Frontiers and Extensions

Tourism Satellite Accounts as an extension of Supply-Use Tables

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Dear IIOA member,

The spectacular evolution of tourism as a major source of income and employment worldwide has spurred the development of instruments that enables its accurate measurement. Among them, Tourism Satellite Accounts (TSA) has become accepted as a tool for the statistical description of tourism: In 1999, only six countries had such accounts; only ten years later TSAs were compiled in more than 70 countries. And this does not include TSAs for regions or other sub-national territories. This is clear evidence of the success of this tool.

As it with other satellites of National Accounts, TSAs rely on the character of "tourism" as a complex phenomenon. Indeed, tourism is so complex that it cannot be completely or explicitly measured even in these in these rather fulsome accounts. Tourism has been termed a "transversal" phenomenon, because it affects several economic components on both the demand- (household consumption expenditure, current intermediate cost of firms, exports…) and supply-side, given that it influences the many different industries that supply goods and services to the fulfil the activity's demands. In this vein, TSAs help firstly by defining the interindustry economic structure of tourism and, secondly, by providing adequate overall figures of the magnitude of its many facets. TSAs can be described as a series of accounts and tables that, based on the methodological principles of the National Accounts, present the different economic parameters for tourism in an interrelated manner for a specific reference date.

The United Nations' World Tourism Organization (UNWTO, 2008) identified ten types of tables referring to different variables, with relation to both tourism supply and demand, i.e.: (1) in-bound tourism; (2) domestic tourism; (3) out-bound tourism; (4) internal tourism consumption by products; (5) production accounts of tourism industries and other industries (at basic prices); (6) domestic supply and internal tourism consumption, by products; (7) employment in the tourism industries; (8) tourism fixed capital formation; (9) tourism collective consumption; (10) and nonmonetary indicators.

With regard to demand, TSAs identify different types of tourists and their expenditures both of which are bifurcated into domestic and international components. The expenditures are also broken out into categories of goods and services demanded. For supply, TSAs analyze such aspects as the structure of the production and costs of the tourist industry, the types of inputs needed to develop the activity, the level of investments in productive capital, the role of the Public Administration as a direct supplier of such services or as a contributor to the same.

Each of account or table is intrinsically useful inasmuch as it provides information on a different aspect of tourism required to fully grasp and evaluate the role of tourism in an economy. Still, what really makes them unique, and therefore is a prime reason for the acceptance and expansion in the use of TSAs, is set of key global macroeconomic variables they contain. For instance, "Tourism GDP" readily summarizes tourism's contribution to the entire economy.

Perhaps due to the success of TSAs, in the increasing role of tourism, and to rises users' demands, they have been expanded even further. Three main extensions now under development by various institutions are (1) the construction of regional TSA, (2) improved treatment of vacation homes, and (3) TSA as an analytical tool.

The distributional effects of tourism on subnational territories is undoubtedly important, and remains a crucial future extension of TSAs for many countries. Finding ways to alleviate statistical offices of the vast statistical requirements for creating interregional tourism matrices and the methodological challenges of benchmarking them to the national accounts remain a focus of this extension.

Spain is one country that has focussed efforts on developing regional TSAs. I am presently developing a specific TSA for the Madrid region. The Community of Madrid is a reasonable laboratory to test the capability of TSAs for dealing with tourism segments such as business, city, and cultural tourism using specific extensions to the core of the UNWTO-recommended framework.
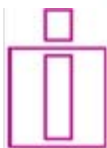
The treatment of vacation homes simultaneously involves challenges to both TSAs and National accounts, given their empirical and conceptual problems of measurement (i.e., the traditional problem of National Accounts of "own dwelling imputed rents" and balance of payments problems, given the increase in people having a second home abroad).

Unfortunately, the success of TSAs as statistical tools has not been paralleled with similar development of their analytical potential. In fact, current literature and applications of economic impacts of tourism use traditional I-O techniques, instead of the more sophisticated and perhaps appropriate TSA-specific approaches. In a recent paper, I suggest and evaluate some example TSA-founded methods.

A detailed description of the contents and compilation of TSAs lead directly to the input-output world: TSAs are one of the most obvious and relevant examples of the application of I-O Supply and Use tables. The above chart syummarizes the compilation procedure and the content of a TSA based on its link to the supply and use tables.
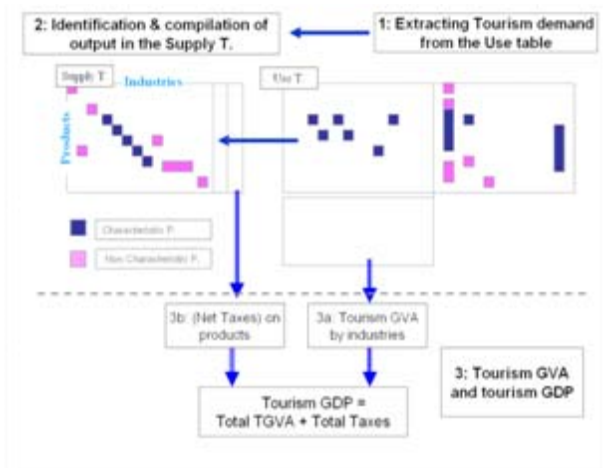
The starting point of tourism from an economic point of view is the expenditure made in a system linked to the tourism trips. For that reason, the first necessary step in compiling a TSA is to "extract" tourism demand from the total demand figures in a Use table.

In a Use table includes final consumption expenditure of both resident and nonresident households. Final consumption expenditures cover both tourism and no tourism consumption; therefore, through specific sources and methods, it follows that TSA compilation must determine the tourism's share of final consumption, albeit broken out by commodities consumed (transport, lodging, etc.). In that way, we obtain tourism demand detail, illustrated by those shadowed areas in the use table of the chart.

The second step is to identify the industries that supply those commodities demanded by tourism. This task is performed using the Supply table. Specifically using the production matrix, we identify those the industries that provide goods and services to meet tourism demand. This exercise also includes extracting portions of appropriate cell-based flows elaborated in the supply table.

What really makes the TSA approach advantageous compared to other methods is that it yield both Demand and Supply estimates that can be synthesized or balanced to achieve a realistic measure of tourism value added GVA and, hence, of tourism GDP. This is illustrated by the step 3 of the chart. As can be seen, the result is a concept relatively similar to GDP but in this case restricted to tourism.

Without getting into details, we should note that the processes of extracting tourism from the SUT and National Accounts are only feasible if robust tourism statistics are available. The main requirements on this count tend to be generated from regions' tourism expenditure surveys. Obtaining such data in a statistically robust manner can be quite resource-demanding. Hence, the development of regional TSAs runs against the very pragmatic (and wide-ranging) problem of constrained resources especially in tough economic times when public budgets are highly scrutinized if they are not reduced.

Chinese Input-Output Association

The Chinese Input-Output Association (CIOA) was founded in March 1987. It was co-sponsored by Renmin University of China's Academy of Mathematics and Systems Science and the Chinese Academy of Sciences of the National Bureau of Statistics of China. Its main objective is the advancement of input-output analysis in China, both in theoretical research and its applications in various areas.

CIOA organizes conferences every three years, usually in August. Since its foundation, it has organized eight conferences. The first conference was held in Jiujiang City, Jiangxi Province, in October 1988. The latest and 8th CIOA conference took place August 17-19, 2010, in Weihai, Shandong Province. About 150 researchers and practitioners from universities, research institutions, national and local bureau of statistics attended the conference. Besides regular conferences, CIOA also organizes thematic meetings in years with no official conference. For example, in 2009, a thematic meeting focused on the effect of international financial crisis on China's economy, and the 2008 meeting's focus was the compilation and application of for 1992-2005 time-series of Chinese I-O tables in year 2000 prices.
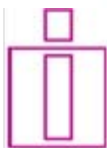
Chinese Input-Output Association (ctd)

CIOA has long felt a close tie to the international input-output world. Indeed, because he attached much importance to I-O research in China, Professor Wassily Leontief visited China in 1986 praising China' contribution to I-O development. Further Professor Chen Xikang, Honorary President of CIOA, was a founding member of the International Input-Output Association (IIOA) and even served as council member for two terms. He was installed as an IIOA Fellow in 2010 at the 18th IIOA conference in Sydney.

In 2005, in collaboration with Renmin University of China, the CIOA co-organized the 15th International Conference on Input-Output Conference in Beijing. Some internationally renowned I-O researchers also have attended CIOA conferences and have had long-term collaborations with the CIOA. For example, in 1997 Professor Karen Polenske of MIT attended the 5th CIOA conference in Changchun, Jilin Province. Professor Erik Dietzenbacher of the University of Groningen, Vice President of IIOA and the Honorary President of the CIOA, visited the Graduate University of the Chinese Academy of Sciences and taught a one-week course on advanced I-O analysis in June 2007.

Professor Hasebe Yuichi of Yokohama National University and Professor Erik Dietzenbacher addressed the 8th CIOA conference with keynote speeches. Professor Erik Dietzenbacher also lead an evening course on scientific writing to Chinese young researchers at that conference.

Professor Geoffery J. D. Hewings, the IIOA president, will also visit China in October 2010, the Chinese Academy of Sciences, together with CIOA, will organize a workshop during his visit.

CIOA plays an active role in promoting China's I-O research. Every three years, it publishes proceedings of selected papers presented at each conference, which are distributed free of charge to main universities and institutes. In addition, since the 6th conference, to encourage more young researchers to commit themselves to I-O research, the CIOA has awarded prizes to the best papers presented at CIOA conferences.

CIOA has it's a website in Mandarin at http://www.iochina.org.cn/. The website provides information on its council and main members, recent progress in Chinese I-O research, China's I-O tables in MS Excel format, and other information, including how to join CIOA, news from IIOA and links to other key I-O sites worldwide, etc. CIOA has plans for an English version of its website.

Council of the CIOA

Leontief Memorial Prize 2010

This 1,000 US$ prize is awarded to the best paper by authors (all less than 40 years old) presented at an International I-O Conference. The prize-winning paper is published in *Economic Systems Research*, the Journal of the IIOA. From the submissions received by the selection committee in early 2010, the papers "A structural growth model and its applications to Sraffa's System" by **Wu Li** (Shanghai University) and "Underestimation of the performance of the EU carbon dioxide emission reductions via external trade" by **José M. Rueda-Cantuche** (European Commission's Joint Research Centre-IPTS) were chosen as winners at the 18th International I-O Conference.

Geoffrey J. D. Hewings
Chair of the Selection Committee
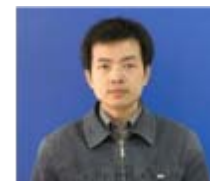
A structural growth model and its applications to Sraffa's System

Wu Li (Shanghai University)

This paper presents a discrete-time growth model based on the classical growth framework to describe the disequilibrium dynamics of an m-agent, n-good economy. And an exchange function is formulated to describe the exchange process among agents, which serves as the exchange part of the growth model. For concreteness, a Sraffa (1960) system is used to exemplify the growth model and simulations are performed. First, business cycles in the growth model are discussed: they are found to be limit cycles in some sense. Then a method is presented that computes the equilibrium land rent in a Sraffian system including homogeneous land: fluctuations of land rent are simulated. Finally, the Sraffa system is extended to a two-country economy in which dynamic economic effects of free trade and trade protectionism are investigated.

Underestimation of the performance of the EU CO$_2$ emission reductions via external trade

José M. Rueda-Cantuche (European Commission's Joint Research Centre-IPTS)

This paper deals with the identification of appropriate measures of the performance of the European Union in reducing its carbon dioxide emissions via external trade, both at the aggregate and at the industry levels.

The standard measures based on the Leontief quantity model and profusely used by input-output practitioners and industrial ecologists result in underestimation of the actual performance of the EU in reducing its carbon dioxide emissions via external trade. Briefly, this is because standard measures currently available in the literature appear to assign the EU less-than-actual exported air emissions (carbon dioxide). Interestingly, this is not true for each and every industry.

From a methodological viewpoint, this finding is justified by a new approach that estimates unbiased and statistically consistent emission multipliers. The approach has three important advantages: (a) it improves the accuracy of the environmental impacts assessed; (b) it computes unbiased and consistent input-output multipliers; and (c) the Leontief inverse is not needed to produce the multipliers—only Supply and Use matrices are required. In addition, another advantage of this approach is that all requisite data for the calculations are readily available from most countries' statistical offices.

Conferences

8th Chinese Input-Output Conference, Weihai, Shandong, China August 17-19, 2010

The 8th Chinese Input-Output Conference was held on August 17-19, 2010 in Weihai, Shandong Province, China. It was organized by the Chinese Input-Output Association (CIOA) and hosted by School of Management, Shandong University. Around 150 scholars from universities, institutes, national and regional bureaus of statistics attended this conference. It was the largest conference of CIOA in terms of the number of participants. More important, more young researchers presented their work at both plenary and paralel sessions.

The scientific committee received more than 170 papers, mainly related to seven topics: 1) input-output theory and methods; 2) compilation of input-output tables; 3) application of input-output analysis in economic restructuring, employment and economic growth; 4) application in industrial economics and macro-economic policy evaluation; 5) application in regional economics and interregional coordinated development; 6) application in international economics and international trade; 7) application in natural resources and environment issues.

In order to enlarge the communication of Chinese IO researchers with international input-output experts, CIOA invited Erik Dietzenbacher, Professor in University of Groningen of the Netherlands and Vice President of International Input-Output Conference, as well as Hasebe Yuichi, Professor in Yokohama National University of Japan

and Vice President of Pan Pacific Association of Input-Output Studies, to give keynote speeches. Professor Erik Dietzenbacher also gave an evening course on scientific writing.

As a tradition of CIOA, this conference issued "the Outstanding Paper Award of the 8th Chinese Input-Output Conference", seven papers mainly written by young authors were awarded.

14th Annual Conference on Global Economic Analysis, Venice, Italy June 16-18, 2011

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

See more information at: GTAP Annual Conference 2011
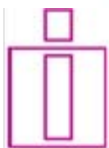
In the next ESR issue

Economic Systems Research – Journal of the IIOA

Volume 22   *Number* 3   *September 2010*

We are pleased to announce that Economic Systems Research has been accepted for inclusion in the Social Sciences Citation Index®, a very important achievement for the Journal and its Editors, and a reflection on the high quality of articles published in the Journal. The Journal will receive its first Impact Factor in 2011.

I. Mongelli, F. Neuwahl & José M. Rueda-Cantuche. *Integrating a household demand system in the input-output framework. Methodological aspects and modelling implications*

In this paper we argue that an accurate representation of household consumption behaviour is central to the analysis and comparison of policy interventions addressing sustainable consumption. Therefore, we propose to extend an Input-Output model with a specific household consumption model, at the core of which is a system of equations explaining the allocation of the households' overall expenditure across different purposes such as buying food, the consumption of fuel for heating or electricity for cooling, education of children or travelling in terms of total expenditure and relative prices. This paper shows that the integration of a specific module for household consumption in a standard Input Output model is an improvement for the analysis of the policies aimed at altering consumer behaviour.

J. R. San Cristóbal. *An environmental/input-output linear programming model to reach targets for GHGs emissions set by the Kyoto protocol*

The Kyoto Protocol contains legally binding targets for greenhouse gas (GHGs) emissions for industrialized countries. The importance of this agreement and the elaboration of a climate change policy make it necessary to define and establish national policy measures and to bring into force environmental regulations that will reduce GHG emissions. Extending our knowledge of the economic-ecologic relationships that exist within the production sphere can assist in defining and implementing successful environmental policies. In this paper, an Environmental/Input-output linear programming model is proposed. To develop the model we consider the input-output model as a linear programming problem combining two types of restrictions: environmental restrictions establishing GHG emission targets, and economic restrictions. The model shows how targets for the emissions of GHGs may be reached and can affect production activity composition.

W. Koller & R. Stehrer. *Trade integration, outsourcing and employment in Austria: a decomposition approach*

Outsourcing and trade integration of advanced countries is debated with respect to employment effects in particular for low educated workers - at least in relative terms. We study the employment effects - differentiated by educational attainment levels - of changes in the patterns of trade integration and outsourcing in the Austrian economy over the periods 1995-2000 and 2000-2005 using hierarchical decomposition analysis based on deflated input-output tables. Outsourcing is modelled as changes 9in the shares of domestically produced intermediates in total intermediates. A similar decomposition of the final demand vector allows to draw conclusions on the overall employment effects of trade integration. The results suggest that the expected negative employment effects of outsourcing and rising import penetration have been overcompensated by increasing exports. Thus, the overall employment effects of Austrian trade integration have been positive for all educational attainment groups. However, whereas the total effects have been strongest for medium and high educated workers over 1995-2000, employment of low educated workers have been strongest and positively affected over the period 2000-2005. This pattern can be explained by a more sluggish export performance together with stronger negative effects of outsourcing and import penetration in medium and high-skill intensive products.

A. Smajgl & L. Liagre. *Analysing implications of limited water availability for great barrier reef catchments*

Economic structure is one of the factors that determine regional vulnerability. A regional economy that depends on increasingly scarce resources is vulnerable. Climate change is predicted to change rainfall patterns in the Great Barrier Reef (GBR) region. Understanding which economic sectors depend on water as an input factor helps comprehending regional vulnerability.Structural aspects of economies are often analysed by Input-Output (IO) models. This paper integrates for the GBR region water availability in an IO analysis and compares the understanding gained from monetary IO multipliers with multipliers that integrate water. This paper argues that traditional IO multipliers can mislead regional decision makers and lead to higher regional vulnerability if restraining water resources are not taken into account.

F. Salgueiro Perobelli, E. A. Haddad, J. Bonet Morón & G. J. D. Hewings. *Structural interdependence among Colombian departments*

This paper analyzes structural interdependence among Colombian departments. The results show that Bogotá has a large influence on the other regional economies through the power of its purchases. Additionally, a centre-periphery pattern emerges in the spatial concentration of the effects of the hypothetical extraction of any territory. From a policy point of view, the main findings reaffirm the role played by Bogotá in the recent polarization process observed in the regional economies in Colombia. Any policy action oriented to reduce these regional disparities should take into account that, given the structural interdependence among Colombian departments, effects of new investment in the lagged regions would flow through Bogotá and the major regional economies.

BOOK REVIEW by Utz-Peter Reich; *The National Accounts as a Tool for Analysis and Policy: In View of History, Economic Theory and Data Compilation Issues, by F. Bos*
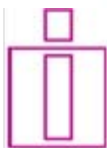
Highlights in journals

M. Lenzen, "Dealing with double-counting in tiered hybrid life cycle inventories: a few comments", *Journal of Cleaner Production*, vol. 17(15), 2009, pp. 1382-1384.

Strømman et al. (2009) developed a method for dealing with double-counting in tiered hybrid LCA. Their algorithms identify overlaps of physical and monetary flows in the process and input–output parts of their hybrid data base, and then remove double-counted monetary flows in the input–output system using structural path analysis. Strømman's adjustment criterion is that the set of input–output paths to be removed should have the same monetary value as the process system flow that it overlaps with. I comment on Strømman's methods with respect to the accuracy of the correspondence between process and input–output systems. I argue that the set of double-counted paths to be removed from the input–output system is better selected on the basis of sector definitions than monetary value.

M. Lenzen & R. H. Crawford, "The path exchange method for hybrid LCA", *Environmental Science & Technology*, 43 (21), 2009, pp 8251–8256

Hybrid techniques for Life-Cycle Assessment (LCA) provide a way of combining the accuracy of process analysis and the completeness of input–output analysis. A number of methods have been suggested to implement a hybrid LCA in practice, with the main challenge being the integration of specific process data with an overarching input–output system. In this work we present a new hybrid LCA method which works at the finest input–output level of detail: structural paths. This new Path Exchange method avoids double-counting and system disturbance just as previous hybrid LCA methods, but instead of a large LCA database it requires only a minimum of external information on those structural paths that are to be represented by process data.

M. C. Lima & M. A. Cardenete. "A European Union Price Policy Model for Southern Spain" *The Review of Regional Studies*, vol. 39(1), 2009, pp. 99-110.

Social Accounting Matrices (SAM) are databases that focus on the intersectoral relationships in a given economy that close the circular flow of income. This article deals with the European Regional Development Fund (ERDF) in Andalusia, a Spanish region that European regional policy classifies in Objective 1. We apply the Leontief model to selected SAMs for the years 1990, 1995, and 1999, in order to develop a price model for assessing the impact of this funding on aggregate and sectoral prices.

L. Yang & M. L. Lahr, "Labor productivity differences in China 1987-1997: An interregional decomposition analysis", *The Review of Regional Studies*, 38(2), 2008, pp. 319-341.

The literature on regional disparities in China is both broad and deep. Nonetheless, much of its focus has been on the effects of trade liberalization and national policies toward investment in interior provinces. Few pieces have examined whether the disparities might simply be due to differences in industry mix, final demand, or even interregional trade. Using two newly published multiregional input-output tables and disaggregated employment data, we decompose change in labor productivity growth for seven regions of China between 1987 and 1997 into five partial effects—changes in value added coefficients, direct labor requirements, aggregate production mix, interregional trade, and final demand. Subsequently we summarize the contributions to labor productivity of the different factors at the regional level. In this way, we present a new perspective on recent causes of China's interregional disparity in GDP per capita.

K. Feng, K. Hubacek, D. Guan, M. Contestabile, J. Minx & J. Barrett, "Distributional effects of climate change taxation: the case of the UK", *Environmental Science & Technology*, 44 (10), 2010, pp 3670–3676

Current economic instruments aimed at climate change mitigation focus mainly on CO2 emissions, but efficient climate mitigation needs to focus on other greenhouse gases as well as CO2. This study investigates the distributional effects of climate change taxes on households belonging to different income and lifestyle groups; and it compares the effects of a CO2 tax with a multiple GHG tax in the UK in terms of cost efficiency and distributional effects. Results show that a multi GHG tax is more efficient than a CO2 tax due to lower marginal abatement costs, and that both taxes are regressive, with lower income households paying a relatively larger share of their income for the taxes than higher income households. A shift from a CO2 tax to a GHG tax will reduce and shift the tax burden between consumption categories such as from energy-intensive products to food products. Consumers have different abilities to respond to the tax and change their behavior due to their own socio-economic attributes as well as the physical environment such as the age of the housing stock, location, and the availability of infrastructure. The housing-related carbon emissions are the largest component of the CO2 tax payments for low income groups and arguments could be made for compensation of income losses and reduction of fuel poverty through further government intervention.

A. I. Guerra & F. Sancho, "Measuring energy linkages with the hypothetical extraction method", *Energy Economics*, 32(4), 2010, pp. 831-837.

Efficiency improvements in energy use are nowadays one of the main concerns of policy makers and plans of action have been designed to achieve targets such as those of the Kyoto protocol. The measure of their success will depend on the degree that these plans spread through the system. In this light the inter-industry linkages turn out to be quite significant for the effectiveness of policies. We propose in this paper an adaptation of the hypothetical extraction method to measure the role of energy and non-energy efficiency gains in an interconnected, multisectoral economy while relating the results to the rebound effects literature.

BOOK REVIEW
H. Weisz & A. Tukker, "Handbook of Input-Output Economics in Industrial Ecology", by S. Suh (ed.) *Journal of Industrial Ecology*, 13(5), 2009, pp. 830-832.
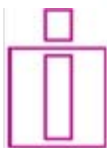
In memory of Prof. Alexander Granberg (1936-2010)

Alexander Granberg, 74, a prominent Russian scientist and Full Member of the Russian Academy of Sciences as well as some foreign academies, a laureate of national and international prizes for scientific achievements in the field of economics, Chairman of the Council on Studies of Productive Forces, and Chairman of the Council on Regional Studies of the RAS, died on August, 22, 2010, in Moscow.

Alexander Granberg was born June, 25, 1936 in Moscow. After graduating the Moscow State Economic Institute, he began a scientific carrier in Moscow. In 1963, however, he decided to depart for Novosibirsk, as did many Moscow scientists who appreciated the bright prospect of establishing a fresh, unique scientific center in Siberia – Academic Town near Novosibirsk.

The scientific carrier of A. Granberg developed rapidly. He got his first academic degree in the age of 27 for a thesis on "Problems of the Planned Input-Output Balance in Natural Units" and a second at the age of 32 for his dissertation "Analysis and Planning Input-Output Links (Economic-Mathematical Studies). He became Professor of Novosibirsk State University at the age of 35. At the age of 48 years, he was elected into the Academy of Sciences of the USSR as Corresponding Member and elevated to Full Member at age 54.

For 20 years, Alexander Granberg worked at the Institute of Economics and Industrial Engineering in the Siberian Branch of the Academy of the USSR (IEIE) at Novosibirsk. And for 20 subsequent years (beginning from 1991) he worked in Moscow for the Council on Studies of Productive Forces part of the Russian Academy of Sciences and of Ministry of Economic Development.

Scientific interests of A. Granberg expanded with his professional growth. In the beginning of his career Alexander developed **planned input-output balances in natural units**— the first in the USSR, as well as the **methods of economic-mathematical analysis of I-O balances**. He maintained this interest even late in his career, when he proposed a modified method for analyzing I-O tables in the SNA terms. After his move to Siberia, A. Granberg devoted himself to **the study of spatial and regional economic issues,** which required developing an adequate toolkit to analyze interregional economic interactions.

In the Novosibirsk IEIE he lead studies in the **field of mathematical modeling** of economic processes:

(1) *Construction, analysis and application of the models that combined sectoral and regional aspects of the national economy (interregional I-O models);* These were balanced models, optimization models, and models of economic interaction. They were used to study national and world economies, as well as tools for forecasting, reconciling national and regional interests, for simulating various the state policies at subnational levels.

In the spatial scopes of these studies were Siberia and the far east of Russia; forecasts were performed via an interregional I-O model to validate expectations for territorial distributional shares of the economies of both the USSR and the Russian Federation. The model complex for forecasting the world economy was predicated on demand figures from the UN Secretariat, and scenario computations were performed for the long-run; economic interactions of the republics of the former USSR were modeled using of coalitional analysis.

(2) *Development of the systems (complexes) of models for forecasting and planning national economy;* In late 1960s, in collaboration with A. Aganbegyan and K. Bagrinovsky a system of models for national economic planning was proposed that allowed for studying possible outcomes from decentralized planning and for making consistent solutions for economic subsystems (with the use of market mechanisms). Later the system modeling was complemented with new mechanisms and algorithms. In 1980s the model complex SIRENA (Synthesis of models of regional and national economy models) was constructed with the connection of sectoral and regional blocks for different users. This complex was used to estimate the effects of regional and industrial projects, given resource and technological constraints. It has since been modified to give full consideration of recent changes in economic and legal conditions.

(3) *Textbooks of economic modeling on which many generations of economists-mathematics were taught in Novosibirsk State University (NSU);* These textbooks ("Mathematical models of the socialist economy" (1978), "Dynamic models of the national economy "(1985) and "Modeling of the socialist economy" (1988)) focused on applications of mathematical
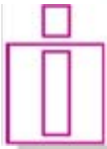
In memory of Prof. Alexander Granberg (1936-2010) – (Ctd)

modeling in economics. They covered such topics as: the role of mathematical modeling in the development of theoretical and applied economics; national economic criteria of optimality and the multiobjective optimization; cost-benefit analysis under the social welfare maximization and the labor cost minimization; models with production, distribution and welfare feedbacks; the development and generalization of Leontief's input-output model; the mathematical analysis of optimization I-O models solutions; macroeconomic models of economic growth; the analysis of optimal economic growth trajectories; typologies of applied dynamic I-O models; dynamic models with backward recurrence; principles and problems of the system modeling of the national economy; the theoretical basing of subsystems' economic interactions models; an applied model of interaction of the state and population in the sphere of labor and consumption, the model of regions' economic interaction.

These textbooks were well-known under student nicknames of "Granberg's red book" and "Granberg's blue book." Since they were protected through the word "socialist" in their titles, they were one of the few basic modern micro- and macroeconomics texts available to students when only the official socialist political economy was allowed to be taught. This attribute later distinguished the competitiveness of the NSU graduates.

Under the direction of A. Granberg the field of the **theory and methodology of spatial and regional economics** developed the basics for analyzing national economies as a system of regions interacting in a state-regulated market. The analytical framework proposed is based on the concepts of resource-technological opportunities of regional development, of accessible effective states and a core of a multiregional system, and of spatial economic equilibrium

In the IEIE works on the development of optimal territorial shares and of inter-republic and interregional interactions pioneered the quantitative assessments for the states of core and of economic equilibrium of multiregional economic system of the USSR, and later in the 1990s for Russia. The consequences of the disintegration of the USSR, of foreign trade liberalization, of the transition in the nation's economic relations with former Soviet republics were estimated.

In 1991 A. Granberg returned to Moscow as the Chairman of the Council on Studies of Productive Forces. Leading this institute, A. Granberg continued his studies on the effects of transition upon regional development.

He also studied basic transformational tendencies in Russian economic space during the 1990s, such the nation's increasing heterogeneity and spatial disintegration and the rise of new problem regions.

The findings and recommendations of these studies became constituents of basic federal documents for regional and spatial policy that guides Russia's mid- and long-term social and economic development. It is also part and parcel to the Federal Target Program "Reduction of differences in the social and economic development of regions of Russian Federation for 2002-2010 and till 2015."

In the effort to promote his ideas about the adequate regional policy A. Granberg exceeded the bounds of pure science and became an active public figure. In 1990 he was elected as People's Deputy of Russia from one of Novosibirsk constituencies and worked as the Chairman of the Committee of Supreme Soviet of Russia on Interregional Relations, Regional Policy and Cooperation in 1990-1993. At the same time he was Advisor of President Boris Eltcin.

In the field of **developing the scientific basics of regional policy, the strategies and programs of regional development** A. Granberg emphatically insisted on distinguishing the regional policy as a subsystem of federal and sub-federal socio-economic policy.


In the 1990s the Russian government decided to trust the "invisible hand of market" and all regional policy measures were explicitly rejected. In this atmosphere A. Granberg completed a series of works wherein he systemized objectives and requirements to support normative and legal concepts as well as institutional regional policy.

He also developed tools to assure its realization including mechanisms of economic regulation and federal programs of regional development. At his urgent request, beginning from 1992, the principal theses of regional policy become constituents of program documents of the government of the Russian Federation.

In developing modern regional strategies he adopted some approaches that were approved earlier, in 1970s and 1980s, in the course of studying the structural and dynamic regularities of Siberia's development in the system of the national economy based upon interregional I-O models.

A. Granberg **development of regional development programs** gave special attention to the. Under his scientific direction the federal target programs of socio-economic development were developed for the Far East and Lake
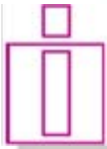
Baikal and for Siberia for the period through 2005. The basic findings of the complex forecast of development and location of productive forces became components of a General Scheme of the Settlement of Russian Federation that gained status as a governmental document.

In the field of the **development of large regional transportation projects** A. Granberg was engaged in evaluating transport communications development projects that were designed to stimulate the socio-economic development of Russia's vast frontier territories and, hence, solve some important national and global problems. A component of this direction was the elaboration of special legal and financial mechanisms to facilitate implementation of these projects.

In more recent times, under scientific direction of A. Granberg a new program of the development of Baikal-Amur Railway region was developed, as well as the complex proposals on the development of Northern Sea Route and of adjacent Arctic regions. The "Continent-Sakhalin" railway [project is being embellished, as are its links to alternative projects designed to modernize the Pacific Far East transport system and adjacent countries of East Asia.

In late 2000s, after 15-year of neglecting federal I-O activities, A. Granberg started to use multiregional I-O models for long-term forecasting. At the request of Ministry of Economic Development, forecasts of spatial development of the Russian economy were performed with some regularity using data from the Novosibirsk IEIE. Adopted in 2008, the forecasts for the period till 2020 and 2030 became constituents of the federal government's "Concept of Long-Term Socio-Economic Development of Russian Federation till 2020."

A. Granberg is the author of more than 500 scientific works published in various languages. He created the school on studies of interregional economic interactions and transformations of economic space presented with academicians, professors, and researchers, such as V. Suslov, S. Suspitcyn, V. Seliverstov, A. Rubinshtein, L. Polishchuk, Yu. Ershov, N. Ibragimov, L. Melnikova, E. Kolomak, V. Zaikin, B. Melentyev, A. Chernyshev, N. Ripinen, N. Bobyleva and others. Alexander Granberg will forever be honored in the memories of his followers and students.

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International Projects

The OPEN:EU project is working to develop a comprehensive and foresighted set of EU consumption indicators that can facilitate greater transparency in decision making and high-quality policy and transform the European Union (EU) to a One Planet Economy by 2050.

The EU FP7-funded project is half way through its two-year period of study. NTNU Trondheim, SEI York, GFN, and the University of Twente have been working together to develop the first prototype of EUREAPA, an interactive online scenario modeling and policy assessment tool that will help policymakers understand the environmental pressures associated with consumption activities. It is based on a combination of multiregional input-output modeling and of ecological and water footprint accounting.

NTNU in particular has developed a hybrid model framework that maintains a high level of product detail from the footprint accounts while combining it with the input-output part of the model. For further information see: Open:EU Project

New databases

Statistics New Zealand

Statistics New Zealand has released Supply and Use tables in basic prices for the year ending March 2007. The tables have a breakdown of 85 industries and 190 products and are available on the Statistics New Zealand website: Statistics New Zealand