which is a border-transgression problem, but has resulted in damage to health in the communities that consume coal.

The purpose of this research is to present a road map showing how developing countries who use coal as the main energy source, should implement measures to reduce SO_x emissions, while they will carrying out economic growth in the future. Moreover, this research has focused particularly on the local environment, and we address the case of Shenyang, Liaoning province located in the northeast part of China, which consumes a large amount of coal consumption, as a case study.

Such environmental problems encompass varied fields, such as engineering, hydrodynamics, medical science, politics, and economics, and require an interdisciplinary research approach in order to reach a solution. So, in this research, we have integrated three models. One is the multi-sectoral economic model which can accommodate engineering information. The air

diffusion model distributes the amount of SOx emissions drawn from the economic model to local grids. And the patient generating model calculates the population that will likely show symptoms of respiratory disease, from the SOx emissions concentration in each grid.

On the desulfurization technology used for as a measure against SOx emissions, we assume a flue gas desulfurization (FGD) equipment for a large-scale boiler and bio-coal briquettes, which are an alternative input to coal, for small boilers and households, respectively. A bio-coal briquette is made from coal powder, lime, and biomass compressed under high pressure, and is a fuel that produces a low quantity of SOx emissions as compared with the regular coal.

Our research shows, first, how SOx generated by coal use would spread, and would damage the health of local residents. Next, we assume the scenario in which desulfurization technology is introduced and then we determined the amount by which SOx emissions would decrease, how many people would be spared health damage, and how the introduction of desulfurization technology would influence the economy of Liaoning province. Based on the results of the simulation, we propose measures against SOx emissions in coal-dependent areas.

□□□□

Kazuhiko Nishimura and Satoshi Nakano

An Assessment of CO2 and SOx Emission Mitigation Potentials by Using Electric Power Planning Models for Three Regions in China

We estimate CO2 and SOx mitigation potentials of the electric power supply sector in three developing regions in China, namely, the East, the North and the Sichuan power grids, by varying the emission constraints of the dynamical cost-minimum power planning model. The model considers the accessibility of the western natural gas reserve to the East and the Sichuan region, while substitution from coal to oil is considered in the North. The results show that (1) about 5 mega tons of CO2 can be mitigated by ¥3,000 per ton of CO2 in the East region, (2) 4--20 mega tons by ¥200--¥1,000 in the North, (3) 3 mega tons or less by ¥2,000 in Sichuan. Unit CO2 mitigation costs increase after 2010 or later due to the introduction of natural gas, except in the North. As for SOx, unit mitigation costs were estimated to be constant around ¥300 per kg of sulfur except in Sichuan, declining after 2010 due to sulfur intensive coal consumption.

□□□□

Benfan Liang

Effect of Pollutant Discharge Fee on the Environmental Protection of China

With the development of international trade liberalization and globalization, the issue of environmental protection has been increasingly important. Establishing a perfect environmental taxation has been encouraged by the international societies. China has conducted its Pollutant Discharge Fee in 1982. The system was spread all over the country in the 1990s of last century. What is the effect of the Pollutant Discharge Fee on the Environmental Protection of China has been discussed in this paper. Through a series of survey on environmental quality and the discharge behavior of enterprises, we have gotten the output of the policies that environment fee can't adjust

enterprise's discharge behavior effectively in most regions till now, but for the large scale industrial enterprises with intensive emission, the influence is obvious. The paper also has examined the mechanisms why one policy can have different effects on different enterprises. Through environment fee is beneficial to effectively allocate resource, to reduce pollution emission, and to accelerate the technology innovation of enterprises, it cost much of the company and also enhance the competitiveness between enterprises of different regions. On the other hand, the local government takes important role on whether the environmental policy has influence or not on the discharge behavior of the enterprises. The paper is concluded that it is mainly local governments but not the enterprises to decide the policy output.



Session II.2.6, Tuesday, 11:00-12:30
Compilation Issues in Input-Output Tables I
Room: Room 1503 at Teaching Building No.1
Chair: Michel Braibant



Luc Avonds

Belgian Input-Output Tables State of the Art

The paper will be partly a sequel to the paper presented at the Montreal conference (Avonds L., Gilot A., *The new Belgian input-output table - general principles*) . This paper gave a general outline of the compilation of the 1995 input-output table. The content of this paper was not strictly limited to the compilation of the input-output table. It also presented an overview of the underlying statistics and the general framework of the national accounts, as far as they are related to the input-output tables. The present paper will benefit from the experience of the compilation of the input-output table for 2000. It will not be simply be an update of the former paper but will more deeply go into certain aspects. The exposition of the general framework will not be repeated. More attention will be paid to the empirical foundations of the in-put-output table instead of the theoretical ones (there is hardly any theory behind input-output tables) .

The 1995 and 2000 input-output tables for Belgium will be compared (with all its limitations) .A contribution will also be made to the international debate on which kind of input-output tables are preferable (product by product tables versus industry by industry tables, product technology versus industry technology when product by product tables are chosen) .



Abel Lucena and Mònica Serrano

The Valuation System of the Input-Output Tables within the SAM and AGEMS Framework

Recently, the Member States of the European Union have adopted the "European System of National and Regional Accounts", ESA 95. It is a significant improvement in comparison with the

previous version. Progress has been achieved in regard with both harmonisation of accounting rules and introduction of more accurate definitions. One of the most important changes is that concerning the valuation criterion used to assess input-output transactions. The ESA 95 recommends measuring them according with the “price basic” definition, this means to valuate transactions among agents excluding “trade” and “transport” margins as well as “net taxes” on products. It is argued that such criterion allows us to preserve a homogeneous price measurement. Accordingly, the basic price valuation is preferred to alternative methods such as producers’ or purchasers’ ones. Nevertheless, it turns out to be difficult to analyse changes in agents’ behaviour using the price system if there is no possibility to measure input-output transactions in the way these are perceived by final consumers. When deciding how to spend their income, consumers take into account purchasers’ prices. Thus, consumers’ demand functions are based upon a purchasers’ price definition. Likewise, when minimising their costs subject to the available technology, producers also consider prices affected by taxation and margins. As a result, producers’ final input demand functions depend on purchasers’ price valuation. Because of it, it is preferable to measure input-output flows in terms of purchasers’ prices in those cases in which researchers are interested in analysing agents’ decisions regarding allocation of resources. Accordingly, the aim of this work is to make a “Social Accounting Matrix”, SAM, of Spain for 1998, which allows us to become compatible the accounting information provided by the ESA 95 with “applied general equilibrium models” format. For doing so, we estimate the input-output flows using a different rule from basic price definition. Although Walrasian models are based upon valuation at purchaser’s prices, we point out that producers’ price criterion is the best option for computing these kinds of models given the available accounting information. Finally, with the purpose of comparing in which cases it would be recommendable to use a particular valuation criterion, we will argue two applications. In the first one, welfare distributive effects caused by utility Spanish regulation policy are analysed. In the second case, we study the relationship between the Spanish households’ type consumption pattern and their greenhouse emissions. The former requires measuring the SAM flows in terms of purchasers’ prices while the latter requires using a basic price valuation. This paper may provide evidence of the importance to have enough information to allow researchers to use the valuation criterion consistent with their goals. We think that going from basic price valuation to purchasers’ one is especially difficult in Spain. There is not enough information in order to build the complementary matrices needed to change valuation such as it is suggested in the ESA 95. For this reason, we think this work may stimulate the debate on how to overcome the difficulties associated with the lack of information regarding valuation methods.

□□□□

Michel Braibant

Compilation of Use Matrix of Intermediate Consumption in France for a New Benchmark Year 2000

The paper shows the compilation of Use Table in France for a new benchmark (base 2000) .

Firstly, we will look at some new statistical sources which are used for the compilation for example business enterprise register, which was used to estimate not only output by branch but also final consumption expenditure, GFCF, changes in inventories, trade margins or total intermediate consumption by branch and its breakdown between goods and services. Another example is given by annual branch surveys the commodity flow approach gives a clear advantage in

identifying many flows. For many products, by their nature, it is possible to identify whether they are current or capital goods, and even where they are used. For example, tractors can only be capital goods that are used in agricultural industries. When compiling commodity flows at a very detailed level, it is thus often possible to allocate the supply of a particular product to only one domestic use

Secondly, it describes a new procedure of balancing, specially the reconciliation between business enterprise surveys and Supply and Use table. The reconciliation consists in the same level of output in the two approaches, then valued added and intermediate consumption (IC) . In the case of IC, we start from a SUT by branch “to go” to a SUT by industry

At last, it possible to calculate GDP from the two approaches output and demand. We give some results of comparisons of calculation GDP of year 1999 in the two benchmarks (1995 and 2000).



Session II.2.7, Tuesday, 11:00-12:30
Room: Room 1504 at Teaching Building No.1
Input-Output Coefficients and Technological Change
Chair: Gabrielle Antille Gaillard



GianDemetrio Marangoni and Giulio Fezzi

The Leontief Model and Economic Theory

This article examines the relationship between classical, marginalist and Keynesian economics and the Leontief model, and shows how the analysis of production and distribution interdependency may provide an appropriate conceptual framework for comparing the different analytical approaches.



GianDemetrio Marangoni

The Economic Consequences of a Technological Revolution

The Industrial revolution changed the world. But did it ever exist? Some economic historians have disputed the term on the grounds that it was not really a revolution. And in fact the concept of "revolution" in the realm of economics, though appealing, is questionable. In politics, it suggests a radical change of regime in a very short time-span. But in economics there are no evident cases in which someone wakes up in a totally new world.

For an economist, what then is a "technological revolution"? The paper proposes a workable definition, starting with some classification of innovations and sectors of production. It utilizes input-output tables to show how to define incremental and radical innovations as well as technological systems. Within this conceptual framework, a technological revolution emerges as a type of radical innovation (or set of innovations) that transforms both the dimension and the

Session II.2.8, Tuesday, 11:00-12:30
Room: Room 1505 at Teaching Building No.1
Modeling International Input-Output System
Organizer Hiroyuki Kosaka
Chair Douglas Nyhus

□□□□

Mitsuru Shimoda, Takatoshi Watanabe and Kiyoshi Fujikawa

A Comparative Study on Direct and Indirect Division of Labor in Asia-Pacific Region Using IDE International IO Tables

In the modern economy, every now and then a commodity passes through several countries during the stage of processing. This reflects the progress of the international division of labor where value-added will be generated in the region that participated in the division of labor responding to the role. But the structure seems to have considerably changed recently in accordance with a change in an international environment including the rapid growth of China. It is necessary to see domestic economy and international trade by industry simultaneously in order to get a bird's-eye view of the international division of labor structure. However, there was no such statistics that provide information for both on a common standard basis. In this situation IDE, Institute of Developing Economies, launched to compile international input-output tables in the Asia Pacific region in 1975 and then it has published such three IO tables as 1985, 1990, and 1995 that include China as an endogenous country. And BOJ, Bank of Japan, last year estimated an extended table for the year 2000 since BOJ has an interest in recent trade trend in the Asia Pacific region. Taking this opportunity, we tried to review historical change in the division of labor in this region.

It is confirmed that Japan and the United States, which were hitherto known as comparatively autarky economies, are still on the same trend. On the other hand, the value-added acquisition rate to the home country (home production rate) tends to decrease in the most of East Asian nations. Moreover, it is surprising to note that they have strengthened dependence on Rest of the World rather than intra-dependency in the East Asian region. In a word, the income of East Asia leaking beyond the border has been getting larger. At the current situation, it seems a little premature to regard East Asian region as an independent economic bloc.

□□□□

Shuntaro Shisido, A. Kawakami, M. Kurokawa, A. Movshuk and K. Tamashiro

Policy Simulations with an Integrated Model for Japan and Northeast Asia

In view of the growing importance of Northeast Asia in the 21st century world economy, an empirical study was conducted in the Leontief – Keynesian framework. .

The study covers Japan, and seven Northeast Asian countries including China, Hong Kong, Taiwan, Republic of Korea (ROK) , North Korea (PDRK), Mongolia, and Russia with two sub-regions for Northeast China and the Russian Far East. These submodels are attached to the above main system, because of their growing mutual inter-dependence with Japan. The above

country models are linked with each other by means of a trade matrix specifically designed for this region. Regarding the specifications of the country models, Japan's model (DEMIOS) is exceptionally large with 81 sectors, covering detailed fiscal and monetary policy variables as well as conventional input-output variables. The total numbers of endogenous variables are about 4,000. For other countries, the specifications of each model are fairly standardized, having 5 common sectors for output, employment, capital stock, etc. and common aggregate expenditure variables such as private consumption, investment, exports, etc. Prices and wage rates are also endogenized. In view of the recent changes in demographic trends, total population, fertility and death rates, age components, emigration, etc. are all endogenized in each country model. The Chenery-Moses type multi-regional input-output model is also used to analyze the structural changes of the region.

Four types of policy scenario for the period of 2000 -2020 are presented a) base line forecast, b) China's growth acceleration, c) Japan's growth recovery and acceleration, d) world-wide recession. The importance of regional collaboration in terms of trade, foreign direct investment, technical aid for energy saving and environmental protection, strengthening of intra- and inter-regional infrastructure are particularly emphasized.

□□□□

Hiroyuki Kosaka and Takashi Yano

A 1985-90-95 Linked International Input-Output Analysis on Global Warming in the Asia-Pacific Region

This paper aims at constructing a 1985-90-95 linked international input-output model and applying the model to the global warming issue with respect to the Asia-Pacific region. The model is based on the Institute of Developing Economies' the Asian International Input-Output Table 1985, 1990, and 1995. Each table covers 10 economies (Indonesia, Malaysia, the Philippines, Singapore, Thailand, China, Taiwan, South Korea, Japan, and the United States) and is divided into 24 sectors. Since the three tables are of nominal data, we first compute prices and convert them into the real tables by applying computed prices. Differed from a computable general equilibrium model or the traditional input-output model, the model is largely estimated econometrically with data for the ten years as shown and determines sectoral output and prices simultaneously. Viewing that China, Japan, and the United States are key economies for global warming, we analyze the effects of policies on the release of carbon dioxide emissions as the model's applications.

■■■■■■■■■■

Session II.2.9, Tuesday, 11:00-12:30
Room: Room 1506 at Teaching Building No.1
Education, Labour Skills in Input-Output Modeling
Chair: Michael L. Lahr

□□□□

Luis E. Vila

Integration vs. Polarisation A Sharing Model Approach to the Labour Market Effects of A Process of Educational Expansion

Labour market integration and labour market polarisation have been proposed as possible, and often as opposed, labour market effects of a process of educational expansion. Within a job-competition framework, I develop an I-O inspired sharing model to test simultaneously for a) upgrading shifts in the requirements for educated workers; and b) changes in the allocation of educated labour to different occupations. The results obtained for Spain over the last two decades, a period of rapid educational advance of the labour force and profound economic changes, indicate that remarkable integration has taken place though, at the same time, there is evidence of increasing polarisation of the market in terms of job-opportunities.

□□□□

Nooraddin Sharify

Investigation for an Optimum Structure of Labour Force Using a Linear Programming Model

The paper uses a Linear Programming (LP) Model to propose a procedure to find an adequate structure of different educational levels of labour force. Several constraints such as job creation for different educational levels of labour force are considered to maximise the Gross Regional Products (GRP) of the Golastan Province of Iran. A Social Accounting Matrix is used to estimate the necessary coefficients for LP Model. It was demonstrated when unemployment is the result of inconsistency between supply and demand for labour force, an optimum structure leads to an increase in labour force employment and the GRP.

□□□□

Bernhard Eckwert and Itzhak Zilcha

Improvement in Information, Income Inequality and Growth

We analyze the importance of information about individual skills for understanding economic growth and income inequality. The paper uses an equilibrium setting with endogenous investment in human capital. Agents in each generation differ by random individual ability, or talent, which realizes in the second period of life. The human capital of an agent depends on both his talent and his investment in education. The investment decision is based on a public signal (test outcome) which screens all agents for their talents. We analyze how a better information system, which allows more efficient screening, affects the co-movements of indicators for income inequality and human capital accumulation.

Our analytical framework is an OLG economy in which private investment in education (say, non-compulsory schooling), while young, affects an agent's human capital in his second period of life. Individual human capital depends also on random ability, or talent, which is still unknown when the agent decides how much 'effort' to invest in his/her education and training. The investment decision is made after observing a signal (test outcome) which screens agents for their abilities. Each individual signal contains imperfect public information about an agent's random

talent. At the same time labor contracts are concluded. Since individual abilities are not yet known agents differ only by the signals they have received. As a consequence, all agents with the same signal are grouped together, and they are paid a wage equal to the mean marginal product of human capital in this group.

In this set up we analyze the effect of better information system, i.e., more efficient screening of individual skills, on the distribution of income within each generation and on the accumulation of the aggregate human capital stock. We find that income inequality always increases with better information. The effects on economic growth depend on the properties of the individual investment decisions which, in turn, are determined by the degree of intertemporal substitution in consumption if individual preferences exhibit high elasticity of intertemporal substitution, agents with more favorable signals will choose higher investment levels. Under this constellation more efficient screening enhances growth and, hence, higher growth goes hand in hand with more income inequality. By contrast, growth and inequality are inversely related when the elasticity of intertemporal substitution is small.



Session II.2.10
Room: Room 1104 at Teaching Building No.1
SAM based Analysis for Chinese Economy
Chair: Jin Fan



Xiaohui Yuan, Juan Mei and Jin Fan

Multiplier Analysis on Structural Characteristics of Consumption of Rural Residents in China.

This paper, based on the MicroSAM of consumption of Chinese rural residents in 2003, studies on the structural characteristics of consumption of Chinese rural residents, by using SAM-based multiplier analysis. Firstly, this paper summarizes the theories of multipliers; Secondly, we build up a 26×26 MicroSAM matrix of Chinese rural residents' consumption, which involves household comprising the lower, the middle-lower, the middle, the middle-upper, the higher, and the rest, altogether six groups; food, cloth, household equipment and services, transportation and communication, residences, educational, cultural and recreational activities and other commodities and activities; factors; enterprises; government; savings-investment; rest of the world. By decomposing it into endogenous and exogenous accounts and using income elasticity measured from Almost Ideal Demand System (AIDS) model we built up (Fan, 2004) , we get fixed price multipliers and accounting multipliers; Thirdly, through further decomposition of accounting multipliers, we have own net effects , open net effects and circular net effects ; Finally, according to the signification of multipliers theories, this paper analyzes all multipliers based on the MicroSAM of consumption of Chinese rural residents in 2003.

We draw the main conclusions as follows Firstly, there exist numerical differences between accounting multipliers and fixed price multipliers, but fixed price multipliers develop more on marginal propensities while accounting multipliers based on average propensities reflecting the balance in a SAM; Secondly, As income and production structures constitute the social economic system structure, from total net effects we can see that total net effects concluded with different

income groups of household, commodities and activities accounts, approximately distribute between 7.124 and 8.861. This means that the relationship among different groups of Chinese economy is very close, and the development of economic accounts comes to be stable; Thirdly, as own net effects represent the transfer in economic activities, from own net effects we can see that the transfers gotten from cloth is relatively the most while educational, cultural and recreational activities getting the least, which reflects that the expenditure of rural residents' education, culture and recreation in China is still very low. Hence, it is necessary to increase the deployment of rural educational, cultural and recreational market and hold out more financial policy; Fourthly, from open net effects we can see that when some economic account gets shocked, the impact of the low, the middle-lower and the middle of rural residents is much more, and all open net effects are more than 5. Compared with other commodities and activities, educational, cultural and recreational activities get the most impact, and open net effects is 2.345. Hence, these accounts are very sensitive to the outside; Finally, from circular net effects we can see that, when gotten a unit of exterior financing, the income of the low, the middle-lower and the middle of rural residents can get difference to 1.849 units, 1.793 units and 1.772 units of financing, while educational, cultural and recreational activities getting 1.343 units of financing. It means that rural economic in China can get steadily developed as long as the economic of the low, the middle-lower and the middle of rural residents can be hold out. At the same time, this also means that there is a larger space to develop rural education, and the transfer effects from government to the low, the middle-lower and the middle of rural residents in China will be notable.

□□□□

Juan Mei and Jin Fan

Compilation of Chinese Rural Residents Consumption Social Accounting Matrix (SAM) of 2003

Recently, in China, it appears to be the phenomenon that it lacks of persistent motive force of growth in consumption. To some extent, this can be ascribed to much lower consumptive level of rural people in China. In latter period of 1990s, the growing rate of expenditure for consumption of people in countryside dropped rapidly. Low-speed growth has kept for a long time and this made the standard of the personal expenditure for consumption raise slowly. Lacking of motive force on rural market has been a very significant factor that restraining national economy from increasing fast and continuously. As a result, we need to probe into the consumption level of Chinese rural residents. Our research will supply analytical bases for further expanding the rural consumptive market, and, our positive result, founding Micro SAM, provides basic database for doing research on policy analysis, such as shock analysis and scene analysis.

From the view of studying on the problem that what are consumption hotspots of Chinese rural residents and based on the existed balanced Chinese macro SAM in 2003 built up by us, which includes Commodities, Activities, Factors, Enterprises, Households, Government, Finance, Savings-Investment and Rest of the World (ROW), we divide three items, that is, Commodities, Activities and Households in detail. Finally, we decompose Chinese Macro SAM in 2003 and found detailed Chinese rural residents consumption social accounting matrix (SAM).

Firstly, this paper will give a review of theoretical research on SAM. Secondly, according to "Input-Output Table of China (2000)", "China Statistical Yearbook (1994-2004)", "China Yearbook 2003 Rural Household Survey", "Statistical Yearbook of China's Customs (2000-2003)", "Yearbook of PBC (1998-2003)" and other corresponding statistical information, as well as the

conclusion of studying on consumptive hotspots of rural residents, we separate the account of Commodities and Activities into food, cloth, household equipment and services, transportation and communication, residences, educational, cultural and recreational activities and other commodities and activities. At the same time, to make our study of the situation of rural residents more universal, and, according to “China Yearbook 2003 Rural Household Survey”, we decompose the item Households into the lowest, the lower middle, the middle, the upper-middle, the highest, and the Urban residents, altogether 8 groups. Now, we build up a 26×26 Micro SAM of China’s Rural Resident Consumption. Thirdly, according to the request of SAM, that is, to keep the balance among accounts, we make use of the methodology of Nonlinear Programming to adjust the initial detailed SAM. By doing this, we get the ultimate balanced Chinese Rural Residents Consumption SAM of 2003. The final balanced SAM supplies the most basic data for studying the problem of multiplier based on SAM. Simultaneously, the study of this paper supplies policy-makers and researchers, who analyze the consumptive hotspots problem, with scientific economic database.

□□□□

Zhiyang Yin, Jin Fan and Qingwu Zheng

Analysis and Compilation of Regional Insure-Economic -Social Accounting Matrix in China

This paper, by giving prominence to insure section, compiles Chinese Jiangsu insure-economic-social accounting matrix. This research can provide decision-makers and researchers with the scientific economic data to make them fully understand and analyze Jiangsu insure, economic, financial and social situations. Firstly, we review the theoretical basis of Social Accounting Matrix (SAM), the international compared researches of SAM update and the development of China’s insurance and consumption credit respectively. Secondly in the point of macro-economic cycle, the paper studies the structure and content of Chinese regional insure-economic-social accounting matrix (RIESAM) after investigating the characteristics of Chinese regional sector and financial sector. We divide the Investment sector into three sectors on the basis of commonly used SAM, which include Investment in Fixed Assets, Finance and Inventories, make it expand to Financial Social Accounting Matrix. In order to study the problem of insuring further, we continue dividing the financial sector into the insurance sector and other financial sectors. At the same time, in order to make the finance, insurance data and other departments’ data keep unanimity, according to the actual conditions of economical operation, we segment the walks and arranges of the SAM into eleven sectors, which include Activities, Commodities, Factors, Enterprises, Households, Government, Investment in fixed assets, Insurance, other financial sectors, Inventories and Rest of the world. In addition, due to the economic trade difference between areas and countries, we add the Interlocal sector, all of these sectors build up the regional Micro Insure-Economic-Social Accounting Matrix. Thirdly, based on “Jiangsu Input-Output Table” (2000), “Jiangsu Statistical Yearbook” and “Jiangsu Communique of National Economy and Social Development by Jiangsu Statistical Bureau in 2002”, and combined with a considerable number of financial data, we compile Jiangsu RIESAM, and using cross entropy (CE) method to get the balanced and updated one for 2002. Finally, we analyses the balanced one, and put forward some proposals.

We draw the main conclusions as follows: Firstly, Analyze in terms of macroscopic, 80.57 percent of the income of the insurance department of Jiangsu stems from the family and the rest stem from enterprises; Its expenditure is used in the family, enterprise and insured savings, which

separately account for 9.3%, 9.4% and 81.3%; The insurance expenditure accounts for 1.07% of total expenditure of enterprise. The paying that the insurance department gives settling a claim account for 0.52% of enterprises' gross incomes. The insurance expenditure accounts for 3.325% of total expenditure of families. The paying that the insurance department gives settling a claim account for 0.384 % of households' gross incomes. The enterprise, family, government and insured savings separately account for 31.12 %, 42.69 %, 13.97 % and 9.96 % of the total value in debt of the bank. Enterprise loan, family loan and bank loan, which used for investment in fixed assets separately account for 43.77 %, 28.46 % and 27.77 % of the Bank assets; Secondly, there are some main suggestions of quickening the development of insurance of Jiangsu (a). Accelerate opening up the rural social security and insurance market; (b). Strengthen the variety of insurance to innovate and optimize; (c). Strengthen the professional personnel training of the insurance; (d). Pay attention to the insurance team steadily, strengthen the insurance service, and improve prestige degree of the insurance company; (e). Strengthen the management innovation of insurance company etc.



Session II.2.11, Tuesday, 11:00-12:30
Room: Meeting room 3 at Run Run Shaw Conference Center
Structural Change and Economic Development I
Chair; Jie Li



Mikio Suga

The Influence on Inequality of Compensation of employee by Change in Industrial Structure

It has been said in postwar Japan that income was distributed equally. In 1998, Toshiaki Tachibanaki, professor of Kyoto University, published a book entitled, *Economic Discrepancy in Japan*, which indicated that income inequality has been widened in Japan in recent years. Since then, lively discussion emerged that whether income inequality of Japan is widened or not. Meanwhile, the industrial structure has changed due to the deindustrialization or following-out, accompanying a strong yen after the Plaza Accord in 1985. Although this discussion of income inequality attracts general public in Japan, and change in industrial structure brought about both job loss and job creation, no one has discussed which change in industrial structure had influenced over the income inequality. By using Japanese Input Output Tables from 1951 to 2000, this paper will examine the influence of change in industrial structure on the inequality of compensation of employee. Here, the inequality of compensation of employee is regarded as proxy of income inequality.



J.M. Albala-Bertrand

Relative Capital Shortage and Potential Output Constraint A Gap Approach

Focusing on core-infrastructure capital vis-a-vis productive capital, we propose a macroeconomic method to determine both the type of relative capital shortage that can constrain potential output and the optimal composition of capital, in any period. The latter also represents a measure of structural change. This method is based on an adapted two-gap model, by means of a Leontief production function, which is estimated via linear programming. It is illustrated with the cases of Chile and Mexico over the 1950-2000 period. We discover an oscillating pattern in which the two types of relative capital shortage alternate over the period. The relative shortage of productive capital appears to be as constraining for potential output as that of infrastructure capital. We also find that optimally core infrastructure appears to be able support a variable level of productive investment over time. The shortage alternation suggests an optimal trade off between these two types of investment, which can be ascertained from a social opportunity cost derived from the prevailing gap in any period.



Tuesday, June 28, 2005

PARALLEL SESSIONS II.3 (14:00-15:00)

provide science evidences for the decision and implementation of national economic development and environmental security strategies.

□□□□

M. Wier, T. C. Jensen, L. B. Christoffersen , J. Munksgaard, T.S. Jensen, O.G. Pedersen and H. Keiding

Growth, Economic Policy and Environmental Performance

During the last decade there has been an increasing focus on the importance of household consumption for the sustainable development of household consumption. In order to evaluate the relation between economic policies at the macro-level, the consumption patterns of various household types and their environmental performance, we construct an integrated modeling framework based on a Danish macro-econometric model, national consumer survey statistics, input-output tables, energy flow matrices, and various types of emissions and associated environmental effects. Using this integrated assessment system it is possible to relate differences in policy measures to differences in private consumption and the resulting differences in environmental performance.

Environmental performance is evaluated using environmental-effect indices, weighting various types of emissions in a global warming potential index, an acidification potential index, and a photochemical oxidation potential index. Subsequently, using DEA (Data Envelopment Analysis) , we use these weighted environmental effects indices to form one environmental performance index. DEA analysis is a non-parametric production frontier approach, measuring environmental efficiency in consumption and production. This type of analysis has not been carried out for any country before. The study benefits from recent and detailed data on production sectors, commodities, energy types, environmental effects and household characteristics. In this paper, we highlight results based on our previous and ongoing research. The studies show that different family types have different environmental performances, and that the environmental performance changes across different macro-economic policy scenarios.

■■■■■■■■■■

Session II.3.2, Tuesday, 14:00-15:30
Room: Room 1503 at Teaching Building No.1
New Developments in Compiling Input-Output Tables IV
Applications in Input-Output Tables
Organizers Jiemin Guo and Mark Planting
Chair Helmut Maier

□□□□

Hong Zhao

Compilation and Application of Chinese Input-Output Table

In this paper, a profile of the compilation and application of Chinese input-output table was

introduced to facilitate readers of various backgrounds to form a comprehensive view of the input-output practice in China. This paper consists of three parts, where part one describes the evolving history of the compilation of Chinese input-output table; part two presents details of all official tables compiled and published by the national and regional statistical bureaus; part three lists some major projects conducted by the National Bureau of Statistics (NBS) cooperating with other institutions.

□□□□

Antonio D'Agata

An Adaptive Multisectoral Model with Structural Change

This paper presents a multisectoral model of structural dynamics. Learning of consumers and of producers are explicitly formalised, although in a very stylised way, and generate structural dynamics of the economy. Hence, unlike existing models of structural dynamics (see e.g. Pasinetti (1981, 1993), Notarangelo (1999)), our work endogenises the technological and consumption dynamics. We provide a concept of (secular) equilibrium and study the dynamic properties of the economy. It is pointed out also that our model can easily and consistently incorporate a variety of firms, this allowing the study of the dynamics of the economy from an evolutionary point of view (see e.g. Metcalfe (1995), (1998)). From this point of view, therefore, our model could be considered as providing a bridge between the literature on structural change and that one on evolutionary dynamics.

□□□□

Helmut Maier

Economic Explanation of Natural and Social Phenomena - Is There an Economic System within Nature?

After an introduction to subject, aims and approach, the paper substantiates in a first part (Remarks on an economic system within Nature) the hypothesis of a functioning economic system within Nature which is not only based on a mere exchange of goods and services but also on a non-visible but indirectly observable and measurable equivalent of money. This natural economic system works with uncompleted information of participants, and any good and service has its price. Using observations, neo-classical theory, and an extension of hedonic methods, the paper identifies certain natural phenomena as economic markets with supply of and demand for goods and services, and the price specification energy. It explains characteristics of this economic system the dual structure of its markets, transfer of payments, banks and central bank, state, taxes, subsidies, and according Leontief's theory the design of the input-output table. Conclusion Human populations are subjected to the economic system of Nature as well as to the economic system of the state in which they live, both systems are interacting.

In a second part (Remarks on interactions between natural and human economic systems) and referring to leading aims and indicators of System of National Account SNA of United Nations and of an equivalent System of Population's Account (not to confuse with the so-called Green GDP), the paper explains disparities between natural and human economic systems. It substantiates the predominance of the natural economic system the top aim (conservation of life) is superior, the

equivalent of money (energy) is universal usable, and it does not know waste. Due to interactions between natural and human economic systems, the paper presents (different) explanations and reasons for social and natural phenomena like overcrowding of world population, migrations, poverty, unemployment, demographic ageing, and change of climate. Result is a different understanding of present social (and natural) problems which include big challenges to human societies to be met by politics in present and future, and the insight that, in present, human species' flexibility is superior to the flexibility of different species. Conclusion is the hypothesis that the social constitutional state – claiming freedoms – unilaterally defines and implements human aims and rights which challenge sustainable reactions of the natural system in the long run, not only on the predominant human species. These reactions partly occur as until now unknown and unmeant phenomena like ageing and change of climate.

In a third part (Remarks on political approaches to meet disparities between natural and human economic systems) and referring to the Convention of Human Rights of United Nations and the Constitutional Law of Federal Republic of Germany, the paper analyzes political reasons for disparities between the natural and human economic systems. It identifies conflict points between leading aims, social transfers, and the value of money. In order to meet these disparities, the paper refers to Stackelberg's duopoly theory with a so-called "asymmetric solution" which provides the weaker partner (here human species) of the competition sufficient profits if he accepts the independence of the superior partner (here entire Nature), and a so-called "permanent imbalance" where both partners act independent and try to impose this behavior on one another. Hence it presents two scenarios "Adapting to superior economic system of Nature", and "Trusting on human species' superior flexibility", for reflection and discussion. Both scenarios exclude juristic aspects as well as questions of political feasibility. The first scenario includes considerable incisions into basic laws and freedoms in order to reduce obvious disparities between natural and human economic systems. In the second scenario human species uses its superior flexibility to balance reactions of natural system on its economic activities, as long as possible. Present efforts of governments and states to meet environmental and social problems can be identified as actions and reactions within this second scenario.



Session II.3.3, Tuesday, 14:00-15:30
Room: Conference Hall 2 at Run Run Shaw Conference Center
Input-Output Economics and the Physical World
Organizer and Chair Faye Duchin



John Gowdy

The Revolution in Economic Theory and the Future of Input-Output Analysis

The past decade has been a watershed in economic theory. Because of theoretical intractabilities and advances in behavioral economics, Walrasian general equilibrium theory is being replaced by realistic models of human behavior and economic production. Most of the new theoretical and empirical work has focused on consumer behavior but attention is now expanding to include the theory of the firm. The current sea change in economic theory presents a real opportunity for input-output analysis to play a major role in revamping mainstream economics in the twenty-first

century.

□□□□

Albert E. Steenge and Marija Bockarjova, University of Twente

Preparing for the Increasing Risk of Big Floods in a Low-Lying Country

The background of this paper is the sudden reappearance of an old issue in the Netherlands coping with water. This time the main challenge seems to come from within rather than from without. While climate change is judged responsible for increased quantities of melting water from the mountains in the Alps region, it has also caused changes in the physical-chemical structure of dykes (dykes ‘are drying out’). As a consequence, the chance of large-scale flooding in the country’s heartland has increased. This calls for the implementation of governance processes that enable us to choose between the various options that exist.

To address these issues, I-O models are required that can cope with a situation where a large part of the country is incapacitated due to flooding, while at the same time the rest of the country needs to reorganize itself. Any such methodology will have to be able to distinguish between direct and indirect effects, and thus provide a basis for systematic decision-making which makes optimum use of the capacities and resources still available

In this paper, we propose that I-O methodology leads us to a system of so-called ‘basic equations’ that serve as a platform for vulnerability and adaptability studies. In this area much work already has been done, also in response to other types of natural disasters such as hurricanes or earthquakes. Nevertheless, no agreement on general principles seems to have been reached so far. Results of an application to the hypothetical case of a major flood in the heavily industrialized central part of the Netherlands will be presented.

□□□□

Sam Cole

An Input-Output Approach to Performance and Protection in China's Regional Economies

This paper starts from the assumptions that disruptive events are inevitable and that economic actors adapt their levels of protection to maximize their economic returns. The study uses a multi-sector simulation model to describe the impacts of disruptions and protection on economic systems. The structure of the economy and the transient transactions are represented in an input-output type accounting matrix that shows the transient transactions among sectors. The largest, exceptional, and occasionally catastrophic events may be uninsurable through the market or local institutions – but the consequences may be mitigated and compensated or reconstruction undertaken by external actors. Within this framework it is possible to explore the consequences of designated unusual events against the background of prevailing systems of exchange and protection. The goal is to link the parameters to available empirical engineering, development, and business literature. The approach will be illustrated using examples relevant to the Peoples Republic of China.

■■■■■■■■■■

Session II.3.4, Tuesday, 14:00-15:30

Room: Meeting room 2 at Run Run Shaw Conference Center
CGE Modeling and its Applications
Chair: Klaus Conrad

□□□□□

Jin Fan, Yan Wang and Hanhui Hu

Shock Analysis of the Impact of the Implementation of Consumption Credit Policy on China's Township Residents' Consumption Behavior-A CGE-based Analysis

This paper, based on China's Micro SAM-based CGE model concerned with Chinese consumption, studies the impact of the implementation of consumption credit policy on China's township residents' consumption behavior. Firstly, we review the theoretical basis of consumption credit in economics, the international compared researches of the system and experience of consumption credit, the development of China's consumption credit and the study of China CGE model respectively. Secondly, we segment the sectors and institutions, which include Commodities, Activities, Factors, Enterprises, Households, Government, Savings-Investment and Rest of the World (ROW) of the Macro SAM of China in 2003 we built up, and build up a 30×30 Micro SAM of China's consumption, which includes food, cloth, household equipment and services, transportation and communication, residences, health and care, educational, cultural and recreational activities and other commodities and activities; the lowest, the lower, the middle-lower, the middle, the middle-upper, the high, the highest, and the rural residents, altogether eight groups; labor and capital. Thirdly, based on "A Standard Computable General Equilibrium (CGE) Model in GAMS" by Lofgren et al (2002), we build up a static China's Micro SAMed-CGE model, which includes price block, production and trade block, institution block and system constraint block. Among the three macroeconomic balances, we think that investment-driven balanced closure is suit to Chinese economy and to our CGE model. We adjust base-year savings rates by a fixed number of percentage points, the rates of selected institutions are multiplied by a scalar. What is needed to interpret is that the data in the course of calibration are calculated by our recent research (Fan, et al, 2003a, 2003b, 2003c, 2004a, 2004b), for instance, the computation of related China's consumption elasticity by AIDS modeling instead of ELES in Lofgren's model. We also make the complement by taking for reference the research achievements at home and abroad, esp. the data of China's CGE modeling. Finally, this paper employs the consumption credit scale to make expansion and constriction to the aggregation, and to make research on the shock influence of structural adjustment on the consumption behavior of China's township residents.

We draw the main conclusions as follows Firstly, the scale of consumption credit makes notable influence on the consumption phase of China's township residents. When the scale of consumption credit increases by -30%,-20%,-10%,10%,20% and 30%, the consumption scale of township residents will increase by -6.33%, -3.76%, -1.82%, 2.89%, 6.82%, 10.12% and 16.79% respectively; Secondly, the scale of consumption credit makes different influence on the different commodities (services), esp. notable on residences, transportation and communication, but less notable on food, cloth and educational, cultural and recreational activities; Thirdly, the scale of consumption credit makes distinctly different influence on the different groups of income and different commodities (services) of township residents. In general, the ease degree of consumption credit policy makes great influence on the families above middle income group and high-valued commodities (services) ; finally, the ease degree of consumption credit policy is similar to the

change degree of township income increase.

□□□□

Cristela Goce-Dakila, Shoshi Mizokami and Kwangmun Kim

Impact of Transport Margin on Economic Welfare In National Capital Region, Philippines A Single Region SAM Approach

A social accounting matrix was constructed for the National Capital Region to attain the following objectives

- (1) to underscore the importance of transport margin the in an applied general equilibrium framework;
- (2) to apply theoretical framework to an empirical study of the impact of additional transport infrastructure via lower transport margins on and
- (3) to measure the impact of transport margins on important regional macroeconomic variables (4) to suggest policy directions which would underscore the role of transport sector in enhancing intraregional interaction .

The paper employed a computable general equilibrium model in quantifying the impact of transport margins. The single- region model being considered is relatively simple, with four production sectors – agriculture, industry, services and nontradeable services; has 2 types of households –rich and poor. The other institutions are the firm sector and the government sector. The model will utilize a CES value-added production function and a Cobb-Douglas utility function. The model distinguishes two factor inputs, labor and capital, which determine sectoral value added using CES production function. Sectoral capital is fixed. Value added, together with sectoral intermediate input, which is determined using fixed coefficients, determine total output per sector. In both product and factor market, prices adjust to clear all markets. Consumer demand is based on Cobb-Douglas utility functions. Armington-CES (constant elasticity substitution) function is assumed between local and imported goods, while a CET (constant elasticity of transformation) is imposed between exports and local sales.

Initial results indicate that welfare losses nearly double the welfare gains if transport margin increases by 0.2 due to inadequate transport infrastructure planning in MetroManila. However, welfare differentials are bigger for rich households than poor households if there are reductions in transport margin.

□□□□

Klaus Conrad, Henrike Koschel and Andreas Löschel

Not Employed 35 Hours or Employed 40?– A CGE Analysis for Germany

In the 1980ies the myth of work-sharing has led policy makers to believe that reduced working time will reduce unemployment. Faced with a record level of unemployment, the present debate in Germany is to extend the weekly hours of work. The open question is whether this extension is a serious option towards more employment or only a fallacy, profitable for the firms. In this paper we quantify the employment effects of an increase in weekly normal hours in German manufacturing

on the basis of a CGE model using an input-output framework for all sectors of the economy. As the work-sharing reforms in Germany and France in the 80ies included persistent hourly wage hikes as income compensation for workers and no alleviation for firms, a negative outcome was not too surprising. Whether an increase in standard hours with a constant weekly payroll will lead to more or less unemployment is from the perspective of economic theory again an unsettled issue. The outcome is in general ambiguous. On the one hand, as the increase in working time (36 to 40 standard weekly hours) raises labor productivity by about 10 percent, conditional demand for labor will increase (substitution effect) and conditional demand for intermediate inputs will decline. Since, on the other hand, workers do have a longer working time anyway, no positive effect on the number of persons employed can be expected. However, output of the manufacturing industry, and thus unconditional demand for labor, capital and intermediate goods, will increase (output effect). In order to sell the additional output, firms have to lower prices. Depending on the price elasticities, revenues and hence profits will change. The objective of our CGE analysis is to find out whether an increase in working time can be considered an adequate policy to reduce unemployment. Since employment effects crucially depend on the specification of the labor market, we will also check the robustness of our results under different labor market regimes.



Session II.3.5, Tuesday, 14:00-15:30
Room: Meeting room 1 at Run Run Shaw Conference Center
International Input-Output Analysis for Asian Countries
Chair: Jan Oosterhaven



Yuichi Hasebe and Nagendra Shrestha

Trade and Economic Growth in East Asia An Analysis for Economic Interdependency Using International Input-Output Table

Asian NIEs (Korea, Taiwan, Hong Kong and Singapore) and ASEAN4 (Indonesia, Malaysia, Philippines and Thailand) started the Export Oriented Policy from 70s and 80s; while China started such policy from late 80s. Such policy helped these countries to expand their trade and direct investment within themselves, as well as with the developed economies to achieve the higher economic growth. After the Japanese economic crisis in early 90s, East Asian countries seem to shift the economic interdependency toward the regional economies from the developed economies. But the East Asian economic crisis due to Asian Currency Crisis in 1997 indicates that the economic interdependency with the developed economy is still significant in East Asian Economy. This paper studies whether East Asian economic interdependency exist with the developed economies or regional economies using International Input-Output Tables consisting NIEs (excluding Hong Kong), ASEAN4, China, USA and Japan as 10 endogenous countries.



Hikaru Sakuramoto, Kozo Ishida, Masahiko Shimizu, Ayu Washizu and Naoko Takenaka

Room: Meeting room 4 at Run Run Shaw Conference Center
Multi-Regional Econometric Input-Output Model for Austria
Organiser: Gerold Zakarias, Gerhard Streicher and Oliver Fritz
Chair: Gerhard Streicher

□□□□

Oliver Fritz, Gerhard Streicher and Gerold Zakarias

MultiREG - A Multiregional Econometric Input-Output Model for Austria: An Overview of the Model's Structure and its Development

MultiREG is a recently developed multisectoral model covering all nine Austrian states and the economic interactions between them. As an integrated model it combines two regional model types, econometric models and input-output models. The paper describes the most important features of the model and also provides information on its regional data base. Specific attention is paid to the methods applied in compiling the multiregional make-use system which is embedded in the model: This system is fully consistent with the national input-output accounts; in its compilation extensive use of primary and secondary regional data was made.

□□□□

Gerhard Streicher and Gerold Zakarias

Endogenizing Regional Trade Relations in the Context of a Multiregional Econometric IO Model

For the construction of a multiregional IO table for Austria, the derivation of inter-regional trade relations was based on the results of a survey of Austrian firms and establishments. The first part of the paper presents the results of this survey and the approach taken to ensure the trade matrix's full consistency with regional production levels on the one hand and national import-export figures on the other.

Both regional IO tables and the inter-regional trade matrix, which are derived for the year 2000, were subsequently used in an econometric multiregional IO model for Austria. The second part of the paper describes the dynamisation (to account for inter-temporal changes) and endogenisation (to allow for feedback-links with the economic model) of the (static) trade matrix.

Regional results of the static trade matrix as well as simulation results from the dynamic trade model conclude the paper.

□□□□

Gerold Zakarias, Oliver Fritz, Kurt Kratena and Gerhard Streicher

Endogenous Update of I-O Coefficients in a Multiregional Econometric IO Model

Updating IO coefficients is an important part in econometric IO models. This is especially true if the model is used for mid- to long term projections, which is probably one of the most important

applications.

Whereas endogenous technical change is usually applied “along the row” (e.g., models in the tradition of Conway’s (1990) WPSM), more recent extension complement this with an additional adjustment “along the column” (Kratena and Zakarias, 2004). This paper goes one step further by fully endogenizing the determination of both row- and column sums and proposes a fully consistent approach by endogenously incorporating a bi-proportional RAS into the model specification. The model utilizes Generalized Leontief production functions to determine column sums and “hypothetical outputs” (Conway 1990) for the row sums.

The paper concludes by presenting empirical results derived from MULTIREG, the multi-regional econometric IO model of Austria, where the updating is applied to technological coefficients of the intermediate use matrix.

□□□□

Gerhard Streicher and Gerold Zakarias

Projecting Transport Demand for Austria until 2025: An Application of a Multiregional Econometric IO-Model

This paper describes the projection of regional transport flows within Austria up until the year 2025. The empirical results stated are taken from a research project conducted for the federal ministry of transport.

The aim of the paper is threefold. The first part describes the basic methodology of our approach and discusses some of the data limitations that had to be overcome. The main components of the approach involve on the one hand the multiregional econometric io-model to generate regional sectoral forecasts of production values. These economic activity parameters are then translated into transport flows by virtue of a gravity model, which was estimated from cross-section data for the base year of 2002. The third component consists of the projection of total transport volume shipped within Austria in each year of the forecast period.

The second part of the paper describes how the various components are linked with each other to generate the forecasts of transport volume. The third part concludes in stating the empirical results and shows some of the projections related to the Austrian main road and rail network.

■■■■■■■■■■

Session II.3.7, Tuesday, 14:00-15:30
Room: Room 1504 at Teaching Building No.1
Globalization and Economic Integration
Chair: Pierre Mohnen

□□□□

Michael Landesmann and Robert Stehrer

Outsourcing, Regionalism and Global Economic Growth

This paper presents a multisectoral model of international economic integration and economic growth. The growth dimension is introduced in the form of an international ‘technology leader’ and international processes of technology transfer and ‘catching-up’. There is an ‘endogenisation’ of productivity growth introduced in the form of the impact of ‘innovational investments’ and – in the international context – through foreign direct investment (affecting the speed of technology transfer) . The model also includes an important Schumpeterian mechanism in that global uneven productivity dynamics allows ‘rents’ to emerge and such rents are higher in countries and industries with relatively high productivity growth dynamics. Depending upon the distribution of such rents between wages and profits (wage-setting mechanisms matter!) , Schumpeterian ‘surplus profits’ feed into innovational investments and also make certain sectors particularly attractive for foreign direct investment (FDI) . The dynamics described in the model thus tracks uneven productivity dynamics (partly endogenised) , wage, price and hence real income dynamics. Furthermore, since it tracks the relative cost dynamics, it shows the attractiveness of ‘sourcing’ intermediate inputs from different international locations. ‘International sourcing’ of intermediate inputs can provide clear cost advantages to producers and hence – given the uneven productivity and cost dynamics – we witness changing patterns in the ‘international sourcing matrix’ of the model.

The analysis of features of international economic integration is further enriched by home market effects (which in general can be different for final products and intermediate inputs) as well as by trade policy measures which allow us to show the impact of ‘regionalism’ (i.e. preferential trading regimes between regional trading patterns) . We analyse the costs and benefits of regionalist arrangements.

The model represents – in our view – important stylised facts of international patterns of industrial specialisation, global productivity dynamics and the effects of (and reasons for) regionalist trading structures which we currently observe internationally.

□□□□

Robert Stehrer

Effects of World Economic Integration on Growth, Structure and Labour Markets

In an integrated world countries are facing competition from advanced and less advanced countries with different institutional settings and different types of developing countries simultaneously. These countries are characterized by a number of different features concerning e.g. product and labour market characteristics, technological trajectories, evolution of endowment structures, industrial policies, etc. In this sense increasing economic integration between two countries or policies in one particular country also have indirect effects on growth and structure in the other countries. In the vast majority of the literature however only 2x2x2 models are studied in a static manner. The aim of this paper is to study the economic effects of increasing integration between larger world regions (countries) through trade flows, foreign direct investment and technology spillovers in the framework of a dynamic multicountry input-output model (based on Stehrer, 2002) . It is argued that the advanced regions are not only facing competitive pressures from a singular type of developing economies but rather have to compete with different types of catching-up or not successful catching-up economies as well as integrated themselves. In the first part the paper sets out the analytical framework allowing for a number of countries, industries and different skill-types of labour. International integration occurs via trade, foreign direct investment, and technology

□□□□

Nguyen T. Anh Tuyet and Keiichi N. Ishihara

Evaluation of Energy Productivity in Vietnam using IO Table

When the sustainable development becomes the global aim, energy productivity becomes important concept. Using IO table, this research revealed the inter-relationship of energy use among sectors and the change of this in Vietnam. In this paper, IOE analyses, which based on a power series expansion of the Leontief inverse, are proposed and the period 1989-1996-2000 was focused on to clarify the energy embodied in subsequent rounds of inputs and outputs for each sector and to analyze the transition tendency of energy intensity in sectors.

The economic reform during the last two decades has shifted the country from an agricultural to an industrial based economy. However, the significance of the cultivation sector is still substantial since this sector generates economic activities in other sectors through its supply and demand for intermediate goods and services. The cultivation sectors use fertilizer, pesticides, machinery, energy, and various services as inputs for their own production processes, of which fertilizer is clearly important. For example, from IO tables, fertilizer occupied 24.38% and 38.37% of agriculture's inputs in 1989 and 1996, respectively. This increase is from the increase in specific fertilizer consumption during this time period. Therefore, given an importance of agriculture in Vietnam, the valuable contribution of fertilizer production for sustaining the agriculture sector will be also clarified. Due to the IO linkages, direct energy intensity in fertilizer sector is first embodied in the second round of the cultivation sector which uses fertilizer products as its input, and then embodied in the third round of food processing sectors which use cultivation's products as its input. Further analysis is also performed to evaluate the hidden contribution of the fertilizer sector to food processing sectors in term of passing on energy.

As the results, it is suggested that saving energy in fertilizer production is also a significant factor in term of raising energy productivity in the food processing sectors. The consideration of the linkages among these sectors is important to improve the energy productivity. It is noticeable how this method is effective to analyze the inter-linkage of energy productivity.

□□□□

Jayant Sathaye, Joyashree Roy, Raman Khaddaria and Sarmistha Das

Reducing Electricity Deficit through Energy Efficiency in India An Evaluation of Macroeconomic Benefits

The demand for electricity has consistently exceeded available supply in India. While the deficit of electricity varies across states, nationally it is estimated to be of the order of 12% on peak and 9% for energy. The limited availability of finance, capital and other legal and administrative barriers have constrained the construction of new power plant capacity, and during the 9th Plan (1997/98 - 2001/02), less than half the planned power plant capacity was constructed. Energy efficiency improvements cost only a fraction of those for supply, and offer a way to eliminate the electricity deficit without increasing direct investment in capacity addition. If the electricity deficit is primarily in the productive sector, energy efficiency offers a way to alleviate the deficit while increasing India's economic output by over US \$ 12 billion, and employment opportunities by over 44 million

person years. These impacts vary by the exact nature of the deficit, and the rate of energy efficiency technology penetration. In addition to output and employment, removing the deficit will also reduce the fiscal deficit by reducing subsidies, and government capital outlay. The analysis is based Efficiency-Employment Integrated Model (EEIM) developed by combining a spreadsheet model with Input output tables of India.

□□□□

Xu Jian

The ECA Method for Evaluating Effect on Energy Requirements of Economic Growth

According to Input-Output model, the amount of energy requirements depends on the following three aspects final demand; non- energy input coefficients and energy input coefficients. All of them are composed of many elements. With economic growth, these elements will change with different extent usually. Consequently, energy requirements will change with the change in any one of all elements but the magnitude of change will have a great difference for the same change in different elements. The paper uses elasticity coefficient as measure index of the effect of change in each element in order to assure comparability. For the purpose, two formulas of calculating elasticity coefficient for the elements in final demand part and in input coefficients part are presented respectively based on the row model and Sherman-Morrison formula. Then, those elements that have much greater effect on energy requirements than other elements will be identified by compare all elasticity coefficients value of both the elements in final demand and in input coefficients. The result of ECA will provide a important reference to judge how to control energy consumption with least-cost way.

■■■■■■■■■■

Session II.3.9, Tuesday, 14:00-15:30
Room: Room 1506 at Teaching Building No.1
History of Input-Output Analysis II
Organizer and Chair: Olav Bjerkholt

□□□□

Olav Bjerkholt and Mark Knell

Did Ragnar Frisch Discover Input-Output Economics?

Ragnar Frisch on various occasions claimed that he had invented input-output analysis in a 1934 paper titled “Circulation planning”. Although prominently published in *Econometrica*, Frisch’s contribution has hardly been discussed in the input-output literature. Frisch’s paper was an attempt to explain the incapsulating phenomena of economic depressions and thus arose from a different motivation than Leontief’s analysis. This paper aims to clarify what Frisch accomplished relative to Leontief (and implicitly assess his claim) . The paper will examine the inventiveness and analytical power of the approach developed by Frisch, and discuss various contexts in which it can be placed in the development of economic thought. The emphasis on distribution rather than on

production, which Frisch's contribution suggest, can be traced back to early attempts at outlining general equilibrium relation. The paper will in this context discuss the roots in the history of economic thought both of Leontief's input-output analysis and of Ragnar Frisch's circulation approach.

□□□□

Christian Lager

The Treatment of Fixed Capital

Four possible ways to deal with fixed capital can be found in literature (i) the user cost approach go back to the classical scholars Whewell and Ricardo and was then adopted by Walras. But in contrast to the latter, who assumed constant depreciation, Ricardo knew the correct formula to calculate the annuity (for a special case). (ii) Others, like Georgescu-Roegen or Leontief treat fixed capital like (produced) Ricardian land. Once a fixed capital good is produced it lives forever. Sometimes depreciation by "evaporation" is assumed but a diminishing amount of the capital good remains forever. (iii) The reduction to dated quantities of primary factors goes back to Adam Smith and played an important role in the approach of the old Austrians. Retaining the characteristic feature of the Austrian concept, Hicks conceived of production as a process which converts a flow of primary inputs into a flow of consumer goods. (iv) The method of treating fixed capital as a joint product was first introduced by Torrens. Thereafter the method was generally adopted, first by Ricardo, then by Malthus and later by Marx. But – as Sraffa pointed out - afterwards it seems to have fallen into oblivion until it has been reconstructed by von Neumann, Sraffa, Schefold and other scholars working in the classical tradition. The joint production method is the most general approach to fixed capital and the other three concepts appear, at best, as special cases.

□□□□

Akhabbar Amanar

Is the constancy of technical coefficients a matter of tolerance? Leontief and the Cowles Commission's econometricians

We argue that the relationships between the Cowles Commission and Leontief during the postwar period, are the essential determinants of the formulation of Leontief's methodology as it is exposed in the first collective work of the HERP in 1953. Hence, this methodology appears as the central stake of the debate on the nature of technical coefficients this debate is neither theoretical nor empirical but first of all methodological.

At the end of Second World War, Wassily Leontief and Tjalling Koopmans were discussing very intently the idea of creating a unique research centre and program around mathematical economics and empirical economics. This would have been the union between the Cowles Commission's econometricians and Leontief's borning "input-output analysis". However, Leontief finally preferred to create his own laboratory the Harvard Economic Research Project. Funded by the Rockefeller Foundation and contracts with the US Air Force, the HERP was created in 1947, and the Koopmans-Leontief project subsequently cancelled. At the same time, the Cowles Commission, looking for new financial supports, signed a contract with the RAND Corporation. In

1947 the Cowles organized a conference, with the RAND Corporation, on “linear programming” which included input-output analysis. Leontief decided not to participate personally at this conference. His reasons seem to be the methodological disagreements between the Cowles and his own “operational economics”. On the other side, it seems that the researchers at the Cowles didn’t appreciate very much the empirical foundations of input-output analysis. See for example the comments by Klein “I found the Cowles group a little flippant about Leontief’s work ... One day I met Kenneth [Arrow] in the hall and I said something favourable about the Leontief system ... Kenneth replied that he thought this was just an accounting system. To people at the Cowles, accounting identities were something to take into account but they did not get one anywhere” [Klein, in Mirowski, 2002, p.628].

In 1949, during a meeting of the *American Economic Association*, input-output analysis is criticized on the constancy of technical coefficients [Fabricant, 1949]. Leontief answered that the theoretical solution was “beyond dispute” “[The] theoretical proposition so clearly stated by Pareto in his criticism of Walrasian fixed coefficients of production is beyond dispute. It is, however, not the fundamental validity of the principle of substitution but its quantitative significance which is important from the point of view of empirical analysis.” [Leontief, 1946, p.39]. Three years later he gave some of the fundamental assumptions of his “empirical science”, hence raising against econometrics and aggregation. Reactions at the Cowles were divers but L.R. Klein is nearly the only one to stress the importance of such scientific rules “Leontief sets the pace with a general discussion of methodology, an interesting method of measuring technological change, dynamic models, and interregional models. Leontief has strong ideas about the appropriate course of quantitative research in economics and a low level of tolerance for alternative approaches. He argues for careful empirical studies of high calibre but wants them to be based on direct observation or measurement and not on indirect method of statistical inference. He shuns macroeconomics and much of the technique of modern econometrics [...] It is hard to see why he felt the necessity for carrying the battle on every page.” [Klein, 1953]. The relationships between Leontief and the Cowles Commission reversed after a time of union came a time of disunion. We will argue that this reversal was methodologically grounded, as well as a consequence of strong institutional influence (notably concerning post-war federal institutions) . Moreover, this “controversy” gives a methodologically focused understanding of input-output analysis the constancy of technical coefficient is indeed a matter of methodological tolerance as measurement rules are conventions. However, these rules are not arbitrary they imply a belief in the existence of what is measured. This will be the heart of our explanation of both the relationships between the Cowles and Leontief, and the question of the constancy of technical coefficients.

We find the same reflection about the role of measurement in economics, in Klein’s macroeconometrics methodology. His methodology is at poles apart with Leontief’s rules of measurement. However, thirty years later, L.R. Klein proposed, at a time when general models of data were less and less used, to build a Keynes-Leontief system “Yet the economic problems of today seem to be intractable when studied through the medium of simplified macro-models. The new system should combine the Keynesian model of final demand and income determination with the Leontief model of interindustrial flows [...]. A principal feature of such combined systems is that they are not based on restrictive assumptions of the fixed coefficient input-output models, but are generalized to allow the coefficients of production to vary, according to the variation of the relative prices” [Klein,1978]. However in Leontief’s opinion, the variability of technical coefficients is perceived not so much as a solution but as a problem. First because using indirect data is not feasible, and second because this variability depends on very complex causes like technological progress.

We then need to develop history of the relationships between the Cowles Commission and

Leontief's group which enlightens the debate on the constancy of technical coefficients. In particular the use of technical coefficients in macroeconomic models (or general equilibrium gives the border between constant technical coefficients and variable ones this border is not a theoretical but a methodological border.



Session II.3.10, Tuesday, 14:00-15:30
Room: Meeting room 3 (30 seats) at Run Run Shaw Conference Center
Structural Change and Economic Development II
Chair: Hiroshi Izumi



Rafael Bouchain and Roberto Ramírez

Structural Change in the Mexican Economy

In this work we realize a study of the structural change in the Mexican economy in the period 1980-1996, the methodology proposed two important measures, the technical change, and the demand structure change in a framework of Leontief model. We need to transform the input-output tables at constant prices for the analysis at 30 industrial sectors using the RAS method. This framework allows the divides of the intermediate inputs by this origin, national or imported. This, make possible the study of the operated change by the globalization on the substitution of intermediate inputs.



Seok-Hyeon Kim

Impacts of Information Technology on Productivity and Linkage of the US Economy

This paper examines structural changes in the US economy in the context of interindustry linkages. Structural changes are studied in terms of factor saving in the input-output accounting which is in concept equivalent to productivity growth but whose sign of change is opposite. While the conventional growth accounting has developed to trace detailed industry sources of productivity growth, its methodology isolates each industry from the rest. On the other hand, the input-output accounting framework has inter-industry relations as its essential key features and can be extended smoothly to factor saving analysis.

This thesis reaches three conclusions. First, the I-O accounting produces comparable results in factor saving as in productivity growth. This paper shows the average annual rate of factor saving was -0.91 percent for 1987-1995 and -1.75 percent for 1995-2000. These figures are larger than the rates of productivity growth based on the growth accounting but the extent of difference is not very large. The fast growth in factor saving, particularly for the latter period, is not only noticeable in size but also qualitatively significant in the sense that active output growth was not accompanied by price increases. Second, Information Technology industries made substantial

J. V. Alarcon and B. Khondker, PD. Sharma and SHD Unit staff Bangladesh Planning Commission

Interactive Interface - The SHD Modeling System for Monitoring Sustainable Human Development in Bangladesh

The SHD modeling system (SHDMS) uses a specially designed computer simulation environment to conduct interactive sessions designed to support proactive decision making. It is also used to communicate and review model results among stakeholders.

The SHDMS serves as a solid background for the Bangladesh Government and Ministries to support proactive decision-making processes as well as to justify policy choices. Using such a model-based approach in national planning strengthens and enhances the credibility of the Governments when interacting with international donor agencies. With a transparent model, it is possible to identify and test differences among opinions, so consensus can be reached. The SHDMS is a new tool that facilitates substantive, consistent and disciplined dialogue among Ministries, development partners and interest groups.

The interactive computer modeling interface enhances the ability to consistently visualize the interrelated consequences in a complex national system by identifying the important links among economic, social and environmental development in ways that are apparent, actionable, and effective.

'Development trends' are inevitably concerned with economic and demographic issues, income distribution, survival risks, access to health and education, patterns of consumption deprivation and inequity. More recently have to provide monitoring indicators for the UNDP MDG and PRSP (Indicators Extracted from Country Experiences) .

In that context the SHDMS is an instrument to account for sustainable human development (SHD) interventions and impacts at the meso and macro level of the economy. Using state-of-the-art modeling technology, it provides the government and other stakeholders with consistent and sound numerical information for assessing interrelated economic trends, evaluating development options and framing national policy at macro and meso levels.

These tasks are accomplished by linking high-resolution mathematical models based on consistent country data (SNA, surveys and censuses) within a simulation environment which tracks process change in six-month intervals and multi-year long-run processes.

The SHDMS like other planning models builds a dynamic computable general equilibrium module (CGE) on a balanced and consistent input-output framework and social accounting matrix (SAM). However, unlike most planning models, the SHDMS includes a dynamically linked cohort-component demographic module that provides inputs to the economic CGE and education modules and computes distribution outcomes over time. The modeling platform is 'VENSIM', a fourth generation modeling and simulation environment that enables the development of large inter-linked dynamic models.

An interactive menu driven user interface, with on-screen prompts allows for basic operation of the SHDMS that consists of eight fully linked major component modules. Each module builds from one or more sub-models. The modules are (1) income distribution and poverty, (2) economy, (3) dynamic social accounting matrix; (4) dynamic multiplier; (5) population dynamics; (6) education; (7) poverty and distribution; and (8) MDG module.

One of the novel features of the SHD modeling system is that all the outcomes are derived from a consistency framework. The system thus allows authorities to analyse and monitor outcomes

under alternative policy interventions.

The SHDMS is based on existing and well-established theories and socio-economic models, which are widely acknowledged in academia and with practitioners in the field. The SAM, CGE and cohort-component population models as well as models regarding household consumption patterns, income distribution patterns and the entrance-dropout education models are all well known and respected in the field. Equations used in the SHDMS are specified according to the corresponding theoretical foundations.

Parameters used in the SHD model are estimated from primary and secondary data. These include price elasticities, mapping from households to activities, propensities for groups to save and consume, productivity, fertility rates, infant mortality rates, under-five mortality rates, school enrolment and dropout rates, and labour force participation rates.

Other novel feature is that, data permitting, the SHDMS can be partially or fully updated at any time and it can be upgraded with additional modules in a seamless manner as well.

In addition to a synopsis of PRS Monitoring Structures the SHDMS technical papers, among others, have been prepared for the Economic Relations Division (ERD) and the General Economic Division (GED) a sample of these are

- Income and Poverty Implications of Export Shock (Bangladesh Perspective)
- Growth and Resource Requirement for Targeted Poverty Reduction (Reduction of Existing Poverty Levels by Half by 2010 and 2015)
- Medium Term Macro Framework (MTMF) in collaboration with the General Economics Division (GED)
- Poverty Reduction Strategy Paper (PRSP) and the SHD Unit
- Medium Term Macro Framework Proposed by the Planning Commission (General Economics Division and the SHD Unit)
- Poverty Reduction Strategy for Bangladesh Some Practical Aspects

□□□□□

Partha Pratim Ghosh, Arpita Dhar and Debesh Chakraborty

A Keynes-Leontief-Klein Type of “Integrated Macro-Econometric and Input-Output Model” for Sri-Lanka

The integration of the standard Keynesian Macro-Econometric Model with the Input-Output Framework of Leontief provides a structure for analyzing both aggregative as also detailed structural economic policies. Econometric Models following the Keynesian approach often do not take into account the structural bottlenecks that characterize a developing economy. Leontief’s Input-Output System focuses sharply on the details of production in each of the different sectors, but treats final demands as exogenously given, stopping short of developing an endogenously driven income-generation circuit. The two approaches may be combined into an Integrated Model of income generation and final-demand estimation that augments the Macro-Econometric approach with the much needed detailed structural supply content and simultaneously creates an endogenous final-demand component in the Input-Output Model.

This paper is an attempt to apply the Keynes-Leontief-Klein Type of Integrated Model on the Sri Lankan Economy. In the Macro-Econometric Sub-Model, we have the Expenditure, Fiscal, Monetary and Trade Blocks, from which we have estimated the Private Consumption Function, Government Consumption function, Investment Function, the Export and the Import Functions that are necessary for obtaining the aggregative or macro results of the model. The Input-Output

Sub-Model serves as a detailed production function to be integrated with the Macro-Econometric Sub-Model. It is based on Sri Lanka's Input-Output Table of 1994, which has been formatted for thirty-sectors.

Using the Integrated Model we have developed the detailed impacts of Macro-Policies on various sectors of the economy. Simulation exercises have been carried out. The preliminary results from the Integration of the two sub-models are satisfactory, suggesting that this framework may be very useful for economic policy modeling.

□□□□

Hu Guoqiang

Comparative Analysis of Economy-Motivating Consumption, Investment and Net Export in Henan Province

Some economic theories concerned regards consumption, investment and net export constitute the economy-motivating "troika". Among the "troika" in Henan Province, which one is the main economy-motivating impetus? Which industry has the strongest relevancy with other national economic industries, thereby motivate the national economy more greatly? Such an industry is a swift horse of the "troika", which should attract more attention of us in macro-economic management. This paper analyses how consumption, investment and export influence the whole province's economy by the input-output table of Henan Province in 2002. It also seeks the most important economy-motivating industry of Henan Province, and provides reference for relevant governmental departments in making industrial policy.

Tuesday, June 28, 2005

PARALLEL SESSIONS II.4 (16:00-17:30)

Session II.4.1, Tuesday, 16:00-17:30
Room: Conference Hall 2 at Run Run Shaw Conference Center
Impacts of Trade Liberalisation
Chair: Gulay Gunluk-Senesen

□□□□

Chandrima Sikdar and Debesh Chakraborty

Promotion of Free Trade between India, Bangladesh and the European Union

European Union is the world's leading trade power today. The European Union is specially committed to supporting developing countries' efforts to integrate into the trading system and to help them reap the benefits of market opening, giving them a hand where needed.

EU is a major trading partner of both India and Bangladesh. The present paper attempts to explore the potentials of enhancing trade between India, Bangladesh and the EU and aims at identifying the possible gains that would accrue to each of the economies when trade takes place between them. The paper presents a theoretical framework, which helps to identify the pattern of trade flows between the three economies in a perfectly competitive world characterized by free trade. The paper extends the framework of Raa and Mohnen (2000) for the three economies. It assumes that each economy has fixed domestic endowments, with tradable and non-tradable commodities that are used for intermediate as well as final consumption. It uses Leontief functions to represent technologies and preferences of three economies India, Bangladesh and Europe. The model maximizes the level of domestic final demand (including consumption and investment) in one economy, subject to a given proportion of final consumption in the rest of the two economies. The latter has been put forward in a way such that the outcomes preserve the actual bilateral balance of payments. This will lead to efficient allocation of resources.

Thus, the model locates the comparative advantages of the economies linked by international trade based only on the fundamentals of the economies endowments, preferences and technologies. This theoretical framework provides a general equilibrium determination of the commodity pattern of trade. The empirical implementation of the model considers trade in fourteen sectors consistent with Input-output tables of the three economies. The result shows that India exports six goods, namely, Agriculture, Fishing & Forestry, Chemicals, Textile, Non-metallic minerals, Metal products and Other Services- all of which it produces. Bangladesh exports Mining and miscellaneous manufacturing, Construction and Trade and transport services. Though it produces Other Services, but given the scope for free trade with India and EU, it chooses to import it from its neighbour India. EU, on other hand, exports Food, beverages and tobacco, Fuel and power products, Paper and paper products, Machinery, Trade and transport services. Though it produces some of Chemicals and Other services, yet the trade figures show that these goods feature in the import list of the union. It imports it from India. The study also isolates the gains from free trade accruing to the three economies. For this three more linear programmes are solved. The extent of gain in this trading arrangement is the highest for the least developed economy Bangladesh (66.8%) , while it is the smallest for the most developed economy EU (1.8%) . The extent of gains for India is in between that of Bangladesh and the EU (26.1%) .

□□□□

Gay Guluk-Senesen and Umit Senesen

Relative Price and Technology Components of Import Liberalisation in Turkey 1973-1996

Turkey switched from import substitution to import liberalization in 1980. This paper studies the effects of this change on intermediate imports with respect to two components relative prices and technology (structural change). The underlying input-output methodology involves decomposition of import requirements with respect to both origin and destination sectors. The novelty is a further decomposition of these components with respect to relative price effects and technology effects. Input-output tables for 1973 and 1996 constitute the database. We treat the year 1973 as representing the pre-liberalization period. The year 1996 represents the end result of import liberalization. In assessing the overall change in the intermediate import requirements during the liberalization period, the focus is on the components of this change. Dependency on imported energy and technology characterises both pre-1980 era and post-1980 liberal era. Currently leading export sectors like Agriculture, Textiles- Clothing, and Food-Beverages emerge as import dependent sectors. Besides, sectoral prices varied in a very wide range from 1973 to 1996; relative prices are far from being uniform. Petroleum products sector is the outlier sector with highest price increase. Accounting for this determinant provides a better tool for assessing the underlying technology component of the altered pattern of import requirements.



Session II.4.2, Tuesday, 16:00-17:30
Room: Meeting room 1 at Run Run Shaw Conference Center
Environmental Impacts in Input-Output Framework
Chair: Wang Jin-nan



Gloria P. Gerilla, Kardi Teknomo and Kazunori Hokao

Technological Changes in Japanese Housing and Its Effects on Carbon Emissions

Population growth has led to the conversion of resource-related land uses, such as agricultural lands, to urban related land uses, like housing. Urban development has made life convenient and comfortable. Travel has become faster, communication has become easier. However, there are externalities that we need to face due to urban development; Externalities such as overcrowding of cities which leads to continual expansion of the city (suburbanization) ; traffic congestion; and the environmental quality is worsening. One aspect of urban development is the construction of residential housing in cities. This paper tries to study the changes of carbon emissions induced by housing construction. To be able to assess the future requirements of society in terms of infrastructure facilities and its sustainability, a study on the historical changes of carbon emissions and the relationship of material requirements to emissions are necessary. The focus is on the technological evolution of Japanese housing to be able to assess its environmental impacts and to be able to recognize the material and energy requirements of housing construction that contribute to the total carbon emissions from housing. The main contribution of the paper is the environmental evaluation of the housing construction system. Moreover, carbon emissions from housing will be

one of the results from the study. The Input-Output Approach coupled with Structural Decomposition Analysis (SDA) is used to analyze the impacts of Japanese residential housing to the environment. The changes in construction technology, emission structure are studied in this paper. It can be shown that these changes contribute to the fluctuations in the carbon emissions from residential housing during the 15 year study period.

□□□□□

Yang Wei and Niklaus Kohler

Analysis on Mass-Energy Flows and Environment Impacts of the Construction Sector of China

Input output analysis has been applied as a top-down approach to deduce energy-mass flows and environment impacts of building stocks in the recent years. It provides complementary data in the national and regional scope, which couldn't be covered by inventory analysis.

China is undergoing rapid modernization and urbanization processes. A large quantity of buildings is being constructed every year, accompanied by massive demolition of old buildings. The transportation system and infrastructure are under pressure. This paper analyzes the evolution of the general energy-mass-monetary flows of the construction sector in China using input-output tables and the national accounts from 1987 to 2000. Recent I/O tables of China are only in monetary value, which could be converted into physical (mass) values using average product prices. Energy flow and environmental impacts of a specific sector can be computed based on the total input amount of the energy products. It is also possible to forecast the potential effects on the other sectors due to the change of final demand for or intermediate input into the construction sector.

Further more, environment impacts of the life cycle of the building stocks in China are modeled and computed, including resource consumption, greenhouse gases emission, solid wastes discharge, water and air pollution. Household (residential) consumption is also considered because a major part of it is due to operation (electric power, heating, etc.) of buildings.

The major system limit of the paper is that, the construction sector in China I/O tables consists of building stocks, transportation and mining construction, infrastructures and decoration of buildings. More detailed category within the sector is not available yet. Waste from demolition of buildings is also difficult to be calculated.

□□□□□

Kakali Mukhopadhyay

Environment and Poverty in India An Input-Output Approach

In India, air pollution is restricted mostly to urban areas, where automobiles are the major contributors and to a few other areas with a concentration of industries and thermal power plants. The major pollutants are CO, SO₂ and NO_x. The major sources of air pollution in the country are industries (toxic gases) , thermal power plants (fly ash and sulfur dioxide) and motor vehicles (carbon monoxide, lead, and particulate matter) . Major polluting industries and automobiles emit tonnes of pollutant everyday thereby putting citizens to great health risks. Already Delhi has attained the dubious distinction of being the fourth most polluted city in the world. Among the 14

highly polluted cities in India Calcutta and Howrah scores the prominent position regarding annual concentration of SPM, SO₂ and NO_x.

Incidence of poverty is high in India and about one third of the population is below poverty line that is largely affected by environmental hazards. How far the environmental hazards are caused by different income groups? Thus issue of environment and poverty is a matter of research.

However, very little work has been done on this problem in India. The present paper concerns with this.

The paper estimates the industrial emissions of CO₂ SO₂ and NO_x in India and sources of change is investigated. In addition, it also examines the sources of change of CO₂, SO₂ and NO_x in India generated by different income groups especially by the lower income groups.

To carry out the study the paper uses input-output structural decomposition analysis (SDA). Extension of the model incorporating different income groups is done. The study covers the period of 80s and 90s. Findings and policy options are presented in the paper.



Session II.4.3, Tuesday, 16:00-17:30
Room: Meeting room 2 at Run Run Shaw Conference Center
The Role of Transport Infrastructure in Economic Development
Chair: Cristela Goce-Dakila



Gong Yurong

Input & Output Investigation and Analysis of Railway Transportation Industry in 2002

In 2002, the nationwide input & output questionnaire has been worked out, which happened once five years. The railway transportation industry is an important department which participates in input & output investigation and offers input & output materials. The input & output investigation of railway transportation industry is the prerequisite of input & output analysis and the foundation of working out input-output table in the country. This paper analyses and studies about the data of input & output investigation of railway transportation industry in 2002.

The railway is the lifeblood of our national economy. It is necessary to utilize the input & output method if we want to understand the current development situation of the railway transportation industry of our country in an all-round way, make the development plan in the future of the railway transportation industry. This paper is discussed mainly

1. According to 2002 railway input & output questionnaire, through calculating coefficient, analyse the degree of dependence of the railway to other trades, relation degree among eight departments of the railway (works department, electricity department, power supply, hydroelectricity, maintenance engineering, vehicles, others).
2. Using the summarized materials of input & output investigation in 1992, 1997, calculate the relevant parameter and analyse development trend of the railway transportation industry comparing with 2002 results.
3. Through an analysis of coefficient, study the state of railway transportation industry system with the input & output method, bring forward a series of advices about lowering costs,

increasing benefit, offer basis for development decision of railway transportation industry

□□□□□

Ole Kveiborg

A Comparison of Economic Impacts from Pricing Schemes in Transport A Review of Different Methodological Approaches and the Results They Can Give

This paper aims at describing and comparing a number of studies of the relationship between heavy vehicle fees (HVF) and the economy. Most of the literature on HVF is concerned with the practical implementation of a HVF and the degree of optimal pricing of a proposed HVF. However, it is also of great interest to know the size of the economic impacts of various fees. Using pricing or fees can to a very large extent be compared to infrastructure investment because both change the costs of transport between two locations. It is interesting to note that despite the vast amount of literature devoted to the study of the relationships between transport and land-use and the relationships between infrastructure investments and economic impacts there is only a very small list of contributions to the analysis of the relationships between HVFs and economic impacts. There exist different analytical methods that can be used to provide insight into this relationship. The paper describes how Input-output models, CGE, SCGE and system dynamics models can be used to calculate the impacts.

These approaches are further illustrated with practical examples from studies on the German 'Maut' using the Input-Output approach, studies on the impacts from HVFs in the Northern part of Europe on the Danish regional economy using a regional economic model based on an input-output structure, but taking into account both some system dynamics aspects and SCGE aspects. We further show the impacts from the Northern European HVF case using a pure SCGE approach.

Finally, a discussion of the use of the revenues is included. The revenues raised by the HVF schemes in Germany and in Switzerland are allocated to infrastructure investments. This may give quite different results compared to the impacts arising from using revenues to lower e.g. income taxes. The model approaches should include both effects from introducing the fees and the effects stemming from the use of revenues. The way this can be accomplished in the different is quite different and may thus result in different outcomes as well.

□□□□□

Shoshi Mizokami, Motoki Itose and Cristela Goce-Dakila

Impact of Transport Infrastructure Investment on Regional Economic Welfare A Spatial Computable General Equilibrium (SCGE) 2-Region Model

The main objective of this paper is to analyze the impact of transport infrastructure investment on inter-regional economic activity and regional economic welfare. It seeks to underscore the importance of looking into welfare distribution effects of transport infrastructure investment projects through the usage of an interregional social accounting matrix (SAM) and spatial computable general equilibrium (SCGE). Subsidiary to this, the research aims to (1) discuss the

□□□□

Kim Heon-Goo

Industrial Labor Productivity from IT Innovation: Korea Case 1995-2000

This paper analyzes the labor productivity and impact on employment in Korea as a result of innovation in IT. The information policies implemented by the Korean government, especially after the economic crisis in 1997, were intended to facilitate economic recovery. The industrial responses to the structures for the years 1995 and 2000 through VIO (Variable Input-Output) model are compared by way of labor productivity changes. This comparison is intended to determine whether IT related process innovation was effective during the period prior to the economic crisis and during the post economic crisis of IMF control. The conclusion I have reached is that the development of IT neither improves the labor productivity nor creates employment overall, according to statistical tests. However, by comparing individual industries, we can see that the principal benefits of IT innovation accrue to the manufacturing rather than to the service sector.

□□□□

Christian DeBresson

Innovative Poles and Innovative Holes in China during the Early 1990s : What Input-Output's Can Contribute

The topic of innovative or new technology clusters, agglomerations, poles has been a recurrent one since the 1950s. Geographers, regional scientists, economists and, more recently, sociologists have recurrently taken up this theme. Amnesia, however, seems characteristic of every new generation of researchers, each one failing to fully learn from the shortcomings of the past. Two strands of such research have used input-output tables industrial complexes (and now Porter-Enright's "diamonds") and growth or development poles (Perroux, 1955). A common feature of both of these two strands of research, aside from their technical problems, is their over-optimism and pro-innovation bias. We will argue, however, and illustrate that the unique purchase of using input-output to identify the economic location of innovation clusters is to point spatial disparities. The polarization of innovation is not only an outcome of economic rationale but, in return, a powerful factor of disparity and regional distortions. We use an 1993 provincially and industrially representative 10% stratified random sample innovation survey (designed with the advice of the author himself) which enables to compile provincial innovation matrix (DeBresson et al., ESR, 1994, 1996) the industry of origin and use. We then compare the inter-industrial flows of innovative goods with the corresponding 1992 provincial input-output tables for China. Using simple calculations and methods (which do not stretch the reliability of the data) , we thus localized for UNIDO in geographic and economic space the areas of relative strength and weakness in innovative activity in China at that time (DeBresson et al., 2001) . The mapping points simultaneously to three (or four) powerful innovative poles as well as surrounding innovative waste lands, deserts, and holes. The descriptive evidence suggests systematically that innovative poles may be themselves the agents of even greater disparities. Repeated casual observations on the ground reinforces the credibility of this hypothesis.



Session II.4.5, Tuesday, 16:00-17:30
Room: Meeting room 4 at Run Run Shaw Conference Center
Structural Change and Economic Development III
Chair: Kazuyuki Motohashi

□□□□

Ki Seok Byun and Chong Gui Kim

Analysis for the Factor of Growth of Korean Economy 1975~2000

This paper examines the trend of growth and changes in industrial structure of Korean economy for the period 1975~2000 by analyzing the Korean 1975-80-85-90-95-2000 linked input-output (IO) tables expressed in constant prices of 2000. Moreover, we research the factor of growth in Korean economy in the aspect of gross output, import, value-added and employment which are individually divided by domestic final demand, export, substitution of import, changes in technology by using the same linked IO tables.

The results of those analysis show that sustainable growth of Korean economy will be attained by expanding final demand such as export, consumption, investment as well as intensive growing high-tech and highly value-added industry.

□□□□

Natalino Martins

Structural Change and Economic Growth in Portugal An Application of Input-Output Decomposition Analysis

Using the 1995 and 1999 Portuguese tables of input-output, at current and constant prices, an analysis was made about the structure of the economy, including its ability to transform final demand in value added and the factors that explain the growth of GDP and imports. The methodology and main results are presented in this paper.

Firstly, the primary inputs contents of final demand were estimated, what allowed an analysis of its evolution identifying three dimensions and three explaining factors. The dimensions are nominal change, and its decomposition on real change and price change. The factors are change on the productive structure (represented by primary inputs multipliers) , change on the branch structure of final demand, and combined effects of productive and demand structural changes.

Secondly, the nominal, real and price growths of GDP and imports, were estimated and decomposed in five explaining factors or effects change on the productive structure, change on the final demand structure, combined effects of those structural changes, growth of final demand and combined effects of structural changes and final demand growth. Those factors were decomposed according to final demand components final consumption of families, final consumption of public administrations, gross fixed capital formation, other component of internal final demand, and exports.

The results show that the Portuguese economy lost competitiveness and increased its exposition to imports, mainly because of the change on the productive structure and because of the growth of internal prices relative to external prices. This evolution produced a depressive effect on the GDP growth and an expansive effect on imports growth, which implied an increased trade deficit.

□□□□

Pi Qun Qiu

Input-Output Model of Economic Circumstances-Resources Occupation and Its Application Among Western Areas in China

Through working out the input-output table of economic circumstances-resources occupation among areas, such as fig.1, this article analyses the present situation of the western resources circumstances in China, and investigates the restrictive effects on western economic development made by the factors of resources circumstances.

1. Serial Coefficients Model of Economic Circumstances and Its Application Among Western Areas

The quadrants from No.1 to No.8 in fig.1 constitute the model of economic circumstantial serial coefficients. The main column is only the division of the twelve western areas. This model adopts rimmed matrix way to bring environmental pollution and protection into itself. Here the value unit is used by production flow and material object unit is used by environment flow. Then the pattern of the model is object-value. This model has the following equivalent relations:

$$\sum_{q=1}^{12} A^q X^q + \sum_{q=1}^{12} E^q S^q + \sum_{q=1}^{13} Y^q = X \quad ; \quad \sum_{q=1}^{12} F^q X^q + \sum_{q=1}^{12} G^q S^q + \sum_{q=1}^{13} R^q = Q$$

By the introduction of provision coefficients among areas, we can infer economic forecasting model and environmental protection model. Moreover we can analyze the economic circumstantial problems among western areas.

2. Model of Natural Resources Occupation Among Western Areas and Its Application

The quadrants of No.9 and No.10 in fig.1 form the model of resources occupation among areas. According to the information requirement of resources occupation during the practical work, division of the main column of this model is in terms of the four kinds of natural resources. The quantity of resources occupation, Z_{ij}^q , W_{ij}^q , represents the storage of natural resource i, which is occupied by department j among area q. The letter j stands for production department or eliminating pollution department. The patten of this model is object-value as well. Quantity of resources occupation uses object unit and technology of input-occupation-output is adopted here. Then we can engage in the researched of natural resources occupation among western areas under the framework of the model.

3. Calculation of Western Resources Circumstantial Parameter and Its Application

We can calculate a series of resources circumstantial parameters according to the data in fig.1. The following calculating ways are provided for the main parameters.

□□□□

Suwin Sandu and Deepak Sharma

Carbon Dioxide Emissions in the Australian Electricity Supply Industry A Structural Decomposition Analysis

Input-output modeling framework could be used for estimating CO₂ emissions corresponding to primary energy consumed by various production sectors. This framework, therefore, could be employed as a suitable tool for policy analysis at disaggregated level. The use of fixed technical coefficients in this framework, however, limits its applicability for any ex-ante policy analysis. Structural Decomposition Analysis in input-output literature is often applied to analyse sources of change in the pattern of energy use and pollution emissions by means of a set of comparative static variations in key parameters of input-output tables. Hence it can also reveal the magnitude and stability of these parameters over time, information that could be used for developing more flexible technical coefficients for policy analysis. This paper presents an empirical analysis of the structural decomposition approach to identify the contribution of various factors to changes in the level of CO₂ emissions in the Australian electricity supply industry over the period 1980-99. The paper explicitly decomposes changes in CO₂ emissions into different contributing components direct primary energy intensity, interfuel substitution, material substitution, investment, and final demand. The results are then compared to understand the nature, extent and sources of change in CO₂ emissions for different electricity generation technologies.

□□□□

Julio Sánchez-Chóliz, Rosa Duarte and Alfredo Mainar

Ecological Impact of Household Activity in Spain A New Approximation to Ecological Footprints

The objective of this paper is to analyse the environmental impact of the Spanish economy by way of seven water pollution and atmospheric emissions footprints. These were obtained on the basis of the Spanish Accounting Matrix for 1999. Only households were taken as an exogenous account, while government, labour, capital and other accounts were treated as endogenous. The data base was obtained from the Spanish Statistical Institute.

The analysis reveals that pollution in Spain is closely linked to food production, energy, extractive industries and paper manufacturing. We show that services, taken as a whole, are major polluters, though this is due to the volume of household expenditure they represent rather than their pollution potential as such. We also show that the Spanish economy avoids a great deal of pollution by importing inputs, which pollute where they are produced.

The ecological footprints, or per capita pollution, are estimated for seven categories of pollution. As might be expected, the values obtained are significantly dependent on income levels and grow in line with them. Nevertheless, where overall income remains the same, poorer households are more polluting than richer ones.

■■■■■■■■■■

Session II.4.7, Tuesday, 16:00-17:30
Room: Room 1505 at Teaching Building No.1
The Relationship between Leontief and Ghosh's Input-Output System Models
Organizer and chair Ezra Davar

□□□□

Rafael Bouchain and Roberto Ramirez

In Vindication of the Gosh model on the Forward Linkages

This paper discusses the pertinent use of the supply driven model, or Gosh model in the calculus of the forward linkages. Its necessary calculate that, and this use in a centrally planned economic situation, or resource-oriented economies as Mexico. Other reason of its use is based in the affirmation of output coefficients are more stable than input coefficients when markets are monopolistic. This is helpful in descriptive analyses of relative forward linkage strength. Although the empirical evidence of there stability it's inconclusive, to indicate the casual effect of a specific type of final demand, and performing an idea of the forward linkages on prices reasons.

In application of Mexico (1996), we needed to create a correctly interpretation for the forward linkages in the Gosh model, and discusses the situation when the production function is abandoned.

□□□□

Ezra Davar

Input-Output System Models Leontief versus Ghosh

In this paper we will discuss the relationship between the Leontief Input-Output system models and the Ghosh model, namely, whether the results of the latter model might be equivalent to the results of the previous model.

Because of that the primary source of misunderstanding and misinterpretation is based upon fundamental differences in the definition and notation of the terms, hence, in the second section the main terms of both the Leontief and Ghosh model's definition and notation are discussed. The central point, here, is the definition of all type of prices and the connection between them. In the third section Leontief's system models of Input- Output are shortly presented. It will put forward the position that there is a necessity to distinguish between the two types of Input-Output systems: a) in money terms and b) Input-Output where physical quantities and absolute (money) prices are separately presented. Following this, the connection between them will be discussed. Ghosh's original supply quantity model and its according dual price model is described in the fourth section. In the fifth section a problem of equivalence between them is discussed. Finally, the last section will summarize and provide some conclusions. The result is that Leontief's Input-Output system model differs from Ghosh's system, therefore they cannot be equivalent. Even in two unrealistic and unusual cases, namely:

(1) When the value added matrix (or the final uses matrix) is a diagonal matrix, and the rate of

change is different for the various factor's latent prices (or category's latent prices) and for the sector's input of factors (or sector's output for categories).

(2) When these matrixes are rectangular and all prices and all quantities, in both cases, are changed by the same rate. Even though the results of these models are formally equivalent, it would be inaccurate to say that these models are equivalent, from the point of view of methodology.

Therefore, to replace Ghosh's quantitative model with the Ghosh price model, as was suggested by Dietzenbacher, is both erroneous and unworthy of consideration.



Session II.4.8, Tuesday, 16:00-17:30
Room: Room 1503 at Teaching Building No.1
Interregional General Equilibrium Models
Chair: Bjarne Madsen



Joaquim Bento de Souza Ferreira Filho

Bottom-UP X Top-Down Regional Modeling A Comparison of the Two Approaches in Modeling Regions Inside Brazil

The choice between the top-down and the bottom-up approaches has always been an issue in regional modeling. The top-down approach is less data demanding than the bottom-up, dispensing off the need of trade matrices between the regions. The results from the national model are split to regions usually according to shares, and the regional solutions do not interact in feedback form with the national solution. These kinds of models, then, are not appropriate to analyze shocks arising in individual regions the causality runs from the national to the regional model.

The bottom-up strategy, on the other hand, comprises the modeling of each region under study as a complete model, and every region is linked to each other through a trade matrix. This approach is suitable to analyze shocks arising at regional level, like for example agricultural supply shocks from some regions inside the national economy. The associated cost is that this approach is more heavily data demanding than the previous one, and, maybe more seriously, demanding on data not usually available, the trade matrices inside the country. This leads to the need to build such matrices based on more or less informative methods, like gravity models.

The purpose of this paper is to examine this issue more extensively, with the aid of two Applied General Equilibrium models built and calibrated with the same set of data for Brazil. Both models comprise 27 regions inside the country, and one is top-down while the other is bottom-up. The main theoretical differences between them are discussed, and the empirical differences in simulating scenarios analyzed. The paper concludes summarizing the pros and cons of the two modeling strategies.



Bjarne Madsen and Chris Jensen-Butler

LINE – An Interregional General Equilibrium Model for Danish Municipalities

The paper gives a mathematical presentation of the interregional general equilibrium model LINE, which is a sub-regional economic model for Danish municipalities.

LINE is an extended version of a simple national general equilibrium model, where space and SAM-actors have been included. The basic structure of the model includes a real circle, showing the conventional Keynesian demand chain, where production is determined by demand, income by production, and private consumption by income. In this circle regional and interregional spillover and feed-back effects and interaction between SAM-actors are included. Further, the basic structure includes a cost-price circle, showing the determination of prices of production by the costs of production, including costs of intermediate consumption, wages and salaries and profits. Sector prices are then transformed to commodity prices by place of production, to commodity prices at place of commodity market place and to private consumption at place of residence. Finally, LINE is closed through a number of links between the real circle and cost-price circle, including equations for the behaviour of the consumers and producers.

Given the analytical solution to LINE, it is possible to evaluate the regional impacts of changes in exogenous variables, such as the transport system or policy instruments. Using model multipliers obtained from the analytical solution the impacts of changes in regional demand and its structure, changes in regional productivity, changes in regional labour market and other regional economic changes are examined. Of special interest are the impacts of changes in regional accessibility, which in the new economic geography literature, is an important factor determining regional development.

□□□□

Morten Larsen, Bjarne Madsen and Chris Jensen-Butler

Modeling Transport in an Interregional General Equilibrium Model with Externalities

In this paper the regional impacts of road pricing on the use of cars are analysed taking into account externality effects from transportation on wages and productivity. In the paper the direct impacts from changes in transport costs on level of wages and productivity (the direct externality effects) have been estimated.

The direct and derived impacts of road pricing have been analysed using AKF's local economic model LINE and include the impacts on regional production, income and employment. LINE is an interregional general equilibrium model, which uses an interregional social accounting matrix (SAM-K) and a regional transport satellite account as the basis for modeling. Additionally, data from a GIS-system (Technical University of Copenhagen) on transport costs have been included to estimate the demand for transport commodities and increase in transport demand and costs due to road pricing.

The direct effects on level of wages and productivity have been included into the model together with the direct effects on commodity prices from road pricing. In the paper the total impacts of road pricing have been subdivided into 3 components 1) The effects on wages of reducing income net of commuting of increasing transport cost by introduction of road pricing, 2) the labour contraction effect from increasing wages through increases in commuting costs, which is a pecuniary externality and 3) the negative effects on productivity of introducing road pricing, which is an agglomeration externality.

In total the impacts of road pricing are substantial. Regions with a high level of average

commuting cost (suburban areas in Greater Copenhagen) suffers most, whereas the centre of Copenhagen suffers least because of short commuting distances. In rural areas impacts are on or just below average because of the low level of road pricing.



Session II.4.9, Tuesday, 16:00-17:30
Room: Room 1506 at Teaching Building No.1
Linkage Analysis I
Chair: Debesh Chakraborty



Guo Jue, Li Qi and Xing Gong Qi

Input-Output Analysis of the Influential Effect of Chinese Financial Development to Economic Growth

This paper has measured and calculated the forward effect and backward effect of the financial development on the basis of the data and basic principles of the Financial Input-Occupancy-Output Tables. It draws a conclusion that the directive effect of the financial development is weaker and demand following function is stronger step by step from 1997 to 2001, and gets the shadow prices of the financial assets occupancy and financing usage by setting up and solving linear programming model. This paper also puts forward some strategies and suggestions for using the financial assets logically and optimizing the resource allocation.



Ali Souri

The Oil Export and the Growth Pattern of Iran

The growth pattern of Iran economy mainly depends on oil export. The oil export on the one hand constitutes main part of exports and on the other hand, it provides foreign exchange for imports. The government consumption and investment are also financed by oil export. In this paper, using Fojita and James (1991) method and regression analysis, the effect of volatility and stability in the oil export will be considered. The results indicate the growth pattern of Iran has influenced by volatility in oil export. The volatility in oil export has induced the growth pattern via import substitution. This effect is positive in short run and negative in long run.



Pham Van Bo

Construction sector is an important part of every economy in the world. It is more so of developing countries like India and Vietnam. They both are developing countries with many similar characteristics. Construction sector includes all types of works that are predominantly of civil engineering nature such as building construction, engineering construction, industrial construction and so on. It is very closely interlinked with other sectors of concerned economy.

The inter-industry analysis reveals that linkage effects of construction sector in both the countries are quite strong. The input-output tables are further used to examine impact of construction investment on income generation and employment generation and reiterate the fact that an increased expenditure in construction sector can create more additional income and employment than most sectors in each country. The observation that type-II income and employment multipliers are quantitatively much higher than type-I points towards the long-term effectiveness of investment in this sector. A noticeable result of this analysis is Vietnamese construction sector lagged behind that of its Indian counterpart during the period of the study requires further understanding and explanation.

The general conclusion of our analysis is that an increase in investment (final expenditure) in the construction sectors of India and Vietnam has the potential of making major contribution to overall income and employment generation in these countries. The results reflect on the desirability of assigning priority to the construction sector for resource allocation – a policy prescription that may help in solving one of the most daunting challenges faced by them and other developing countries.



Session II.4.10, Tuesday, 16:00-17:30
Room: Conference Hall 1 at Run Run Shaw Conference Center
Water as Important Natural Resources I
Chair: Alessandra Alfieri



David Batten, James Lennox and Scott Maves

SESAME-Water A System of Economic and Social Accounting Matrices and Extensions to support Water Policy and Management in Australia

Policy-makers increasingly require integration of social, environmental and economic analyses. Because water is a special economic good, water policy and management is one area in which such integration is urgently needed. This is clearly the case in Australia, where severe droughts often threaten continuity of supply and demand side interdependencies (farmers feeding city dwellers) are poorly understood. This paper describes a system of economic and social accounting matrices and extensions (known as *SESAME-Water*) that should help to clarify the welfare derived from water.

SESAME-Water aims to supplement the existing social and environmental extensions to the National Accounts with additional indicators relating to water (e.g. water quality, ecosystem services) . The representation of key environmental, social and economic processes, attributes and outcomes in greater detail will involve extensions to the national input-output table and the representation of social and environmental processes within satellite accounts. Historical I-O

Clopper Almon

Introduction to Inforum Software

Inforum software is designed to facilitate the process of building dynamic interindustry models. One Windows-based program, called simply G, allows the user to work with a time series of matrices. G can display a row or a column over a number of years, show a table for one year, and graph a cell of a matrix over time. It can convert flows to coefficients, perform RAS balancing and standard matrix algebra, such as matrix inversion, over a series of years. It handles banks of time series data and fits equations to data by least-squares regression, SUR, Hildreth-Lu, ARIMA, softly constrained regression, and non-linear regression. The results include not only the regression coefficients and usual t and F statistics but also the more dependable mexval and normalized residuals, as well as the leverage diagnostic variable and various tests of normality. Most importantly, G is able to combine the resulting regression equations into macroeconomic models, run the models, and analyze the results. The models can be run not only in the standard, one-scenario-at-time mode, but also with stochastic simulation or with optimization of the fit of the model or policy optimization relative to a given objective function. Interdyme, an extension of G for building interindustry models, offers the user a matrix language that can be used in the construction of models that integrate input-output analysis with regression econometrics. Optimization of fit and policy is also available in these models. Interdyme models can be built and run without ever leaving the G window. Besides the extensive graphics capabilities of G, there is a tabulating program for producing tables that compare various runs of a model. G is available free on the Internet. The Interdyme extension is available without cost to partners in the international Inforum system of connected interindustry models. Many of these capabilities, both elementary and advanced, will be demonstrated.

□□□□

Somprawin Manprasert

Optimization in Dynamic Interindustry Models Built with Inforum Software

TIDY, the Thai Inteindustry DYnamic model, is built with the Inforum software. Building it required, not surprisingly, solution of a number of problems posed by incomplete and sometimes inconsistent data, complicated by a major economic crisis in the recent history. Of particular methodological interest, however, was the use of the fairly new optimization features in the Inforum software. First, systemic optimization was used on parameters of some of the equations to make the entire model fit well over the historical period. While classically trained econometricians are inclined to regard FIML estimates as ideal, the truth is that FIML considers lagged values of endogenous variables as known, predetermined quantities when, in fact, they depend on the parameters being estimated. Fitting through system optimization recognizes the dependence of these values on the parameters being estimated. Small changes in the values of the parameters have been found, in the case of TIDY, to make large improvements in the fit of the model.

Once the parameters have been established, essentially the same capability of the software allows the user to specify a welfare function (or a misery function) and adjust policies to optimize of the performance of the economy relative to that function. For example, the misery

Evening Courses on Tuesday 19:00-21:00

19:00–20:30

Room: 1505 at Teaching Building No.1

Course 2A:

Mark Planting

Methodological Overview of Construction of I-O Accounts, special focus on the U.S. accounts

The purpose of the session is to provide training to IIOA members from other countries on how the U.S. prepares its input-output accounts. The session will include a presentation of the steps used to construct the U.S. input-output accounts, the sources of data available and how they are incorporated, and the relationship between the input-output accounts and the national accounts.

or

19:00–21:00

Room: 1506 at Teaching Building No.1

Course 2B:

Susana Santos

Social Accounting Matrix and the System of National Accounts: An Application.

The purpose of the session is to show how the System of National Accounts and the input-output tables are used to construct a Social Accounting Matrix, as applied to Portugal.

Thursday, June 30, 2005

PARALLEL SESSIONS IV.1 (9:00-11:00)



Session IV.1.1, Thursday, 9:00-11:00
Room: Meeting room 1 at Run Run Shaw Conference Center
Compiling Supply and Use Tables (SUT) and Input-Output Tables (IOT) (II)
Organizer and Chair Csák Ligeti

□□□□

Peter Ritzmann

European Union Input-output Data

Eurostat, the Statistical Office of the European Communities, collects data mainly for the Member States of the EU. Specific regulations fix the framework for the data provision and interchange within the European Statistical System and thus foster the standardisation and international comparability of European statistics.

The European System of Accounts, ESA 95, established the collection of supply, use and input-output tables since the end of 2002. In the meantime Eurostat has a comprehensive library of tables in stock. The statistics are available free of charge via download from the Eurostat website or can be received upon request on a CD-ROM.

The presentation shall provide an overview on the structure and contents of the data offered. It shall as well inform about the scope of Eurostat's work in this domain.

□□□□

Carlo Driesen, Erik Hoogbruin and Brugt Kazemier

From Supply and Use Tables to Input-Output Tables and Vice Versa

In 1991 Statistics Netherlands introduced the supply and use tables as part of the National Account. Since then, the supply and use tables are the main statistics on the production structure of the Dutch economy. They form the basis from which the input-output tables, which are relevant especially for analytical purposes, are derived.

Currently, there is a time-series of supply and use tables for the period since 1987. However, there was a need for a time series since 1970. If such a time series was available, benchmark revisions of the time series of the National accounts could become far easier. Therefore a method was developed to derive supply and use tables from input-output tables, which are available from 1969 onwards. This paper describes both, the current practice of constructing input-output tables from existing supply and use tables, as well as the new methodology to go the other way round.

□□□□

Mária Forgon and Csák Ligeti

Integration the Hungarian SUT/IOT and the National Accounts

Hungary has been working on the introduction of ESA'95 rules concerning the SUT and IOT framework for several years. Based on these improvements the SUT at current prices have been compiled since 1998 regularly. As a result of the Dutch-Hungarian co-operation the simultaneous compilation method of SUT at current and constant prices are implemented from the year of 2000.

The aim at this paper is to describe the next step of the improvements that is the integration of SUT into the traditional National Accounting System. First an overview is given on the background that led to development of the accounting framework. The integration can be achieved in two ways fully and by "a softer method". In the first way there is only one simultaneous compilation process, in the second way the integration means basing provisional NA calculations on the – latest available – SUT, and later revising them with the SUT for the reference year to get the definitive NA figures. The future plan is to build up a fully integrated, more standard, transparent and more reliable accounting framework of NA figures, but it can be done step by step. In this paper particular attention is given to the integration of business statistics into the NA system by creating a new intermediate database for NA as an important step to reach the target.

□□□□

Iljen Dedegkajeva and Reelika Parve

Compilation of Product-by-Product IOT for Estonia

One of the most frequently discussed method for compiling product-by-product input-output tables is the method based on product technology assumption, recommended by ESA 1995. This paper deals with the Estonian experience in the derivation of such kind of input-output table. In practice, the application of the product technology assumption frequently leads to negative, although often small flows in the transformed input-output matrix, the adjustment of which is quite time and effort-consuming.

The paper presents the results of a product-by-product input-output table compilation based on the product technology assumption. In this study, two different approaches are used. The first one is the Almon Clopper's algorithm that avoids negative entries when compiling input-output tables; another input-output matrix is calculated with the standard product technology method and contains a certain number of negative values. These two tables are compared and the largest negatives appeared in the second transformed input-output matrix are analysed.

■■■■■■■■■■

Session IV.1.2, Thursday, 9:00-11:00
Room: Meeting room 4 at Run Run Shaw Conference Center
Social Accounting Matrices in Southern Africa
Organizer and Chair: Glenn-Marie Lange

□□□□

James Thurlow

Diversification and Poverty-Reduction in Zambia An Economy-Wide Approach

The paper uses a SAM-based regionalized dynamic CGE-micro model for Zambia to contrast alternative pathways to economic diversification in terms of their ability to generate pro-poor growth. The SAM and CGE model were developed under the MERRISA project (Macroeconomic and Regional Integration in Southern Africa). Special features of the model include its focus on agriculture (13 agricultural commodities), the consideration of non-monetary accounts, own household consumption, and the separation of marketing margins on domestic products, exports, and imports. Two features dominate the Zambian economy agriculture and its dependence on copper mining. The paper considers measures to reduce poverty by removing constraints to increasing agricultural productivity and the expansion of agro-processing industries. These measures reduce poverty directly by increasing agricultural incomes, but also reduce the vulnerability of the poor by reducing dependence on incomes from copper mining, whose volatile world price creates economic instability. The paper also considers the impact of external shocks due to changes in world copper prices.

□□□□

Glenn-Marie Lange and Jon Barnes

A Social Accounting Matrix for Tourism in Namibia

Ecotourism has been identified as an important way to promote sustainable economic development, providing income from sustainable management of natural resources and wilderness areas. Increasingly, ecotourism is also being promoted as a strategy for pro-poor economic growth and poverty reduction. In Namibia, international tourism, primarily ecotourism, is the third largest export, accounting for 10% of GDP in 2002, and there is a substantial domestic tourism industry as well. Namibia has set aside nearly 15% of its total land area as protected areas, and a growing share of land under traditional tenure as well as private ownership is being devoted to ecotourism.

This study analyzes the contribution of ecotourism to poverty reduction and sustainable development, focusing on the two major components of the ecotourism industry tourism in protected areas and tourism in the lands under traditional tenure. A SAM is used to measure both the direct, local impacts of tourism as well as the larger economy-wide impacts. The Namibian SAM was expanded to represent 8 different types of tourism enterprise. The number of factor inputs was increased from 5 to 7 to represent 1) labour hired by tourism activities from local communities, and 2) rents and royalties paid to local communities for access to their land and wildlife for viewing or hunting. To provide this new data, extensive surveys of tourism enterprises were conducted. The survey data were used with information from the 2003 Tourism Industry Survey to scale up the survey data to national data.

□□□□

Anemé Malan

Compilation of a Social Accounting Matrix according to the 1993 System of National Accounts The South African Experience

South Africa has recently constructed a SAM for 1998 using the new framework for SAMs based on the 1993 SNA. The paper discusses the issues that arose from implementation of the new framework, and how the resulting SAM differs from earlier SAMs for South Africa. The SAM

includes only 30 products and 27 industries, but, in keeping with the new policy concerns, it provides extensive information about the generation and distribution of income. Labour income is disaggregated into 55 categories (11 occupations x 5 racial groups) and households are disaggregated into 100 categories (20 households ranked by percentile of income distribution x 5 racial groups).

□□□□□

Scott McDonald, Cecilia Punt and Melt van Schoor

A Multi Region Social Accounting Matrix for South Africa

In many large and/or economically diverse countries it is not possible to do full justice to the complexities of economic interdependencies in a single region Social Accounting Matrix (SAM). This is especially relevant in South Africa where both the uneven distribution of natural resources and the historical development of the country have conspired to produce a country where the distributions of economic activity and people are seriously distorted. In such circumstances a conventional SAM, which treats a country as a single entity, will fail to provide either a complete description of economic relationships while proving an inadequate basis for the modeling of a range of economic policy issues. In this paper the development of a multi regional SAM for South Africa, which seeks to address some of these concerns, is reported.

The resultant SAM consists of four regional SAMs with a full articulation of the trade and transfer relationships between each region and for each region with the rest of the world. In addition the SAM identifies nationwide institutions – principally central government and incorporated business enterprises – that do not have region specific identities but interact with all regions. A major feature of the SAM is the large numbers of household (180) and factor (160) accounts. This feature reflects the importance of labour markets and income distribution in contemporary analyses of the South African economy; in particular the detailed coverage of households and factors facilitates the use of the SAM in the analyses, *inter alia*, of the effects of changes in the economic environment and/or policies upon employment, income distribution and inter regional migration. The development of this SAM has had to confront substantial problems associated with shortfalls of information. To confront these difficulties recently developed techniques in maximum entropy estimation have been used to estimate a stochastic SAM; these techniques, combined with very developments in non-linear programming algorithms, have made it possible to estimate a balanced SAM of a scale that would not have been possible a few years ago. In the process a SAM is produced that is a response to the challenge, by Thorbecke in *Economic Systems Research*, to produce a stochastic SAM.

■■■■■■■■■■

Session IV.1.3, Thursday, 9:00-11:00
Room: Conference Hall 1 at Run Run Shaw Conference Center
New Approach in Regional Modeling and Their Applications in the Analysis of China's
Regional Development (I)
Organizers Karen R. Polenske and Zhi Wang
Moderator and Chair Karen R. Polenske
Discussant Dianqing Xu

□□□□

Patrick Canning and Zhi Wang

A Flexible Mathematical Programming Model to Estimate Interregional Input-Output Accounts

This study implements and tests a mathematical programming model to estimate interregional, inter-industry transaction flows in a national system of economic regions based on an interregional accounting framework and initial information of interregional shipments. A complete national IO table, plus regional sectoral data on gross output, value-added, exports, imports and final demand are used as inputs to generate an interregional input-output system that reconciles regional market data and interregional transactions. Desired theoretical and empirical properties of the model are discussed in details. The model is tested by a 4-region 10-sector example against data aggregated from a multi-regional global input-output database and test results from seven experiments are evaluated against eight Mean Absolute Percentage Error indexes. It shows that the model has remarkable capacity to discover the true interregional trade pattern from highly distorted initial estimates. The paper also discusses some general guidelines for how to implement the model to a large dimension multi-regional account based on real national and regional statistic data.

□□□□

Zhan Guo and Karen R. Polenske

Evaluation of Yellow-Dust Storms and Countermeasure Policies in North China Using Regional and National Input-Output Models

The frequent yellow-dust storms in China in recent years have widely disrupted economic activities, destroyed farm land, and created a great hazard to human health. This natural hazard illustrates typical sustainability issues, such as over-exploration of natural resources, environmental deterioration, unbalanced rural-urban development, and cross-boundary environmental justice, that face most developing countries. Meanwhile, there are various programs with vast investment from different levels of government to prevent, protect, and mitigate the impact of yellow-dust storms. However, the interactions among yellow-dust occurrences, economic production, natural resources, and policy initiatives have not been well studied. By including the four elements into an analysis framework, we investigate (1) how the over-consumption of natural resources induces yellow-dust occurrences; (2) how this over-consumption causes long-term damage to various industrial sectors; and (3) how policy initiatives can yield the most cost-effective result in both economic and environmental terms. In particular, we examine the role of forestry, water, and land resources on yellow dust formulation using regression analyses. Also, we analyze the contribution of timber flow, water consumption, and land occupancy to economic production using input-output (I-O) models and environment accounting (EA) methods. Then, we investigate the economic and environment benefit of policy initiatives, such as reforestation, watershed management, soil and water conservation, tillage regulation, and grazing controls.

□□□□

Li Shantong and He Jianwu

A Three-regional Computable General Equilibrium (CGE) model for China

This paper describes a three regional CGE-model for China which focuses on the trade and environmental issues. China is a large country composed of more than 30 provinces and autonomous regions with different natural resource, comparative advantage and stages of economic development. It is important to introduce a degree of geographic differentiation into the analysis of China's issues that would be not suitable by a single China-wide model. This paper presents the technical specification of a three-regional CGE model for China.

The three-region Chinese CGE model described in this paper is an extension of the two-region Chinese CGE model that had been Development Research Centre, PRC. To build the three regional (Guangdong, Shanxi, and rest of China) CGE model, 2 typical provinces are chosen, the first one is Guangdong province, the other is Shanxi province. Guangdong province locates in southern China, neighboring Hong Kong and Marco. As one of the largest economies in China, it accounts for nearly 35 percent of China's foreign trade in 2003. The development of Guangdong since 1978 and its economic structure could be a representation of China's coastal area. Shanxi, the "Coal Warehouse of China", locates on the middle of North China. The output of coal in Shanxi ranks the first in China and accounts for nearly one-fourth of the country's total. According to the UNIDO technique classification, resource-based manufactured export account for 61.94% of the total manufactured export in 2000. Shanxi province is an important energy base for China and energy intensive industries play an important role in the whole economy. The emission of pollutants per unit industrial GDP is more than 2 times of national average level, even for some pollutants about 5 times. Therefore, it is important to have it in the model for environmental analysis. The regional disaggregation in three-region CGE model makes it possible to assess the impact on coastal and inland areas of trade and environmental policy or other policy reforms.

To build the three regional CGE model, this paper focus on the two issues one is the estimation of interregional trade, the other is improving the environment module in model. Different from the two-regional model and a single China-wide model, the interregional economic linkage is more complicated. Bilateral trade between regions is replaced with triangle trade. The estimate of the trade flows among regions is one of the most relevant problems in building multi-regional economic model for policy analysis especially because the most common situation is lack of data on that trade. In China, interregional trade is not covered by official statistics. The structure of the paper is as follows

In the first part, the background of the three regional CGE model is introduced.

In the second part, more attention is given to the estimation of interregional trade with indirect method because of lacking of "real data". Based on the interregional trade estimation and data from other sources, the three regional SAM for China is constructed.

In the third part, the discussion will concentrate on the environmental part of the model. It adds emission factors describing emissions of CO₂, SO₂, NMVOC, NO_x, PM₁₀, CH₄ and N₂O. Furthermore, factors indicating the impact on ambient concentration and exposure are added. The impact on human health and preferably other environmental end-points like crop damage and material damage are also incorporated.



Session IV.1.4, Thursday, 9:00-11:00
Room: Room 1505 at Teaching Building No.1
Applications and Related Issues in INFORUM System
Organizer and Chair Toshiaki Hasegawa

□□□□

Maurizio Grassini

The Difference of CGE Modeling and INFORUM Approach

The INFORUM multisectoral model and the Computable General Equilibrium (CGE) modelling approaches are presented and compared. The INFORUM approach has been developed at the University of Maryland while the CGE approach has many birthplaces. The first stems directly from the Leontief's thought; the observation and the measurement of the economy come first, then the working of the economy is investigated by means of time series regression analysis. The Leontief legacy implies that the input-output table is part of the statistical basis of the model; however, the INFORUM model covers also the modelling of those macro economic variables usually considered in the macro econometric models; hence, national income and product accounts belong to the data base supporting the empirical structure of this model. This means that the INFORUM approach is much more than a simple "input-output plus econometrics" model.

The CGE model has been developed in many places; nevertheless, it has distinctive features. The input-output table is commonly recognized as its statistical basis, but it plays the role of a micro representation of the economy as shaped by the theoretical neoclassical framework. The neoclassical paradigms prevail on the observed working of the economy. The quantitative representation of a CGE model is obtained by means of the "calibration" method, which remains a distinctive and compulsory feature of this modelling approach. "Calibration" is a procedure to give a quantitative feature to an economic model "observing the literature", not the observable economy. The CGE sounding economic theoretical foundations - which are strictly neoclassical - should provide and even assure the quantitative representation of the economy. In this perspective, a CGE model is not submitted to any test.

The INFORUM model has economic theoretical foundations as any quantitative model built and designed to understand the working of the economy, so that the model performance is necessarily evaluated and tested against the observed economy.

□□□□

Wang Yinchu

The Impact of Free Trade between China and Japan on Chinese Economy

After getting into WTO, a further issue in prompting foreign trade is to establish free trade agreement between two partner countries. By using Input-Output based multi-sector models MUDAN, which has 59 sectors and describes Chinese economy, and JIDEA, which has 100 sectors and describes Japanese economy, an analysis of free trade between China and Japan was simulated. This paper presents the mechanism of the linkage between the two models and the impact on Chinese economy if there is free trade between China and Japan.

□□□□

Mitsuhito Ono

Simulation of Japan-China Regional Economic Arrangement

Japan Inter-industry Dynamic Econometric Analysis model (Jidea) has been developed since 1991. This model has an Input-Output structure which currently comprises of 102 industrial sectors. This model is especially suitable for the simulation analysis at industrial levels as its nature.

These days many FTA agreements became effective, and the effects of such agreements come to popular concerns. To evaluate the effects of FTA once established between China and Japan, we linked our Japanese model with our partner's Chinese model, Mudan. In this paper, we will focus on the methods to link the two models first. Then the results of trades created after the removal of tariffs will be shown.

□□□□

Douglas Nyhus

China: An Input-Output Modeling System

This paper reports on the construction of a 29 province 33 sector interregional input-output model for the year 1997. The model is fully consistent with the reported provincial accounts of China. Two provinces (Hainan and Tibet) are omitted from the work because of a total lack of data. For each province it distinguishes four categories of final demand: household consumption, government consumption, capital investment and inventory change. Value added is broken into four primary factors: wages, depreciation, profits and taxes. Trade is broken into four categories: foreign exports, domestic (exports to other provinces) exports, foreign imports and domestic imports. Matrices showing the bilateral trade between provinces have been estimated for each of the 33 sectors.

■■■■■■■■■■

Session IV.1.5, Thursday, 9:00-11:00
Room: Conference Hall 2 at Run Run Shaw Conference Center
CGE Models Applied in China

□□□□

Lin Sun

The linkage of Shanghai Economy with the Rest of China and the World market - Input-Output and CGE Model Analysis

The purpose of this paper is from the point of the view of Shanghai economy as a demand market and supply market, to examine the linkage of Shanghai economy with the rest of China and the world market in the past few years by using the data from 1997 and 2002 Shanghai Input-output tables, and to simulate the linkage of Shanghai economy with the rest of China and the world market in the period of 2002 to 2010 by making use of a 14 sectors dynamic Shanghai economy Computable General Equilibrium (CGE) model. Results indicate that Shanghai economy has entered in the stage depending on the accumulation of capital not the growth of the labor to expend its produce capacities. The essence of Shanghai economy is still a producer and not the consumer of the end goods. From the side of the rest of China, Shanghai economy is an acceptable supply

market and not an acceptable demand market, but from the side of the world market, Shanghai economy is good in both. Because of the high degree linkage with the world market through import and export in two-way, in addition the large demand market of the rest of China, Shanghai economy has the capacities to sustains the shock of the change of exchange rate.

□□□□

Zhang Jin Shui and Hao Xiao Hong

The Optimal Growth Solution for the Multi-sector Nonlinear Dynamic Input-Output Model and the Dynamic Computable General Equilibrium Model

In this paper, the linear Leontief input output model is extended to the nonlinear dynamic multi-sector model. It can also be considered as the dynamic computable general equilibrium (CGE) model. The method is proposed for calculating the growth rate, the profit rate, the prices of goods, and the levels of production when this system is in the optimal growth path. The relations between the Leontief IO model and the nonlinear dynamic CGE model are discussed. We can get some usual calculating results by using this model and Chinese practical data

□□□□

Wang Fei, Guo Songhong and Mitsuo Ezaki

Labor Migration and Regional Development in China A Regional CGE Analysis

Labor migration between regions steadily expanded in China in her process of transition to the market economy, being accelerated recently by the liberalization of registry system for migrants to the cities of lowest level. From the point of view of liberalizing labor mobility between regions, we have analyzed the problem of regional development in China, especially that of wage and income disparity between regions, quantitatively by using a regional CGE (Computable General Equilibrium) model of the Chinese economy, which links 30 provincial models of 7 industrial sectors. We have applied the link system to both comparative static analysis of 1997 and comparative dynamic analysis of 1997-2010, from which we have derived quantitative implications on desirable relations of the three key concepts in regional development degree of liberalization of labor mobility, amount of labor migration and reduction of wage and income disparity between regions. We have confirmed also desirable impacts of government investment policies in favor of the provinces in the western region, allowing for changes in comparative advantages due to labor migration and discretionary investment.

□□□□

Mingtai Fan, Yuxin Zheng, Shuchang Qi and Jie Chen

A Dynamic CGE Model for China's Agricultural Policy Analysis

The problem in a CGE-based agricultural policy analysis is the constraint in agriculture related

information in China's input-output tables. In this paper, a dynamic computable general equilibrium model is detailed as a tool for China's agricultural policy analysis. By decomposing the agriculture and foodstuff sectors further using cross entropy approach, we estimate and update China's input-output table in 2000. Based on this updated input-output table, a China's dynamic CGE model is calibrated to the base year 2000. An example is presented, applying the dynamic CGE model to evaluate the impact of agriculture-related tax policy reforms on Chinese economy.



Session IV.1.6, Thursday, 9:00-11:00
Room: Room 1504 at Teaching Building No.1
Agriculture Industries as Key sectors
Chair: Debesh Chakraborty



Taye T. Amos

Determinants of Technical and Allocative Efficiency Among Small-Scale Maize Farmers in Nigeria.

A study was conducted to examine the determinants of technical and Allocative efficiency of small-scale maize farmers in Nigeria using cross sectional data collected from farmers. The Nigerian Government has put in place efforts aimed at improving productivity of farmers for food self-sufficiency. As a developing country, Nigeria has the potential of feeding her teeming population. Maize is an important food crop that can be used to achieve the objective. Thus it has become imperative to examine the factors affecting the efficiency of the maize farmers.

The Stochastic frontier production function was used to analyse the data collected using a structured questionnaire administered on purposively selected maize farmers in the study area. Primary data were collected using a multi-stage sampling technique, from farmers in villages in Northwestern Nigeria. Results of the data analysis showed a wide variation in technical and Allocative efficiencies among the farmers. This was indicative of ample opportunities for farmers to increase their level of efficiencies in maize production. Farmers were operating at the rational stage of the production system as depicted by Returns to Size (RTS) of 0.11. The technical efficiencies (TE) of the farmers ranged between 0.29 and 0.97 with a mean of 0.67. The study further showed that the coefficients of age and education positively affected technical inefficiency or decrease technical efficiency of the farmers in the study area. These variables are important factors that the government policy should address so as to improve the current level of efficiencies among the small-scale farmers in Nigeria.



Xiaohe Liu Xu Jian, Ping Liu and Benjamin Buetre

Developing an Input-Output Table of China for Detailed Agricultural Policy Analysis

China is a large country with a rapidly growing economy. Although the share of the agricultural

sector in the Chinese economy is declining, agriculture remains an important sector, employing hundreds of millions of people. There is also a considerable movement of agricultural labour toward the fast growing manufacturing and services industries.

Given the sheer size of Chinese agriculture, developments in domestic agriculture have major impacts both in China and also in the rest of the world, with potential for large impacts on global agricultural markets. With the entry of China into the WTO in 2001, and the pursuit of regional and bilateral trade deals both by China and trading partners, the ability to provide an accurate assessment of the potential impact of reforms is imperative.

A number of tools are available for the analysis of Chinese agricultural policy. However, because of the key role of agriculture and its linkages with the rest of the Chinese economy, a general equilibrium (GE) approach is frequently chosen. While this approach is appropriate, the accuracy of the results relies on the validity of the underlying data – especially the input-output (IO) tables. These tables show how products are produced and consumed.

Inaccuracies and misrepresentation in the input-output table can bias the results and lead to misleading or incorrect policy conclusions. For China, the lack of a detailed representation of important agricultural sectors in published input-output tables prevents a more targeted and relevant analysis of agricultural policy change. There are only three agricultural products (agriculture, food and fibre) in China's most recent IO table. Although there is an existing global GE database for China that has a detailed agricultural sector, the product representation and the costs and sales data in the database vary substantially from that indicated by other data sources.

In this paper, we build an alternate IO table with representations of important agricultural sectors for China. We use local knowledge of production and sales structure and other published data to construct the relationships between inputs and outputs in agriculture and the flows to and from agriculture with other industries.

We discuss the various techniques in constructing the data and highlight the characteristics of the agricultural IO flows. Many of these characteristics are unique to China. By incorporating this revised IO structure into a CGE model, it is hoped to provide a richer understanding of Chinese agriculture and improve on existing estimates of the impacts of agriculture-specific domestic and international policy changes.

□□□□

Guan Qingsheng and Zhang Dongping

On the Harmony of Agriculture with Economy The Henan Province Case

In this paper we propose an empirical method to evaluate the harmony of the agriculture with the economy, based on a set of coefficients. Induction Degree Index (IDI), Force Degree Index (FDI) and Elicitation Degree Index (EDI), which are all extracted from the Leontief inverse matrix, are employed in the analysis. By these instruments and the Henan Provincial Input-Output Tables (1992, 1995, 1997 and 2002) we have analysed the coherence of the agricultural production structure with the economic final demands structure, as well as the coherence of agriculture as a unitary sector with the whole economy (all the sectors, including itself). The results show that Henan's agricultural production structure has got optimized, which was more and more suitable to the economic demands. But some inharmony are still exists. We also give some proposals for the adjustments on Henan's next-step agricultural production structure.

results indicate that the use of capital stock in efficiency units does cause some smoothing of Total Factor Productivity growth over time. In the 1950s, when investment accelerated, the vintage-adjusted capital growth rate well exceeded the BEA growth rate, and vintage-adjusted TFP growth is significantly lower than unadjusted TFP growth. The measured productivity slowdown of the 1970s is somewhat ameliorated.

□□□□

Hiroshi Izumi and Jie Li

Productivity Growth in Japanese Economy by Industry —A Estimation through Total Labor Productivity and Total Factor Productivity

A frequently used expression for productivity growth is the following, which is based on trans-log production function.

$$(1) \quad TFP = \frac{Y_1 - Y_0}{Y_0} - \frac{1}{2} \sum_i (w_{1i} + w_{0i}) \frac{X_{1i} - X_{0i}}{X_{0i}}$$

While we will estimate productivity growth rates in Japanese economy 1960-2000 by industry through this expression, we will measure them using another method, that is, total labor productivity. And we will compare and analyze them.

Total Labor Productivity (TLP) takes “indirect labor productivity” as well as “direct labor productivity” into consideration. That is to say, TLP combines “direct labor productivity” and “indirect labor productivity” which includes the labor productivity to produce “materials” and “fixed capitals”. Okishio, who died in November 2003, and Morishima, who died in July 2004, re-formulated the framework of Marxian economics in terms of mathematical economics, which is well-known in the world. Indeed TLP is an application of Marxian equation of labor value formulated by Okishio, Morishima and others, TLP, however, is not a characteristic conception in Marxian economics; for example, Dalgaard, Mathiasen and Thomsen of “Statistics Denmark” calculated TLP in their paper “System Productivity Time Series for Denmark 1966-96” prepared for IIOA conference given at Macerata Italy in 2000. TLP can be regarded as one of general productivity indicators like Total Factor Productivity (TFP).

Total labor required to produce one yen value, can be calculated by solving the following simultaneous equation system consist of the equation (2), (3), and (4). Then, TLP is defined as the reverse value of the total labor required.

$$(2) \quad l_j = \sum_{i=1}^n (a_{ij} + b_{ij})l_i + r_j l_m + L_j \quad (2') \quad 1/l_j \quad \text{Total labor productivity}$$

$$(3) \quad l_m = l_e$$

$$(4) \quad l_e = \sum_{i=1}^n k_i l_i$$

l_j total labor per unit of j commodity coefficient

a_{ij} domestic intermediate input

b_{ij} fixed capital consumption coefficient

L_j direct labor coefficient of j

Session IV.1.8, Thursday, 9:00-11:00
Room: Room 1104 at Teaching Building No.1
The Compilation and Application of Input-Output Table in China
Chair: Xianchun Xu

□□□□□

Ping Fan

The Current Status of Input-output in Xinjiang Region and the Deliberation for Its Application

Input-output is an integral part and one of the major approach of the national accounting work, which is playing an important and unique role in the macro-economy management. Under the strong support and correct guidance of the National Statistical Bureau, we have respectively prepared the Input-output Tables for years 1987, 1992, 1997, and 2002, which were done with the framework and method basically similar to that of the National Statistical Bureau. For many years, due to lack of qualified personnel and staff, shortage of advanced technology, and insufficient funding , the development of Input-output application and analysis has been carrying out unsatisfactorily, and the well-prepared Input-output tables with great efforts and lots of input of human and finance resources have turned to be the historical data. In this connection, the Input-output would surely be facing serious challenge of existence and development. To bring about a favorable situation for the Input-output development, we have made tremendous efforts and done a great deal of job. For example, through the consultancy and cooperation with some domestic science research institutions and universities, and by using the mobile multi-objective Input-output approach, we have conducted the analysis and research and provided the helpful data and information for preparation of “Xinjiang 11th FYP” ,and this is highly appreciated by high ranking officials of the local government, and therefore the Input-output approach has gained its position and been accepted socially . We have also written the article “The Positive Roles of Investment, Consumption and Export Plaid in Accelerating the Xinjiang Economy ”. Based on relevant data and information, the article carefully analyze the actual condition of the local economy and differentiate overall imports from out-of-country import to out-of-region import, and further more the out-of-country import consumption and out-of-region import consumption , and the out-of-country import investment and out-of-region import investment, and finally calculated the real investment and consumption of the local, by deducting the portion of out-of-country and region from the overall investment and consumption, so as to calculate the shares of the Three Demands in GDP and the contributing rate of those to the GDP augment. By using the latest Input-output table analysis and estimation data, the Article has also conducted the study of initial GDP effect, indirect GDP effect and final GDP effect by increasing unit demand, so as to identify the rather bigger industries which take a large portion in Three Demands to accelerate the GDP. And from this, some peoples mindset has been changed and some misunderstanding cleared up. The program initiated by the statistical departments with the involvement of specialists of universities and research institutions, and with the practical operation of the professional national accounting agencies is a new pioneering way and opens up a bright prospect for the Input-output development and promotion in national accounting work. For the further development of the Input-output in Xinjian Region, your good advice, positive recommendations and friendly cooperation and strong supports would by

kindly invited and greatly appreciated. Only by this can the Input-output in Xinjiang be pushed forward in an all-round way and good social and economical results be achieved.

□□□□

Deyou Zhao

A Solution to Draw up Production Branch Input-Output Tables Improvement to UV Calculative Methods

There are two kinds of classification to branch in input-output accounts. One is Production branch classification, another is industrial branch classification. First, product classification indicates that all products are sorted according to the similarity of the product. Similarity of the product means product's cost mix, manufacture craft and input mix are all same. Industrial branches consist of many industrial activity units, which engage in same or similar economical activity. The added value of main product made by industrial activity units is much more than the added value of secondary products.

Input-output Tables Drawn up by us are main production branch \times production branch input-output tables. We have two kinds of methods to draw up production branch \times production branch input-output tables. One method is to decompose the input directly; the second is to calculate input mix indirectly.

There are two hypotheses used in calculating input mix indirectly. One is production craft hypothesis, according to the hypothesis, all input mix are the same, no matter they are manufactured in which industrial branch. The second is industrial craft hypothesis, according to the hypothesis; all productions manufactured in the same industrial branch have same input mix. Suppose real input mix matrix is L , input mix matrix calculated according to production craft hypothesis is O , input mix matrix calculated according to branch craft hypothesis is P .

In order to decrease the calculative error, the author designs a new plan. I give another hypothesis. According to the hypothesis, Input mix of secondary products manufactured in a industrial branch are same to input mix of industrial activity units which manufactured the secondary products only. I decompose Input mix of secondary products according to input mix of industrial activity units which manufactured the secondary products only and merge with input mix of industrial activity units which manufactured the secondary products only, the remainder part calculate to input mix of main product. The result calculated like this is noted matrix Q . I prove through an example, the error matrix Q to L is less error matrix P to L and error matrix P to L .

□□□□

Zhang Yaxiong

The Compilation and Application of 1997 China Multiregional Input-Output Model

This paper firstly attempts to discuss the compilation method and procedures of 1997 China Multiregional Input-Output Model. We adopt the column coefficient model (Chenery-Moses model) and estimate the interregional commodity flows through transportation OD tables and conducting survey. The model consists of 8 regions with 30-sector classification. Secondly, we define the regional and interregional backward and forward linkages, and discuss the contributions of final

demands to the regional economic development. Then we analyze the spillover and feedback effects between coastal and non-coastal regions by decomposing the Leontief inverse. Finally, the impacts of the investments related on the 2008 Beijing Olympic on economic development among the regions are calculated.

□□□□

Zaizhe Wang, Zuyao Hu, Xianchun Xu, Shuchang Qi and Kouzo Miyagawa

The Regional Structure of Chinese Economy---- Some Analyses based on Multi-Regional Input-Output Table of China 1997

For understanding the economical, regional difference and the interdependence relation between regions of energy in China, we tried to make a Multi-Regional Input-Output Table of China 1997 which can be used to analyze the economy, energy, environment (3E) of China. There are 29 regions in the table, and one region has 40 industry sections, and one industry section has 20 kinds of energy. In addition, there is an amount of the CO2 exhaust, too.

We make an experimental study of the economic interdependence relation between regions in China from the viewpoint of 3E by using the table. We emphatically considered the pattern of the economic development in the coast region and the realities of Western Region Development in China. The policy was simulated based on the consideration result for the development of Chinese economy in the future

■■■■■■■■■■

Session IV.1.9, Thursday, 9:00-11:00
Room: Meeting room 2 at Run Run Shaw Conference Center
Compilation Issues in Input-Output Tables II
Chair: Bent Thage

□□□□

Yusuf Siddiqi

Capitalization of Research and Development The Canadian Experience

The present SNA-1993 treats spending on research and development (R&D) as intermediate expenditure. There is a strong possibility that the revised SNA-1993 may recommend capitalization of research and development expenditures in the accounts. The paper outlines key conceptual and operational issues relating to capitalization of R&D and, through a bridge table, calculates the impact of such a move on main aggregates in the Canadian System of National Accounts.

□□□□

Alexander Elbert

Trade Margins of Israel – Methods and Problems of Calculations

The transformation of purchaser's prices into basic ones and vice versa is one of the most important parts of Input-Output calculations. To be able to do that, we have to know the values of trade and transportation margins. Trade margins, as well as transportation margins, are created when the merchandise is transferred from the factory to the final user, through the long chain of merchants and carriers. As a part of preparations to build Input-Output Tables, we have to prepare the vector of trade margins.

This research shows the way to count the margins on products, which are purchased by private consumers. As a result, our project will also be used in calculation of private consumption by National Accounts Department. We have to point out that the calculated trade margins include a portion of transportation margins. But we assume that their share is negligible in comparison to the level of trade margins.

To withstand our ends, we use a combined approach. The construction of the margins in agricultural industries is possible by finding the difference between the prices used in calculation of consumer price index and between the producer's prices of fruits and vegetables that can be derived from the data of Agriculture Department. The calculation of the margins in food industries will be done by comparison between the prices used in construction of consumer price index and those used in derivation of index of wholesale prices of manufacturing output.

The remained part of manufacturing industries is a bit another story. Here we could use the results of our Trade, Services, Transport and Communication Survey. This Survey had allowed us to calculate wholesale as well as retail trade margins by derivation of output's share in revenue. The detailed classification of trade industry allows getting a good match between trade industry and the relevant manufacturing industry of origin of specific group of products. The total trade margin is provided as a product of wholesale and retail margins.

In addition to the calculation of margins on domestic products, an attempt was also made to calculate the margins on imported products.

During our research we had found out that this approach is a fair solution to the problems, which arise in different industries. We do not make any special time- and money-consuming surveys. The whole work is based on the information, which is already being collected by CBS. The main aim of our work was to develop the ability to derive the trade margins in the quickest and the cheapest way without losing the quality.

□□□□

Bent Thage

Symmetric Input-Output Tables Compilation Issues

In this paper it is argued that any type of SIOT that can be compiled in practice depends heavily on industry related flows in the sense that the institutional characteristics of the industries are the main determinants of the data in the SIOT. On this background it is further argued that the compilation of SIOTs as industry by industry tables based on the assumption of fixed product sales structures (in the SNA terminology "industry technology") should be preferred method. This type of table is not an approximation to a more ideal table, but exists in its own right as part of "best practices" official statistics, fulfilling central quality criteria, including user needs.

It is the aim of the paper to give a simple and hopefully pedagogical exposition of some basic questions that must be decided before compiling an input-output table in practise. Its main contents are a discussion of the rationale for the “best practices” methods that are actually being followed by the major compilers of input-output tables. As these methods are regularly being challenged from a more theoretical point of view, the paper discusses the relevance of this criticism. The main argument in this paper is that a misconception of the very nature of the data from which input-output tables is derived - and consequently of the empirical foundation of input-output analysis - are at the root of the controversy.

This paper can be seen as a follow-up to the paper Symmetric Input-Output Tables and Quality Standards for Official Statistics that I presented at the 14th Input-output Conference in Montreal, Canada in 2002.



Session IV.1.10, Thursday, 9:00-11:00
Room: Room 1506 at Teaching Building No.1
Effects of Trade Liberalization in Developing Countries
Chair: Pierre Mohnen



D.P. Pal and D.Basu

Economic Integration A Systemic Measure in I-O Framework

Countries are linked through trade. For mutual benefit they are grouped and consequently economic regions are formed in some form or other .Examples are SAARC, ECM, EFTA etc. Depending upon the form and nature of grouping, trade relations among countries vary from regions to regions. The pattern and volume of trade of countries hence are different. Such differences cause differences in the impact of trade on growth and development. Over time the nature of integration of the countries also changes. It is thus of interest to examine the strength of integration of economic regions so as to make a comparative analysis for regions. For this, what is required is a systemic measure of integration. In this paper such a measure is developed in the I-O framework and is used to perform a comparative study among the economic regions.



Anushree Sinha, KA Siddiqui and Poonam Munjal

Impact of Globalization on Home Based and Other Women Workers A Macro Analysis

This study attempts to examine the impact of policy changes on the welfare of women workers in India. As a large section of women workers are involved in informal activities, we have differentiated factor of production by informality. The study distinguishes households deriving income from formal and the informal activities. SAM incorporating informal sectors and informal households enables a study of the work participation of women in different sectors of the economy.

The flow of value added from different sectors to the various factors of production and the flow of factor income to different households on the basis of factor ownership differentiated by gender is incorporated in such a SAM. The SAM is used as a base for building a Computable General Equilibrium (CGE) model. The CGE model incorporate factors of production distinguished by gender and informality.

□□□□

Chandrima Sikdar, Thijs ten Raa, Pierre Mohnen and Debesh Chakraborty

India-Bangladesh Bilateral Trade in the Context of Globalization A General Equilibrium Approach

India and Bangladesh had adverse balance of trade, throughout the last two decades. The government of both these countries pursued policies of trade liberalization since the beginning of the 1990's. This has enabled the economies to gradually emerge from inward-looking, protected perspectives into open, globally integrated ones.

There have been various attempts to promote greater trade between India and Bangladesh under the provision of SAPTA (South Asian Preferential Trading Agreement) and SAFTA (South Asian Free Trade Area) . Given the importance attributed to free trade as a policy to boost bilateral trade between the countries in this paper we present a theoretical framework, which helps to identify the pattern of trade flows between the two economies in a perfectly competitive world characterized by free trade.

The paper presents a neoclassical model of international trade, which assumes that each economy has fixed domestic endowments, with tradable and non-tradable commodities that are used for intermediate as well as final consumption. Leontief functions are used to represent technologies and preferences. The efficient allocation of resources is obtained by maximizing the level of domestic final demand (including consumption and investment) in one economy, subject to a given proportion of final consumption in the other. Thus, the model proposes a new way to locate the comparative advantages of the two economies linked by international trade. It constructs a competitive benchmark based only on the fundamentals of the two economies endowments, preferences and technologies. No statistics or constructs beyond the fundamentals of the economies are used in the model. In particular, it employs no price statistics. Nor does it admit of any artificial limitations on the direction of trade. This theoretical framework, which provides a general equilibrium determination of the commodity pattern of trade, is a general equilibrium version of Raa and Mohnen (2000). The empirical implementation of the model considers trade in twenty five sectors comparable in the I-O tables of India and Bangladesh. The basic findings are India enjoys comparative advantage in almost all the commodities excepting Rice, Fishing and Services, which it finds suitable to import from her neighbouring country Bangladesh. On the other hand, in a free trade set up Bangladesh's comparative advantage rests in these three goods. The study isolates the gains from free trade accruing to either economy. Though Bangladesh gains significantly from this bilateral trading arrangement with India, but such an arrangement ends up making Bangladesh too much dependent on India for the supply of several essential goods. So to make Bangladesh self reliant to some extent, we carry out two simulations in the paper where we make Bangladesh produce on its own some important goods of its consumptions and lower the volume of its import of that good from India. But such an attempt lowers the extent of gains for Bangladesh.

The paper also explores the possibility of Bangladesh producing some of its important consumption items on its own by utilizing the Indian technology for production. To show how this

could be done the paper proposes the super free trade model of India and Bangladesh. By holding technology in production and consumption constant across the two economies this model enables one to separate out those goods in whose production an economy has a comparative advantage solely due to its technology from those goods for which the comparative advantage is brought about by endowments of the economy. The gains from such a super free trade arrangement is also obtained .With super free trade, Bangladesh becomes relatively self reliant as it can produce many goods on its own by freely employing the India technology of production. However, such an attempt also ends up lowering the country's gains from free trade with India. This model, not only gives idea about the relative importance of the determinants of the pattern of comparative advantage, but also throws considerable light on the contemporary issue of technology transfer associated with international trade. The paper concludes with policy options.

□□□□□

Vijay K. Bhasin and Camara Obeng

Trade Liberalisation, Foreign Borrowing, Poverty, and Income Distributions of Households in Ghana

Ghana has adopted the Poverty Reduction Strategy, which emphasizes increased focus on poverty reduction in the design and implementation of its policies. Trade liberalization is one of the ways through which poverty could be reduced. However, trade liberalization results in decreased fiscal revenue of the government, which reduces the public savings. However, this fiscal deficit could be financed through increased foreign borrowing, so that the public savings do not fall. The present study uses the CGE model and examines the impact of trade liberalization, in which lost tariff revenue is compensated by foreign borrowing, on the poverty and income distributions of various categories of households. The study tests the hypothesis that the elimination of import and export duties on agricultural products accompanied by an increase in foreign borrowing reduce the incidence, depth and severity of household poverty and improve the income distributions of various categories of households.



PLENARY SESSION 2, Thursday, 11:15-13:00

**Conference Hall 1 at Run Run Shaw Conference Center
Input Output Whence and Whither?
Organizer and Chair: Anne P. Carter**



Anne P. Carter

Input Output and Mainstream Economics in the United States Research Strategy and Representation of Technology

Despite widespread use of input output tables in economic research most U.S. undergraduates and even many graduate students in economics have never even heard of input output. What, beyond a data set, do we stand for? How did Leontief's focus differ from that of mainstream neoclassical economics with respect to scope and emphasis? Are there deep methodological and/or ideological differences? When and why did input output and the mainstream diverge? What role should we seek in relation to the broader economics discipline now and in the future?



Emilio Fontela and Antonio Pulido

Input Output in Europe Trends in Research and Applications

The first part will recall the early association of input-output with formal planning in the east and with indicative planning (Netherlands, France, etc.) in the west, and the academic interest of Cambridge Growth Project and projects like Hermes.

Reference will be made to other fields of application and to the role of national accounts.

The second part will concentrate on the academic evolution after the fall of the Berlin wall and will be based on the results of the data-bank on I/O papers and communications.



Masahiro Kuroda

Input Output Analysis of the Japanese Economy Structural Analysis and its Application

No abstract available.



Andras Brody

Time's Arrow and Errors in Data and/or Computation in Leontief Models

The paper advocates the use of eigenvalues when analyzing the sensitivity or results of input-output computations. It shows the dependence of the results and even the basic process of inversion on the always better determinable eigenvalues. It proposes two error-reducing iterations that are also useful in assessing and handling errors and also elaborates on the usual sources and magnitudes of errors. Finally, by stressing the irreversible character of the processes it demonstrates the error-attenuating character of the setup proposed by Professor Leontief.



Thursday, June 30, 2005

PARALLEL SESSIONS IV.2 (14:30-16:00)



Session IV.2.1, Thursday, 14:30-16:00
Room: Conference Hall 1at Run Run Shaw Conference Center
China's Economic Growth and Input-Output Analysis III
Chair: Li Shantong



Jin Fan, Qingwu Zheng, Yan Wang and Xiaohui Yuan

Scenario Analysis on the Influence of Improving the RMB Exchange Rate Regimes Forming Mechanism on the China's Macro Economy-General Equilibrium Analysis

This paper applies Social Accounting Matrix (SAM), from the angle of general equilibrium analysis, having the China's SAM of 2005 as the shock object, resting on the assumption that the Chinese Yuan (RMB) Exchange Rate Regimes forms on the basis of the real effective exchange rate, makes a scenario analysis on the influence on the China's macro economy. The main conclusions are as follows. Firstly, the appreciation of the RMB shall not change the trade surplus of China, meanwhile, is to improve the deterioration of China's foreign trade since 1999. Secondly, the FDI takes on a characteristic of indifference to the RMB appreciation; however, the appreciation of the RMB will the international idle money. Thirdly, the appreciation of the RMB will be favorable of the structure upgrading of the citizens' consuming level, meanwhile, this appreciation maybe going to widen the gap between the rich and the poor, and maybe made the current austere state of employment worse and worse. Fourthly, the appreciation of the RMB will increase the fiscal revenue of the government and do favor to the aggregate economy stock. Finally, the appreciation of the RMB will make little influence on the GDP applying either approach of expenditure or that of income.



Jing He

An Empirical Analysis of Macrocconomic Response to Crude oil price volatility in China by using the Input-output Models

Although the use of the input-output price model has been widely appreciated in public macroeconomics calculation way, the dynamic model is no less wide spread and is used more in theory and than in practice. From 1998 Chinese government reforms the price system of the domestic crude oil. When we exam the macroeconomic responses to oil price volatility, the initial model is out of data. In this paper a number of methodological refinements are proposed, including the formulation, for the first time, of an extended price model, based on the discrete time functions. The contribution of this paper is twofold. First, we develop a new model of input output (IO) price analysis based on the discrete time functions to measure the impact of oil price. Second, we apply the price volatility model (PVM) to explain the macroeconomic responses between Jun 04,1999 and Jun 04,2004 try to identify the volatility rate of price in the other 9 sections effects resulting from changes in oil price. This process enables us to establish the feedback measure not only between the

oil prices and the price system but also between theory and application. It is a great advantage and an important tool for planners and decision-makers.

□□□□

Gao Ying and He Jianwu

Study on Application of Structural Path Analysis Method within a SAM Framework

The Social Accounting Matrix (SAM) sketches out a general figure of a nation or a region by listing the national economy accounting data within a square table. While providing data basis for the construction of economy model, SAM itself is a powerful tool of studying industry structure and the interdependence of economy accounts. Multiplier Decomposition and Structural Path Analysis is two main methods within a SAM framework. The basic idea of the methods is to partition the SAM accounts into endogenous and exogenous accounts and then to see what related effects happen as a result of the external injection on certain endogenous account. Multiplier Decomposition reveals the magnitude of global effect and shows the quantity distribution of the global effect within and among endogenous accounts. On the basis of this, Structural Path Analysis further illustrates the operation path and mechanism of external injection, i.e., along what path and to what extent does an external injection act on other accounts in an economy. Such analysis results will provide greater reference for policy makers and decision makers. This article takes the static value-type model as a background, gives a brief introduction of the basic theory of SAM and Multiplier Decomposition, then introduces the Structural Path Analysis method with an illustration of its principle and the relationship between the two methods. Then, on the basis of the SAM of China in 1997, this article sets several policy simulation scenarios and does some positive research on characteristics of Chinese industry structure and income distribution using Structural Path Analysis method. Finally, this article summarizes the strengths and limitations of the Structural Path Analysis method and indicates the direction for further research.

■■■■■■■■■■

Session IV.2.3, Thursday, 14:30-16:00

Session moved to Tuesday.

■■■■■■■■■■

Session IV.2.3, Thursday, 14:30-16:00

**Room: Conference Hall 2 at Run Run Shaw Conference Center
Environmental Impacts in Input-Output Models**

Chair: Peter Rørmoste Jensen

□□□□

Bui Trinh, Francisco Secretario, Kwangmoon Kim and Duong Manh Hung

Construction of Mega City's Inter-Regional Input-Output Table for Vietnam by the Hybrid Approach

Vietnam has been producing national input-output (I-O) tables since 1992 with the compilation of the first official I-O table for 1992. So far, three national I-O tables, in varying sizes, have been constructed for selected benchmark years, the latest of which is the 2000 I-O table. Presently, the compilation of I-O tables at the national level is an effort of the country's central statistical agency - the General Statistics Office (GSO).

In Vietnam, the GSO has been producing, in addition to its SNA-based national accounts, domestic product and expenditure accounts at the regional level to provide government planners with economic indicators in monitoring and assessing the performance of regional economies. While these regional accounts provide vital macro-economic indicators for regional development planning and policy formulation, its usefulness as an effective analytical tool for translating development objectives into specific programs and projects are quite limited.

It therefore underscores the need to compile regional I-O tables that could provide the database in regional micro-economic analyses. Unfortunately, no official attempts have been initiated so far to compile Inter-regional I-O tables that could be generally attributed to lack of the needed vast resources.

This paper presents the output of an empirical investigation of regional economic structures through the input-output approach. It is based on the bi-region inter-regional I-O table constructed for Vietnam's economy, initially taking into account the regional economies of Ho Chi Minh (HCM) and all areas outside of Ho Chi Minh (or Rest of Vietnam: ROV).

The conventional static, open-type of I-O models is adopted in compiling the 2-region inter-regional I-O table that traces the flow of goods and services, intra-regionally and inter-regionally alike. The first sections of this paper describe in sufficient detail the conceptual and accounting framework as well as the methods and sources of data used in the compilation process. Special emphasis is given to the hybrid or mixed approach of I-O table compilation – its advantages and disadvantages.

The next section of this paper deals with an I-O analysis of the empirical findings based on the resulting inter-regional I-O table for 1996. It highlights, among others, the intra-regional and inter-regional economic dependencies.

Finally, the paper spells out some recommendatory measures geared towards improving the compilation of regional I-O accounts in Vietnam, given the observed limitations of this study.

□□□□

Bui Trinh, Francisco T. Secretario, Le Ha Thanh, Kim Kwangmun and Nguyen Thuy Duong

Economic Environmental Impact Analysis Based on a Bi-region Interregional I-O Model for Vietnam

The structure of inter-regional linkages has been commonly discussed in regional analysis. Attention has been directed to problems of inter-regional feedback effects and the degree to which a change originating in one region has the capacity to influence activity levels on another region, which, in turn, effects activity back into the region of origin. Miyazawa suggested an innovative way of partitioning the inter-regional I-O system that resulted in the identification of what are now referred to as Internal and External Multipliers and the Push/Pull relations between one region and

another region.

The objectives of this paper are two-fold. First, it is the aim of this paper to analyze the economic structure of the Vietnamese economy at the regional level, intra-regionally and inter-regionally alike. This objective was made feasible with the construction of a 2-region Inter-Regional I-O (IRIO) table for the year 2000. The IRIO model then serves as the basic tool in pursuing the second objective, which is to quantify and analyze intra- and inter-regional environmental effects of residual emissions due to economic activities.

□□□□

Peter Rørmoste Jensen and Thomas Olsen

Structural Decomposition Analysis of Air Emissions in Denmark 1980-2002

Recently, the Danish environmental satellite account has been revised for the period 1980 to 2002. In a NAMEA type framework (national accounting matrix including environmental accounts) it includes comprehensive statistics on energy use and related air emissions in Denmark. It includes 25 different energy carriers and 8 different types of emissions. Linked to the Danish annual i/o tables with 130 industries and almost 100 categories of final demand, it facilitates quite detailed analysis of the development in emissions. In this paper a number of Structural Decomposition Analyses (SDA) of energy related emissions of CO₂, SO₂ and NO_x to air in Denmark are carried out in order to reveal the development in the driving forces behind the emissions. The SDA analyses overcome the non-uniqueness problem by calculating the total average of all (n!) different but equivalent decomposition forms as advocated by Dietzenbacher and Los (1998). This also ensures that the results are exact with no residual term. However with the number of components in the analyses n equal to 7 or 8, calculations are quite demanding in terms of computer power (5040 or 40320 loops respectively). Therefore, following de Haan (2001) and Seibel (2003) a shortcut is taken that reduces the number of necessary calculations dramatically to 2(n-1). Sensitivity analyses reveal that results for the n components vary substantially between the single decomposition forms expressing the need to overcome the non-uniqueness problem by taking the total average of all possible forms.

■■■■■■■■■■

Session IV.2.4, Thursday, 14:30-16:00
Room: Meeting room 2 at Run Run Shaw Conference Center
New Applications of Input-Output Modeling II
Chair: Erik Dietzenbacher

□□□□

Rodrigo Simões

Spatial Industrial Complexes; Spatial Accessibility Matrix and Fuzzy Logic Approach, Minas Gerais - Brazil

This paper aims at discussing economic clusters recouping the Perrouxian concepts of polarised regions and spatial industrial complexes. It presents an intersectoral analysis of industrial localisation by using a methodology of spatial interpretation of the input-output matrices. The paper builds up i) a spatial friction coefficients' matrix; and ii) the use of fuzzy logic for the characterisation of productive chains in space. The paper is divided in 3 parts. The first part briefly presents the literature with the most important methodologies of sector-key and/or industrial complexes identification, relating them with the space. The main conclusion is a relative analytical limitation of the same ones. The second part describes either, a methodology of intersectoral locational analysis with the construction of an intersectoral spatial friction matrix; and an introduction to fuzzy logic on classification methods applied to regional questions. The final part presents, for the State of Minas Gerais – Brazil, in the years 1980 and 1996 i) an application of the proposed methodology, and ii) the identification of spatial industrial complexes for Minas Gerais economic structure, using a multivariate method of classification with fuzzy logic. The evolution of the intersectoral structure of Minas Gerais between the years is well described by the methodology and some aspects of political economy goals are indicated.

□□□□

Joost R. Santos and Yacov Y. Haimes

Impact Assessment of Major Economic Disruptions using the Inoperability Input-Output Model (IIM)

In this study, we deploy the inoperability input-output model (IIM) for assessing the economic impacts of disruptive events in the U.S. (e.g., natural disasters and large-scale accidents) that can cause significant impacts on consumption. The IIM is based on Leontief's input-output model which is capable of describing the ripple effects of disruptions to interdependent sectors. Besides describing economic impact in financial terms, the “inoperability” metric is also used in the IIM to quantify the percentage to which a sector's production is affected relative to the desired level. To analyze the magnitude and extent of sector linkages, we construct an interdependency matrix based on the North American Industry Classification System (NAICS) . The study highlights three key features of the IIM. First, demand patterns in the aftermath of such events are modeled and analyzed using post-traumatic stress disorder (PTSD) fact sheets and public-domain databases on survey of consumers. Second, the capital flow data released for the first time in 2003 by the U.S. Bureau of Economic Analysis enable the application of a dynamic IIM to describe the temporal behavior of economic impacts associated with disruptive events. Third, visualization tools are presented for conducting a multiobjective ranking of the most-affected sectors using both economic loss and inoperability metrics. Ultimately, the study offers insights on describing the sensitivity of the economic sectors to various classes of disruptions, which in the broader perspective can provide guidance towards economic policymaking.

□□□□

M. Alejandro Cardenete Flores and M. Carmen Lima

Impact Assessment of European Structural Funds in Andalusia a CGE Approach

In this work we carry out an impact analysis of the European Structural Funds (ESF) to the object of assessing their effect on the GDP, the level of prices or the consumers' income on the region of Andalusia in the south of Spain. Accordingly, we present an Applied General Equilibrium Model (AGEM_A) and we compare the reception scenario of regional funds with a hypothetical situation where this financial support has been removed. The AGEM_A has been built by supplementing the statistical information provided by the Social Accounting Matrices for Andalusia corresponding to 1990, 1995 and 1999, with the data included in the three Community Support Frameworks (CSF) approved by the European Commission.



Session IV.2.5, Thursday, 14:30-16:00
Room: Room 1504 at Teaching Building No.1
Economic Theory and Input Output I
Chair: Thijs ten Raa



Hartmut Kogelschatz

On the Solution of Stochastic Input-Output Models

The static, open input-output model reads $(I - A)x = d$, where $A \geq 0$ is an $n \times n$ input matrix with $\sum_j a_{ij} < 1$, d and x are $1 \times n$ final demand and output vectors, respectively. In contrast to the familiar model the coefficients of A , d and x are regarded as random variables in this paper, since there are many influences on production and demand, and hence on the resulting output $x = (I - A)^{-1}d = Ld$, where $L \geq 0$ denotes the Leontief-inverse of A . Correlations within A or d can be allowed for, but may often be neglected. However, even for independent coefficients within A and d those within L and x are correlated. This can be seen from the Neumann series of L and is also valid for a Taylor approximation used, inter alia, in the simulation.

Empirical input matrices are derived from a database from year 0 such that $(I - A^0)x^0 = d^0$ is fulfilled for this reference system. It is assumed that these values of A^0 and d^0 represent either a) expected values or b) modes of the underlying random variables A and D which corresponds to maximum likelihood estimation. If there is no other information, variances are assumed to be derivable by a 3σ -rule. The input coefficients a_{ij} are taken i) as $3\sigma_{ij}$ or, alternatively, as ii) $2\sigma_{ij}$. In both versions it is assumed that an interval of length $6\sigma_{ij}$ (ending with i) $2a_{ij}$ or ii) $3a_{ij}$) captures nearly the whole probability mass. Version ii) seems to fit better to the asymmetric beta distributions, skewed to the right, of the bulk of very small input coefficients.

Two types of approximation of L are applied α) Taylor series and β) approximation of each coefficient of L by the diagonal of A and only one corresponding row and column (RC-approximation) exploiting nonlinearity of the mapping $g: A \rightarrow L$ (without using powers of A). Approximations of $E(L)$ and $cov(L)$, and $E(X)$ and $cov(X)$ are deduced from the Jacobian of the mapping g and from the corresponding Hessian. The results simplify considerably if correlations within A and D are negligible, which seems realistic.

Crude probability regions for L and the solution x can be given, which may be improved, if knowledge of the distribution types of A and d is available. Assumption of normality may cause

difficulty with respect to the requirement that $(I - A)$ has a nonnegative inverse.

In a simulation it is assumed that the column vectors of A and normed final demand D have independent Dirichlet distributions, or its components Beta distributions $Be(r, s)$ on $[0, 1]$, which seems reasonable for fractions. With these distributions no problem occurs with invertibility, since it can be ensured that the dominant eigenvalue of A is less than one. The density of A transformed by g is theoretically derived for any distribution and, in particular, applied to the beta distribution. The parameters r and s in the simulation, based on German data, are derived from assumed $E(Y)$ (or mode (Y)) and $Var(Y)$. A simple approximation of L by minors suggests that the coefficients of L may have Beta distributions of the second kind. Theoretical considerations show that this distribution type then should also be appropriate for the solution x . This is confirmed by the simulations. Also, the two types of approximations of $E(X)$ and $Var(X)$ show a good performance. The theoretically expected approximate, relatively narrow, 2σ -regions contain 90-95% of the simulation results for most coefficients. For version 2, taking into account the skewness to the right of the distribution of A , here, it is assumed that the relation of 1/2 for left and right parts (with respect to $E(Y)$) of the probability region for A may be transferred to L as a proxy because its distributions are also skewed to the right. In the appendix, some results and approximate theoretical distributions are reported for case a) and version i). The theoretically derived approximate densities of L and X mainly accord with the histograms of the simulation. As a result, it may be possible to do without simulations within this model framework.

□□□□

Zonghie Han and Bertram Schefold

An Empirical Investigation of Paradoxes (Reswitching and Reverse Capital Deepening) in Capital Theory

This paper examines the empirical relevance of the capital controversy between the proponents of the classical and of the neoclassical paradigm in economics. Aggregate capital at the macroeconomic level is regarded as the sum of capital goods employed, measured in terms of normal prices. Hence the price model of Sraffa (1960) and the dual models of the price and quantity systems of von Neumann (1937) become the basis of the investigation. The capital controversy is concerned with consequence of the choice of the cost minimizing technique in the production system for the relationship between distribution and the value of capital. Theoretical examples are easily constructed which contradict the fundamental neoclassical hypothesis of an inverse relationship between the rate of profit and the intensity of capital.

This paper for the first time presents empirical examples. To this end, the quantity system of the von Neumann model is here used to model spectra of techniques, or books of blueprints. 32 input-output tables from 9 countries of the OECD input-output data base serve as data. One input-output table represents one technique (production system). A spectrum of technique, or book of blueprints, consists of two input-output tables from the OECD data base. A technique is chosen by selecting one out of two activities in each of the 36 sectors (each book of blueprints consists of 2/36 techniques). The linear programming of the quantity system yields 496 = 32 · 31/2 envelopes as choice of technique. Among these, one envelope is found which involves reswitching, considering a subset of the envelopes, and reverse capital deepening is observed in about 1.37 % of these cases, which is stochastically significant.

This seems to confute the neoclassical doctrines in capital theory empirically which have

been experiencing was a transition from 'poverty' → 'adequate food and cloth' → 'well to do', accompanied by large-scale migration from rural areas to the fast-growing cities and significant population growth. This development has left deep marks on resource availability and quality. China is poor of water resources with 2,300 m³ of per capita availability, which is less than 1/3 of the world average. Especially North China can be characterized as extreme water scarce with only about 271 m³ per capita. However, China has been recognized as one of the world largest manufacturers and exporters recently, and as a result significant amount of 'virtual water' was traded between regions or exported to abroad.

This paper is to investigate the current water consumption pattern in China by incorporating water into the monetary Input Output (IO) table; and apply the extended IO analysis to account for virtual water flows. Water is a primary input to the economic production chain, and involved in almost all of the production activities. Therefore, water is either embedded in the final demand or being used for cooling and cleaning and discarded in the waste flows. In order to identify water activities in production process, a set of water coefficients are surveyed and calculated to represent the water consumption pattern for each industrial sector in IO table.

Due to the great regional disparity in terms of water availability and consumption we base our analysis on eight regions reflecting administrative boundaries and biophysical attributes. The extended IO tables will be connected to the hydrological [add full name] CHARM model to allow a more complete water accounting.

The current trade structure in China is not very favourable from the point view of natural resources allocation and efficiency. North China indirectly exported about 10% of its total available water resources to other regions or countries annually through trade. At the same time, large investments are made to finance water transfer projects from outside in order to reduce the pressure caused by water consumption in agricultural irrigation and industrial production. By promoting and developing industries less dependent on water in water scarce regions and thus transforming the trade structure first steps can be made towards avoiding a large scale water crisis in China.



Session IV.2.7, Thursday, 14:30-16:00
Room: Room 1505 at Teaching Building No.1
Leontief Multipliers and Inducement Analysis
Chair: Roland Lantner



Ho Un Gim

The Overestimation Problem in the Leontief Multiplier A Suggested Solution Based on "the General Relation"

To avoid double-counting impacts and overestimation of the importance of a sector's output, the new concept of "net multiplier" (Oosterhaven and Stelder, 2002) accepts sectoral outputs as entries instead of exogenous final demand. This net multiplier is proposed by multiplying the traditional (ordinary, standard) Leontief multiplier by the sectoral final output ratios, that is, $f_j /$

x_j .

Gim and Kim (1998) proposed the general relation between the notion of direct and indirect input requirements of commodity i to support a unit of final demand of commodity j and that to produce a unit of gross output of commodity j in the open static input-output model. Recently, Gim (2002) also showed that the elements of the Leontief inverse can be decomposed into four different parts (the final demand, the direct effect, the technical indirect effect and the interrelated indirect effect); that the elements of the total requirements matrix for a unit of final demand can be decomposed into three different parts (the direct effect, the technical indirect effect and the interrelated indirect effect); and that the elements of the total requirements matrix for a unit of gross output can be decomposed into two different parts (the direct effect and the technical indirect effect).

In this paper, we propose an alternative concept of the Leontief multiplier with attention to the general relation between two different notions of direct and indirect input requirements. The total (direct and indirect) input requirements matrix for a unit of gross output, I^g , can also be applied to derive a new concept in input-output multipliers different from the existing multipliers, including the net multiplier, which are drawn from the Leontief inverse. Therefore, the notion of I^g can be used to avoid double-counting impacts generated on the basis of the Leontief multiplier. This alternative concept of multiplier analysis is illustrated empirically for the usefulness of the matrix I^g for “*The 2000 Input-Output Tables of Korea*.”

□□□□

Akiko Nakajima

Decomposition of Employment Inducement Coefficients Case of Japan, USA and ROK

We have been regressing inverse of value added productivity of labour by employment inducement coefficient in our past research. In this paper, employment inducement coefficients are regressed by inverse of value added productivities of labour. Not only regression coefficients, but also constant terms become significant.

Significant regression coefficients are explained as value added inducement coefficients of own sector. Constant terms are explained as sum of value added inducements coefficients towards other sectors multiplied by inverse of value added productivities of labour. Regression coefficients take slightly high value, and constant terms take low value around recession. That is, value added inducements towards other sectors become relatively weak at and around recession. Such movements are compared during different phases of economic fluctuations, and among Japan, USA and Republic of Korea.

□□□□

Roland Lantner

Interdependence, Feedback Loops and Leontief Inverse

In order to get a good idea of the intensities of the global interdependence in an Input-Output table, the best and fastest way is to analyze the values of the terms of the Leontief inverse.

Evening Courses on Thursday 19:00-21:00

Room: Room 1505 at Teaching Building No.1
Course 3A:

Yusuf Siddiqi

Compiling Regional Input-Output Tables

The purpose of this session is to provide training on the compilation of regional input-output tables, based on the framework of the Canadian regional input-output tables and the conventions and practices developed for Canada.

or

Room: Room 1506 at Teaching Building No.1
Course 3B:

Liv Hobbestad Simpson, Janja Kalin and Marek Rojcek

Supply and Use Tables as compilation framework for Supply and Use Tables and Input-Output Tables in Constant Prices

- Methodological advantages of annual supply and use tables in current and constant prices
- Framework and accounting structure, requirements to classifications
- Requirement to input data and valuation matrices. Implementing missing data
- Alternative price indices and volume indicators for constant price compilation.
- Demonstration of an integrated, automatized and detailed process with a set of equations for compiling SUT in current and constant prices.
- Assumptions for the automatic compilation of IOT in current and constant prices
- Experience from Norway compiling annual SUT and IOT in current and constant prices fully integrated in the national accounts system.
- Experience from the Check Republic compiling SUT and IOT in current and constant prices
- Experience from Slovenia compiling SUT and IOT in current and constant prices

Friday, July 1, 2005

PARALLEL SESSIONS V.1 (9:00-10:30)



Session V.1.1, Friday, 9:00-10:30
Room: Room 1104 at Teaching Building No.1
Input-output and Environmental Accounting Introducing the System of Integrated
Environmental and Economic Accounting 2003 (SEEA-2003) IV
Environmental Accounting for Solid Waste, Energy and Materials Embodied in International
Trade
Organizer Glenn-Marie Lange
Chair Jan van Tongeren

□□□□

Wang Yixuan

Energy Accounts of China, Compilation and Use

The Energy Accounts of China for the years of 1987, 1995 and 1997 were compiled based on available statistics and accounting data with the technique help of experts from Statistics Norway. In accordance with Input-Output Table and energy statistics, the accounts cover 33 industrial sectors and 2 household sectors including 25 major energy carriers. The accounts consist of energy balance sheet, energy supply table, energy demand table and energy end-use table. The energy accounts give a complete picture of energy production, consumption, use and future trends in China in the decade, as well as supply and demand of energy carrier, energy consumption by industry and by household, etc in China. The accounts are used to make scientific analysis and an assessment of the general energy conditions in China.

□□□□

O.G. Pedersen

Waste Accounts Based on Physical Input-Output Tables

This paper shows how accounts for solid waste as satellites to the national accounts can be established. A breakdown of the waste generation according to national accounting industries is introduced. Estimations of waste generation by industries is based on physical supply-use tables (built on the principle described in SEEA 2003, chapter 3) , the material balance principle and physical input-output tables.

The method, basic data sources and level of detail used for this study are more or less the same as the one used for the regular production of Danish monetary input-output tables. Thus, the physical flow dimension and the monetary flow dimension are consistent.

The paper presents the results of calculations for Denmark 1999. The model has been used for the following nine waste fractions Paper, glass, plastic, food waste, iron and metal products, rubber, wood products, lubricating oil, and miscellaneous products. For each fraction, complete physical input-output tables at an 8-industry classification as well as overall material balances at a 26-industry classification are presented. Furthermore, a complete breakdown of the waste statistics at 26 industries and 18 fractions of waste is shown.

The generation of solid waste is shown explicitly within a preliminary and rough physical input

□□□□

Motaz Khorshid

Problems of Expanding the Input-Output tables to a Comprehensive Social Accounting Matrices Lessons of Experience from the Middle East Countries.

Social Accounting Matrix, commonly known as SAM, plays a dual role in Development planning and economic policy analysis. On one hand, a SAM represents a method for organizing economy wide data in a consistent and comprehensive way. It captures the main structural features and linkages within the economic systems. On the other hand, a SAM can be a very useful tool in support of the model building process. Input-Output tables (I/O) are the corner-stone of detailed SAMs. Data experts begin generally with an Input-Output table and then with a set of complementary accounts- from different sources- to complete the structure of the SAM. Meanwhile, the path from an I/O to a SAM is not a straight forward exercise.

Two main problems arise during the SAM assembly process; (i) adjustment of the original I/O structure to satisfy the analytical purpose of the SAM, and (ii) Integration of the multiple-sources and fragmented additional Socioeconomic information into the SAM. The purposes of this paper are; (i) To identify analyze and suggest appropriate solution to the above SAM construction difficulties, and (ii) To summarize, experience and learned lessons related to the SAM building process in the Middle East region, with special reference to Egypt, Kuwait and the UAE.

□□□□

F. Bazzazan, M. Alavinasab, A.A. Banouei

Construction Regional Input-Output Table and Its Applications

This paper gives details on the construction and application of a regional input-output table for Yazd province in the centre of Iran. This is the first regional input-output table, which will reveal the economic structure of the region and to be employed for regional planning by Plan and Budget Organization, Yazd Division, in Iran. The table covers twenty two sectors.

Constructing a survey based regional input-output table is a difficult task especially if the required data for certain region have not been already prepared. According to the literature, in such cases noticed that variety of non-survey or semi survey techniques have been experienced. In the case of Yazd, a semi survey based method has been used to construct a twenty two sector input-output table in which almost eighty percent of necessary data are survey- based and for the rest of data we employed RAS method of national input-output table and the knowledge from the experts.

□□□□

Edoardo Pizzoli

From Firm's and Farms' Balance-Sheets to the National Input-Output Table An Empirical Investigation for 2000 Year

There is a theoretical relationship between the balance-sheet of a company and the national

Dust storms originate in arid and semi-arid regions, transporting a thick cloud of fine sediments along with strong winds. Dust storms can extensively disrupt socio-economic activities, such as construction, tourism, trade, and transportation. Particles in a dust storm hinder sophisticated manufacturing, damage agricultural products, and generate risks to human respiratory and cardiovascular systems. As a typical trans-boundary problem, dust storms have affected 17 provinces in China and reached Japan, Korea, Mongolia, and even North America. However, there have been no systematic analysis or even statistical data of dust storms from an economic perspective.

On the basis of second-hand information, our case study in Beijing 2000 presents a preliminary impact analysis of dust storms. We integrate regional input-output models with environmental evaluation techniques and dose-response analysis. In addition to the traditional approach of demand-driven analysis, we make an innovative application of input-output analysis by examining the supply-side effects of the economic impacts caused by dust storms on Beijing's economy. Most important, we incorporate water resources into regional economic framework, illustrating the exacerbating relationship between dust storms and water resources and how such impacts influence the regional economy of a water-scarce city like Beijing.

Our analyses demonstrate that the costs of cumulative effects of dust storms can be more expensive than those immediately visible, and that the vicious cycle among human socio-economic activities, dust storms, and water resources tends to exert significant constraints for regional economic development. Considering the prohibitive cost to mitigate both visible and invisible impacts of dust storms in the near future, investment in well-designed environmental planning may promote regional economic development, instead of impeding it.

With extremely limited data availability, our primary purpose is not to produce precise numerical results, but to develop in more detail than we have done in earlier work, an integrated regional economic model incorporating environmental considerations, especially water conservation, into regional planning practice. Policy analysts can use and further improve to evaluate the comprehensive impacts of other phenomena with similar properties more accurately.

□□□□

Yu-Hung Hong

Assessing Property Tax Reform in China: An Input-Output Analysis

Using the input-output technique and the 1997 Input-Output Table of China, we assessed the economic impacts of five property tax reform scenarios in China. They are (1) to terminate the Adjustment Tax, (2) abolish the City Maintenance and Construction Tax, (3) replace the Urban and Township Land Use Tax (LUT), Urban Real Estate Tax (URET) and Building Tax by a new property tax, (4) restructure the LUT, and (5) establish a land rent system.

Our assessment indicated that the proposed new property tax would need to have a high tax rate, so as to compensate for all tax revenue losses instigated by the fiscal reform. The new tax rate is estimated to be about 189 percent higher than the current rate for the Building tax. Such a high tax rate would engender resistance from would-be taxpayers, making the implementation of the reform difficult.

Besides, the new property tax would increase the total tax payment of enterprises operating in the secondary industries, but reduce the tax liability of firms in agriculture, banking and other services sectors. These differential impacts on industries would have long-term effects on the development trajectory of the country.

One way to avoid the high property tax rate would be to establish a land rent system. According to our estimates, had the central government required all land users to pay an annual land rent in 1997, rental income would have added 29.8 billion yuan (US\$3.6 billion) to the government treasury, representing a 2.9 percent increase in total tax revenue. This revenue increase would represent a net gain over estimated tax revenue losses under the proposed property tax reform.

Had the government decided to keep the total tax revenue approximately the same, it could have set the new property tax rate at 4 percent, which is the same as the Building Tax rate for personal dwellings rented at market prices, and then discounted the land rent by as much as 47 percent. With a reasonable tax rate and a substantial reduction on rental payment, taxpayers would be less resistant to the reform.

If the government were to increase the new property tax rate to deepen the tax reform, it could lower the rent level to avoid antagonizing taxpayers. This approach of revenue-neutral shift would provide local governments with an array of options to adopt the new property tax system in stages and at a pace that suits their economies.

□□□□

Xiaoyu Shi

Energy Prices and Intensity in China

Since the start of its economic reforms in 1978, China's energy prices relative to other prices have increased. At the same time, its energy intensity, i.e., energy consumption per unit of the Gross Domestic Product (GDP) has declined dramatically by about 70% in spite of the continuous increases in energy consumption. Is this just a coincidence? Or does a systematic relationship exist between energy prices and energy intensity?

This research examines China's energy prices and energy intensity changes during the last two decades at a macro level. It is conducted by using three complementary economic models of the input-output-based Structural Decomposition Analysis (SDA), Shift-Share Analysis (SSA), and an econometric regression model. The results present whether and how the variations in energy prices affect the energy intensity and efficiency, as well as the energy-consumption pattern and trend in China. They can serve as a new start point for China's energy and carbon emission forecasts, which was traditionally done without accounting for energy prices. In addition, the policy implications may initiate new thinking about energy policies that are needed to conserve China's energy resources and reduce carbon emissions.

■■■■■■■■■■

Session V.1.4, Friday, 9:00-10:30
Room: Meeting room 2 at Run Run Shaw Conference Center
Applications of Dynamic Models
Chair: Jing He

□□□□

Raja M. Albqami

Determine the Impact of Money Supply on the Real Economic Growth

Even though that the importance of the money supply for the economy is widely recognized and has been emphasized by several theoretical studies, interact between money and real economic is one area where economists dispute. On one hand, some economists believe that real economic is growing regardless of the growth of money supply. On the other hand, other economists emphasize the important of monetary sector. Given the above discussion, if one agrees with the importance of monetary policy to the growth of the economy, then what is the optimum money supply which ensures economy growth, full employment, and low inflation?

The objectives of this study are two-fold. First, to study the impact of monetary policy on economy growth using dynamic applied general equilibrium model, where Saudi Arabian economy has been used as a case study; and second, to determine the optimum money supply in the dynamic applied general equilibrium model.

□□□□

Burkhard Schade

A System Dynamics Model to Evaluate Economic Feasibility of Environmentally Sustainable Scenarios with an Integrated Input-Output-Table

The aim of the System Dynamics Model (ESCOT) is to describe a path towards a sustainable transport system in Germany and to assess its economic impacts. ESCOT was developed within the environmentally sustainable transport (EST) project of the OECD that was designed to consider the ecological and technical aspects of a transition towards sustainable transportation. ESCOT comprises five models the macroeconomic, the transport, the regional economic, the environmental and the policy model.

An integrated Input-Output-Table for the German economy forms the backbone of the economic assessment. The Input-Output-Table is calculated endogenously by macroeconomic variables mostly from the demand side. It feeds back to other macroeconomic indicators in the next time period.

The economic assessment for environmentally sustainable scenarios show that the departure from car and road freight oriented transport policy is far from leading to an economic breakdown. With an expansion of the time period for the transition we derived even more encouraging results.

For the economic assessment it is important that ESCOT considers not only first round effects but also secondary effects. This ability makes ESCOT to a powerful instrument for the assessment of such large ecological changes.

□□□□

Jing He

A Dynamic Computable General Equilibrium Model to Calculate Shadow Prices of Water Resources Implications for China

Although the use of shadow prices (SP) calculation approach has been widely appreciated in public macroeconomics calculation way, discussions of SP have been confined to static settings. This paper develops a dynamic SP approach based on multi-periods input-output (I-O) optimizing model. Unlike previous approaches, it is based on the dynamic computable general equilibrium (DCGE) model to solve the problem on marginal long-term prices of water resources. Firstly, basic concepts of dynamic I-O analysis and turnpike theory are reviewed. Secondly, definition and algorithm of DCGE is elaborated. Lastly result of SP for 1949-2050 in China as well as the sensitivity analysis by using the national water conservancy input-occupancy-output table of China for 1999 in 19 sectors is listed out. A lesson from this paper is that the SP of water resources is largely based on the scarcity extent. Selling prices of water resources should be rewritten with the use of parameters representing SP.



Session V.1.7, Friday, 9:00-10:30
Room: Conference Hall 2 at Run Run Shaw Conference Center
Economic Theory and Input-Output II
Chair: Thijs ten Raa



Giuseppe Freni, Fausto Gozzi and e Neri Salvadori

Existence and Uniqueness of Balanced Growth Paths in an Endogenous Growth Multisector Linear Model

We will study the existence and uniqueness of balanced growth paths (BGP) in a multisector 'AK model' in continuous time with a von Neumann-Leontief technology. We find a simple and meaningful condition that is sufficient for existence of both the BGP and the set of dual supporting prices. Although we provide a set of additional conditions that ensures uniqueness, we show that a fair general uniqueness result can be obtained only if the difference between the rate of growth and the rate of profit is small. We interpret these results with reference to the literature on multisector models developed within Leontief-Sraffa-von Neumann literature.



Liu Xinjian

A Relative Theory of National Production

There are some essential differences between Leontief input-output economics and traditional mainstream economics. One is that Leontief models always include intermediate inputs in them, and intermediate input coefficient matrices are the central and remarkable characters of them. The compiling process of input-output table has revealed the shortcomings of modern GDP accounting. This paper gives a critical view to classical GDP accounting theory on three questions. The first is

that how to distinguish production from consumption or final products from intermediate products, and the second is that whether it is reasonable and scientific to calculate GDP by adding various products in market prices or how the GDP produced and sold in different markets or in different times can be compared reasonably, and the third is that whether GDP is an appropriate indicator of welfares. After clearing up the GDP notion, we put forward a relative production theory to treat with the first question. Our theory think that, in an economic system as a whole, one set of sectors gives a certain volume of net final products to the other set, and that it gets different production value from different accounting aspects. This paper has given several kinds of economic accounting indicators for different meanings, and sets up a new type of input-output model and defines a new total input coefficient as well.

□□□□

Thijs ten Raa

Debreu's Coefficient of Resource Utilization, the Solow Residual, and TFP The Connection by Leontief Preferences

Debreu's coefficient of resource utilization is freed from individual data requirements. The procedure is shown to be equivalent to the imposition of Leontief preferences. The rate of growth of the modified Debreu coefficient and the Solow residual are shown to add up to TFP growth. This decomposition is the neoclassical counterpart to the frontier analytic decomposition of productivity growth into technical change and efficiency change. The terms can now be broken down by sector as well as by factor input.

■■■■■■■■■■

Session V.1.6, Friday, 9:00-10:30
Linkage Analysis II
Room: Meeting room 1 at Run Run Shaw Conference Center
Chair: Michael L. Lahr

□□□□

Raufdeen Rameezdeen, Nisa Zainudeen and Thanuja Ramachandra

Study of Linkages between Construction Sector and other Sectors of the Sri Lankan Economy

Input-output analysis has been widely used to assess sectoral economic performance and production interdependence. This paper uses input-output tables compiled since 1960s in Sri Lanka to analyze the significance of construction in a developing economy and its relationships with other sectors of the national economy. Results show that construction indicates an above average, significant backward linkage while a below average, insignificant forward linkage in the forty sector economy of 1994. An aggregated sectoral analysis reveals high dependence of construction on manufacturing followed by services. The trend analysis shows an increasing dependence of construction on the services sector. The outputs of construction mainly satisfy the services sector. The paper shows that the trend of the profile of inputs and outputs are correlated to the economic

policy regime in operation. It is argued that input and output profiles of construction not only mirror the technology that has been used for production as claimed by previous researchers, but also the governing economic policy.

□□□□

Paramita Dasgupta and Debesh Chakraborty

The Structure of the Indian Economy

The study explores the structure of the Indian economy with an input based scheme of classification of sectors. On the basis of the factors of production (natural resource, research & development and labour & capital) intensively used in the production process, all economic activities are classified into three broad categories - Ricardo sectors (natural resource intensive), High-Technology sectors (high-technology intensive) and Heckscher – Ohlin sectors (capital-labour intensive). In order to explore the structure of the Indian economy Input – Output technique developed by Leontief, has been used as it offers important insights into the structure of an economy. The relative strength of linkages of the three categories of sectors have been studied and the key sectors of the Indian economy are identified.

Rasmussen's most widely used methods of measuring forward and backward linkages are used to identify the key sectors. Forward linkages of different sectors are also measured within the Ghosian framework where a matrix of fixed output coefficients is used for this purpose.

When we use Rasmussen's method for measuring both forward and backward linkages, key sectors are mostly Heckscher – Ohlin (H-O) sectors. Among the ten key sectors, the numbers of the Ricardo and High Technology (H-T) sectors are two and one respectively. Again when Rasmussen's method for measuring backward linkage and Ghosian framework for measuring forward linkage are used, the number of the key sectors has substantially increased to eighteen. The numbers of both the Ricardo and H-T sectors have increased while the number of the H-O sectors remains same.

In order to get a better picture about the structure of the Indian economy, another framework is presented in the paper. The I-O model is partially closed for which sectors are divided into two groups, durable sectors and non-durable sectors. The non-durable sectors are endogenised to form an addition vector on the transaction matrix and the durable sectors are treated as exogenous. In the augmented structure there has been a significant improvement in the absolute values of both forward and backward linkages but the qualitative characters of the sectors have not seen to be changed significantly. In the augmented structure, the number of the key sectors is seen to be less than that of the identified key sectors in the Leontief and Ghose models. Interestingly, none of the H-T sectors qualifies as the leading sector in this structure.

Finally in the paper the components of final demand are identified which act as the driving force behind the entire analysis of linkages in the input-output static open framework. The study concludes with some policy implications.

□□□□

B.Patro, A.K. Patro and N.Acharya

Structural Change of the Orissan Economy an Analysis between 1994-95 and 2001-02

Orissa is one of the most backward states in the Indian Union located in its eastern coast. The state is rich in mineral and water resources. Failure of harnessing these resources in a planned manner has resulted in the continuance of undeveloped characteristics of this state since long. The effort of the state to industrialise the economy has not been possible due to the absence of infrastructure facilities. The economy is thus characterized by low per capita income, under utilization of natural resources and a low level of living of the people.

A capital deficient backward economy has to carry out its investment programme in a calculated and careful manner. Before embarking on any project, there is a need to identify the inter-sectoral dependence by deriving the input-output matrix for the regional economy. The sector giving the highest growth momentum is to be taken up to achieve the best possible result.

A preliminary effort in this direction was made in around 2000 by using data of the state economy for the year 1994-95. (Patro, 2002). The sectors identified with high forward and high backward linkages are animal husbandry, basic chemical and chemical products, plastic and related products, manufacture of metal products and electrical M.E. industry. The sectors of low backward and low forward linkage are associated with cereals, pulses, agriculture, forestry, fishing, construction, manufacture of beverages and other manufactures and repair. The technological interdependence of the sectors indicates a negligible impact of the production in the primary sector of the economy.

The population of the state is mostly dependent on agriculture and allied activities. Dependence on this sector is to the extent of 75 percent of the total population. In the recent years, the Government of Orissa has taken several steps to dynamise the state economy and brought structural changes in the state economy. This paper is an effort to measure the extent of the structural change achieved in the state economy in between 1994-95 and 2001-02. By using the data available for 2001-02, the paper will make an effort to estimate the same technical coefficients and the value of the linkage coefficients. By analyzing these values, the implication of the policy on reform measures will be assessed for future guidance.



Session V.1.7, Friday, 9:00-10:30
Compilation Issues in Input-Output Tables III
Room: Room 1504 at Teaching Building No.1
Chair: Luc Avonds



Jari Kauppila

Applying Input-Output Approach in Economic History The Finnish Economy at the Dawn of the Great Depression of the 1930s

Input-output methodology can be put to use in economic history. Input-output tables are important tools for the compilation of data into consistent accounts as well as for economic analysis. Despite of these obvious benefits, input-output analysis has held limited appeal for economic historians.

There are still only very limited number of input-output tables available that have been constructed especially for the purpose of economic history. If input-output tables can be used for such a variety of purposes, why have there not been more studies on the subject available?

Part of the explanation can be found from the immense amount of statistical data required in constructing historical input-output tables, thus, making the construction very labor-intensive, especially if the result is to yield reliable and accurate figures. Lack of data may become a constraint in applying input-output modeling especially in economic history. Secondly, models, as a consequence of the data problems, may become too simple for the tasks they have been built for. On the other hand, complexity of any issue far in the history can make it difficult to understand the outcome, especially in sense of determining what forces are driving the results. Thirdly, most of the economic historians are interested in questions concerning growth and development. The comparative static nature of for example input-output analysis cannot explain the dynamic longer-run implications of economic growth.

However, there clearly are questions of motivation that cause the relatively narrow use of input-output methods in economic history. By extending the reasons for constructing the tables, new applications might occur. If the construction of the input-output tables is motivated also by other factors than pure analysis there might be more economic historians working on the compilation. One of these motivations is to check the consistency and the reliability of the existing time series data on historical national accounts. Tables can be used for a sensitivity and reliability analysis of the results obtained. Thus, input-output tables as such are already informative and valuable and need not be extended further unless so wanted.

Especially, applying the supply and use approach in the construction of the input-output tables can solve many of the problems economic historians are facing. In addition to providing reliability check for the estimates, the supply and use approach helps in the understanding of results from any modeling. The simple and understandable presentation form of the supply and use tables makes it easier to point out the driving forces in the economy. They also help us to understand and identify what assumptions and parameters are crucial to an outcome of a model based on the tables as they give us clear picture of the robustness of the input-output tables.

This paper presents key findings from the construction of the first historical Finnish input-output tables describing the Finnish economy in 1928 by the author. The emphasis of the paper is in the benefits of the supply and use approach in constructing input-output tables with limited data available. It will be shown that the supply and use tables can be used for reliability estimation as well as for analytical purposes. In addition, the supply and use tables as well as input-output tables will be used in order to reveal the structure of the Finnish economy and interdependencies of industries at the dawn of the Great Depression of the 1930s.

□□□□□

Natalino Martins

Symmetrising and Deflating in the Construction of the Portuguese Input-Output Tables for 1995 and 1999

Accordingly to European System of National Accounts of 1995, supply and use tables, at current and prices of year -1 , as well as, taxes, subsidies and trade margins tables, are made available by the Portuguese Institute of Statistics. These tables relate products to branches, what gives place to

the presentation of tables of production, where the branch sources of each product are quantified. In this way one may discriminate the main and secondary productions of each branch.

This paper intends to present the methods applied in the additional operations necessary to the construction of the Portuguese integrated systems of input-output tables for 1995 and 1999, at current prices and at constant prices of 1999.

In order to get product-by-product tables, symmetrizing implies to extract the costs of secondary productions from the branches where they are got, and allocate them to the branches where they are specific according to technology and use. How to do it, avoiding inappropriate negative flows and keeping the consistency within each table and between different tables, is the first methodological matter to be approached in this paper.

Deflating, across chaining price indices, may generate several kinds of problems inconsistency within each table and between different tables and negative flows. How to avoid those problems is the second matter to deal with in this paper.

□□□□

Filippo Moauro and Riccardo Corradini

Volume Measures of Input-Output Table in a Time Series Perspective a Proposal for Italy

The paper proposes a data panel model to obtain volume estimates of input-output tables. The method applies when the matrixes are compiled following a sequential approach, i.e. compilation at current prices followed by deflation and it focuses on estimation of the matrix of intermediate uses. The model uses the production price index to deflate domestic uses and the unit value index for imports, under the hypothesis that the annual differences of these indicators are not significantly dissimilar among industries. The model combines the estimates for uses with those related to total inputs, coming from a different source. First results of the application on this method for Italy are finally discussed.

□□□□

Michel Braibant

Comparison of Input-Output tables in Different Countries

The paper provides international comparisons of input-output table among most industrialized countries (Europe, United States, Canada, Japan, and Australia) . This analysis is made in structure.

Firstly, it reveals the input structure of each industry (by column), specially the technical coefficients. The use table columns show the cost of production in the corresponding industry. The industries are gathered to obtain a classification in a high level for example, agriculture, manufactured goods, construction, transport, energy, trade, services, etc. Given this industry output and the intermediate consumption obtained in the use table, it is possible to measure value added as a residual variable.

Secondly, it describes the use of different kinds of products (by row). Every product is shown as being used in intermediate consumption by industries or in final use. Final expenditure is broken down into final consumption expenditure of households, final expenditure of general

government and NPISH, gross fixed capital formation, changes in inventories and acquisition less disposal of valuables and exports.

We will see some differences of structure between countries differences in technical structure of production but also differences in share of domestic market between uses.



Session V.1.8, Friday, 9:00-10:30
Room: Room 1505 at Teaching Building No.1
RAS and other Bioproportional Methods and Applications
Chair: Jan Oosterhaven



Jane Kiringai

Updating an Input-Output Table with Insufficient Information A Kenyan Example

The use of input output tables in policy modeling and analysis cannot be overemphasized; besides the standard Leontief model, the I-O table is a critical dataset in CGE modeling as a subset of a Social Accounting Matrix, SAM. In Kenya the last survey based Input Output table was constructed in 1976 with updates through non-survey techniques in 1986 and 1990. The lack of this tool for the Kenyan economy constrains policy appraisal and modeling. The Kenyan economy has undergone several changes in the production structure after liberalisation in the mid 1990s which would not be captured by the old coefficients. A priori the share of imported intermediate inputs is expected to increase with liberalisation, the traditional RAS approach does not effectively capture the change in the coefficients. In the absence of a recent production survey, this paper uses the traditional RAS approach and the more recent entropy difference econometric approach to update the Kenyan I_O table and compares the change in the coefficients using the two approaches, to provide more dependable input output coefficients for policy relevance. The constrained optimization is done using the General Algebraic Modeling System, GAMs.



Manfred Lenzen, Blanca Gallego and Richard Wood

A Flexible Approach to Matrix Balancing under Partial Information

A common problem in compiling and updating distribution matrices or input-output tables is that of incomplete data. Missing matrix elements may be due to a variety of reasons such as costly and therefore incomplete industry surveys, or the suppression of confidential information. Unknowns almost always outnumber data points, resulting in the system being under-determined, that is exhibiting too many degrees of freedom to be solved analytically, so that certain estimation, balancing or optimization techniques have to be applied.

Despite having received mixed responses in relation to the accuracy of its results, a widely applied remedy in this situation is the bi-proportional, or RAS method, which bi-proportionally

scales a matrix \hat{A} of unbalanced preliminary estimates of an unknown real matrix A , using A 's known row and column sums. The balancing process is usually aborted when the discrepancy between the row and column sums of \hat{A} and A is less than a previously fixed threshold. A special situation arises when some of the matrix elements of A are known in addition to its row and column sums, for example from an industry survey. Moreover, some aggregates of elements of A could be known. Previous approaches to considering such partial information (the 'modified RAS' approach, or Gilchrist and St Louis' TRAS method) have largely dealt with information that assumes a particular aggregated form. We propose a RAS variant where the partial information can take any form. Our approach works by imposing constraints on arbitrary-sized and -shaped sets of elements of A . We refer to our method as 'constrained RAS', or 'cRAS'. We present an application of cRAS to an input-output system for Australia.

□□□□

Jan Oosterhaven and Bertus G. Talsma

GRAS and RAS versus Minimising Absolute and Squared Differences in Coefficients

Jackson & Murray (2004) claim that their sign-preserving minimisation of squared differences in coefficients produces a smaller information loss in updating IO transaction matrices than the iterative GRAS algorithm of Junius & Oosterhaven (2003). Here we sort out differences in measures from calculation errors, and show that the information loss needs to be measured with absolute terms when increasing and decreasing cell values occur together. The new and improved numerical results show that GRAS outperforms both sign-preserving alternatives in all but one comparison of lesser importance. They furthermore show that minimising absolute differences consistently outperforms minimising squared differences. Finally and most surprisingly, they show that the classic solution of using RAS with the negative cells excluded outperforms GRAS when IO coefficients and multipliers are compared, and outperforms both sign-preserving alternatives in all but one comparison.

■■■■■■■■■■

Friday, July 1, 2005

PARALLE SESSIONS V.2 11:00-12:30

Session V.2.1, Friday, 11:00-12:30
Room: Conference Hall 1 at Run Run Shaw Conference Center
New Developments in Compiling Input-Output Tables VI: Special Issues on I-O Data
Organizers: Jiemin Guo and Mark Planting
Chair: Erik Dietzenbacher

□□□□

Milan Jayasinghe

On the Mechanics of Measuring the Production of Financial Institutions: New Insights from Canadian Experience

With the emergence of new technologies, innovative financial instruments and the integration of financial market operations across the globe, national accountants are confronted with a series of new challenges and complexities in determining the economic output of financial institutions.

The SNA93 recommended measure, the FISIM – financial intermediation services indirectly measured - which focused around the traditional deposits and loans is currently under scrutiny as numerous views have been expressed questioning its validity in measuring the financial output. Critics have argued that the FISIM, as is defined, fails to capture the recent developments in financial markets and the technological advances, and thus undermine the true economic contribution of these institutions. Several OECD task groups have examined this issue and currently considering changes to the existing methodologies.

The goal of this study is two-fold. First, it explores a number of emerging areas in finance that are critically important for national accounting purposes. Second, by using the latest Statistics Canada Input-Output tables, it examines empirically how the recent technological advances and the global integration of financial market activity have impacted the Canadian financial sector and provides some insights as to how the current SNA methodologies could be modified or/and extended to account for these recent developments.

□□□□

Zhao Jinwen

Diagnostics High Leverage Cases and Influential Observations in Regression Analysis

In this article, we first give the probability density function of Andrews-Pregibon's diagnostic statistic. Then we suggest two new diagnostic methods for high leverage cases and influential observations in regression analysis that they based on the multivariate standard distributions, such as, Wishart distribution, distribution, Wilks distribution, and so on. We find that these methods are very successful in assessing influence. They can diagnostic the high leverage cases and influential observations in regression analysis more easily.

□□□□

it does contribute to a restraint effect to help control the environmental burden release. However, whether this tax alone is effective and, if true, how much the tax rate should be are among the controversial questions needed to solve. Moreover, based upon the advance in recycling technology and the importance of demand side management from a material cycling viewpoint, it is extremely important to introduce the appropriate method for determining the most optimal policy among the proposed alternatives. This paper constructs CGE model with WIO and SNA data based framework using the data set of 1995 Japanese Input-Output table including totally 44 ordinary commodity and energy related sectors, 24 types of waste generated both by industries and households and 5 waste disposal service industries. The objective is to explain the inter-relationship between the production activities of goods and waste disposal services on the one side and corresponding households' behavior on the other. The model is used to evaluate the proposed environmental scenarios with respect to the economic welfare impact as a whole.

□□□□

Kakali Mukhopadhyay, Debesh Chakraborty and Erik Dietzenbacher

Pollution Haven and Factor Endowment Hypotheses Revisited Evidence from India

The debate on the relationship between trade expansion and pollution has led to two conflicting hypotheses. Both of them may be based on the Heckscher-Ohlin theory that derives comparative advantages from factor endowment differentials.

On the one hand, the pollution haven hypothesis (PPH) uses “pollution permits” as an additional factor, next to labour and capital. In developing countries (say South) , environmental regulations are typically laxer and restrictions are less tight than in developed countries (say North) . Therefore, South is relatively well endowed with pollution permits and thus has a comparative advantage in the production of pollution-intensive goods. South is expected to specialize in and thus export pollution-intensive goods to North, and to import pollution-extensive goods from North. Expansion of trade then implies that dirty industries relocate from North to South. In a similar vein, rich countries have a higher willingness to pay for environmental quality and thus set higher environmental standards inducing extra production costs. Dirty industries from the developed world will be displaced from the world market by similar industries from developing countries that have lower production costs.

On the other hand, the factor endowment hypothesis (FEH) predicts that trade liberalisation will result in trade patterns with the opposite direction. Rich countries in North are typically well endowed with physical capital. Since capital-intensive goods are often also pollution-intensive, the Heckscher-Ohlin theory predicts that North specializes capital-intensive and thus in polluting goods. Therefore pollution-intensive industries will relocate production from countries in the relatively labour abundant South to those in the relatively capital abundant North. The present paper aims at contributing to test both hypotheses (PHH and FEH) for India during 1990s. In addition the paper also tests the same hypotheses for the case of India and EU (15) . The input-output method is used and suitably modified to test both the hypotheses. It is clear from the results that import related pollution is much larger than the export related pollution for India. The findings of the present work challenge the pollution haven hypothesis (PHH) because the trade liberalization policy in India has not been associated with pollution-intensive industrial development. In contrast, the study supports the factor endowment hypothesis. Not only because India's imports are more pollution-intensive than its exports, but also because the export oriented

labour requirements are much larger than its import counterpart. This is in line with the underlying assumption in the FEH that capital-intensive goods are pollution-intensive (and labour-intensive goods not).



Session V.2.3, Friday, 11:00-12:30
Room: Room 1503 at Teaching Building No.1
Regional Input-Output Modeling
Chair: Ma Zhong



Liu lin-qing and Tan li-wen

Identification of Mage-Clusters with the Method of Maxima Application to Hubei Province

This paper used input-output data to identify mega-clusters of Hubei province with method of maxima, and these clusters include 36 of 42 sectors. In these clusters, Agro-Food cluster, Finance-Retail cluster, and the cluster composed of Construction cluster, Metal-Auto cluster and Transport-Oil cluster, are taking the critical role in Hubei province's economy.



Mina Mahmoodi

Analysis of the Link between Input-Output and Population at the Regional Level The Case of Yazd Province of Iran

This paper tries to link between production active population in the framework of extended Input-output model.

This paper has two main purposes. One is to give a brief analytical review of the impact of economic changes on household income and consumption in terms of employed and unemployed households. The second is to assess the sectoral employment on the unemployed households in the province. For this purpose, the recently constructed input-output table of Yazd will be used. To disaggregate the sectoral employed households from unemployed households, the detailed households surveys at the regional level will be used for the first time at the regional level.



Ma Zhong, Chen Bo, Shang Haiyang

Compilation and Application of Local Input-output Table A Case of Gansu Province of China

This paper tries to present a practicable method to construct a local input-output table detailed

commodities inflows.

Provinces or Region's local input-out tables in china have taken the same pattern as the national table, which simply arranges the interregional import, export in quadrant II. Measuring the correlations between the industries only, this traditional input-output table is hard to calculate the interregional correlations, which should be indicated in local model. Analysis based on it is unsuitable to local economy circumstances especially in relatively open areas. This limitation restricts the Local applications of input-output technical to regional.

This paper therefore emphasizes the importance of introduction of compilation of local input- output table detailed commodities inflows. Outlining the general conception and structure of local input-output model detailed commodities inflows, the author taking Gansu province of China as example, demonstrated how to compile the table by direct decomposition using survey data from manufacture and commercial units. By means of adding indicates concerning import export data in survey booklet, estimate and divide the inflows and outflows data into two quadrants by original producing area, including intermediate cost and final consumption data in detail. The new type of local input-output table is very useful for improving the application in regional economical analysis.



Session V.2.4, Friday, 11:00-12:30
Room: Room 1504 at Teaching Building No.1
Energy Consumption in China
Organizer and Chair: Chen Xikang



Eryuan Wang

Input-Output Analysis of Energy Consumption

The author compiles China's Extended Energy Input-Output Table with Assets (2000) for making a study of China Energy Consumption. This paper analyses Chinese energy consumption with extended input-output Table with assets, mainly from 2000 table. It includes five sections as follows.

- 1) Framework and structure. In this paper, all the industries of national economy is classified as twenty sectors ,that is, nine energy sectors and eleven non-energy sectors.
- 2) The production structure and the consumption structure of energy. The difference analysis of the production structure and the consumption structure of energy, in other words, supply structure and demand structure. The author thinks that consumption structure decides production structure, while in turn production structure affects consumption structure.
- 3) Computation of energy using efficiency. The output of per unit energy consumption is an important index to reflect the system's energy efficiency. Suitable policy is to encourage the development of sectors with higher energy efficiency and limit those with lower energy efficiency at the same time. Energy conversion efficiency is another index to reflect energy efficiency.
- 4) Analysis of assets in energy sector. The production of energy sector not only needs inputs of other sectors but also needs assets, for example fixed assets, labor force, circulating funds, etc. Assets analysis of energy sector is to analyze production efficiency of energy sector itself, its purpose is to improve supply quantity and structure of energy.

5) Computation of total synthetic energy input. This paper discusses problem of total synthetic analysis of energy input by using Extended Input-output Table with Assets.

□□□□

Baiding Hu

An Analysis of Energy Intensity in China

It is widely reported that the energy intensity of the Chinese economy, measured as the ratio of total energy consumed in standard coal equivalent to the real GDP, has been declining continuously since 1989. While various studies have been carried out to explain factors driving China's energy consumption, only a few studies have focused on modeling the causes of China's decline in energy intensity. The study of Fisher-Vanden et al. (2004) used the regression approach to modeling energy intensity based on sample data collected on a large number of industrial enterprises. With two most recent input-output tables at the time, Garbaccio et al. (1999) employed the input-output approach to constructing an index on energy intensity. Fisher-Vanden et al found that production structure changes were one of the major factors causing the decline in energy intensity, whereas the study of Garbaccio et al pointed to technological changes being responsible for the decline in energy intensity. A direct comparison between the two studies can be difficult as production structural changes were not explicitly considered in the study of Garbaccio et al. However, the present study, adopting the input-output framework, considers structural and technological changes in both the final as well as the intermediate consumption stages. In doing so, the paper introduces a new method to decompose energy intensity, which is able to attribute changes in energy intensity to the two types of changes separately in intermediate and final stages of consumption. In the light of the Elasticity Coefficient Analysis method due to Schnabl (2003), the new decomposition method can also show the impact on energy intensity of differences in technologies that govern the linkage between intermediate and final consumption. This method is applied to analysing energy intensity changes for the period 1987-1997 in China. The empirical results show that production structure indeed played a larger role than technology in determining energy intensity, which is consistent with the findings in Fisher-Vanden et al.

□□□□

Baiding Hu

Modeling Sectoral Fuel Demand in China

Recently Fisher-Vanden et al (2004) have used firm level data to estimate an energy intensity function for a large number of enterprises in China. This is the first study to use the regression approach to examining the relationships between fuel prices and fuel consumption in China. One of the major findings of the study is that firms are very responsive to relative fuel price changes. However, as the authors acknowledged, the data set is comprised of only sampled enterprises and the time frame is too short to examine firms' dynamic behaviour. The present paper aims to model fuel demand behaviours in China using longer data series at the sectoral level. Unlike the Fisher-Vanden et al study, fuel price data for the present study are first estimated using China's input-output tables and industrial ex-factory price indices. Sensitivity analyses are carried out to

evaluate the estimated fuel prices. Then, using annual data on total fuel consumption by sector for the period 1985-2000, the study investigates how sectors respond to changes in the relative prices of various fuels. Four sectors in the Chinese economy are selected for the study, namely, the chemical industry, the metal industry, the non-metal materials industry and the residential sector, which are top energy as well as top coal consumers. Five fuels are considered, namely, coal, crude oil, electricity, natural gas and petroleum products, which accounted for nearly all of the total energy consumption in each of the four sectors. A translog demand system is estimated for each sector using the seemingly unrelated regression method. The results suggest that significant substitutions away from coal to alternative fuels take place in the residential as well as the metal sectors.



Session V.2.5, Friday, 11:00-12:30
Room: Room 1506 at Teaching Building No.1
Structural Issues in Development Process
Chair: Xu Jian



Ding Jingzhi, Min Qi and Lin Yi

Forecast of Crude Oil Price and Its Impact on China's Economy

Nowadays, rise of oil price affects every respect all over the world from economics to our daily life. Based on a research program of oil price forecasting with China's Shengli Petrol Group, the aim of this paper is to forecast crude oil price, employing both qualitative analysis and quantitative methods, thus help decision makers in related enterprises with right decisions.



Kenneth U. Nnadi

A Quantitative Economics of Structural Interdependencies in Nigeria's Real Sector

The literature on the Nigerian economy is saturated with the impression that the economy is suffering from disarticulation, undue external orientation and lack of structural interdependencies. This notion is casually accepted, notwithstanding the absence of any empirical study carried out for the purpose of verification or falsification. This paper set to redress this situation, with the following major objectives to generate coefficients of structural interdependence for the economy, and to provide a quantitative framework for the falsification or verification of the hypothesis that the Nigerian economy is deficient in structural interdependencies. Pursuant to these objectives, a flow table was generated from published statistics of the Nigerian real sector, comprising manufacturing, mining, and electricity consumption, weighted respectively as 31.9, 65.6, and 2.5 of total industrial production.

the newly published national economic input-output tables from 42 sectors of Hebei Province, the expenditure of technical development is used as the indicator of the innovation activity. Thus the flux index model of forward-back technical cost is established and both the beneficiaries and contributors' effects are calculated. Based on the clustering analysis, an in-depth analysis of the connection between different sectors is carried out so as to determine both contributing and benefiting sectors for and from the overflow effect of technical innovation. Accordingly, proposes are put forward concerning how to collocate the limited technical expenses among the sectors of Hebei Province.

□□□□

Zhang Jin and Qin Xiaotie

The Application of High Technology I-O Model

The western developed countries begin to present different development tendency, Knowledge economy becomes dominant, had been also been called as extensively, knowledge economy or New economy . It has produced an epochmaking influence for human social development, has finished industrial economic times, Make mankind have entered a new development stage .Now, this kind of economic form has become the tendency of world economic development, It is the outstanding characteristic of this kind of economic form to keep economy develop continuously, to consume the limit resource low, to protect the environment.

Face new challenge and situation of world economic development, how can the input-output technique reflect both knowledge economic and the basic characteristics of our country, so to Serve better for macro-management and macro- decision, It is an important problem of input-output model development. This paper of high technique model is raised to meet this situation. High technique model is essentially split high technique industries from the primary input-output model to stress high technique industries.

Our country as biggest developing country in the shunting period, Economic development is in the stage to turn from mid-term industrialization to mature industrialization period, Traditional estate still hold leading position in national economy, High technical estates is only to get breakthrough in key products, key fields , key areas, Economy development exist obviously two-yuan economical traits, This particularity of economical development demand that the macro-economical policy must accommodate the actual condition of our country, With the principle of " industrialization and knowledge " driving economy to increase, driving industrialization by knowledge , accelerating the change to New economy, Realizing the economy development fast. The development of the input-output technique Should be combined with this basic national conditions, it has larger application value.

Using the nation-wide investigate of 2002 years , We have ulteriorly disassembled input-output department on the national scheme foundation , have finished the high technology model of 2002 years of Liaoning province, and have carried out preliminary analysis for Liaoning economy.

□□□□

Ruan Dacheng

Research on Operation Efficiency Discrepancy in Shanghai Banking Industry ---- Empirical

END