



UNITED NATIONS
DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION

19th International Input-Output Conference
13-17 June 2011, Alexandria, VA, USA

Keynote Speech:
Input-Output Analysis and Contemporary Official Statistics

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Chairperson,
Colleagues,

I am honoured to be asked to speak at this important meeting and would like to thank the organizers for this opportunity. I have submitted a formal paper to the Conference organizers that spells out in more detail what I am going to talk about today. Time will only allow for me to draw out some of the key themes and I encourage those of you who are interested in some of the detail to read the paper.

I will start by saying a few words about my own organization and the global statistical system with which we are part. The global statistical system can be envisaged as the national and international organizations that provide official statistics at the global, regional and national levels, together with the mechanisms that bind those organizations, including the annual meetings of the United Nations Statistical Commission, the United Nations Fundamental Principles of Official Statistics and the international statistical standards and best practice guidelines developed under the umbrella of the Statistical Commission.

The United Nations Statistical Commission was established in 1947; it is recognized as the apex entity of the global statistical system. It brings together the Chief Statisticians from around the world. It is the highest decision making body for international statistical activities, especially the setting of statistical standards, the development of concepts and methods and their implementation at the national and international levels. The Statistical Commission considers special issues of concern in international statistical development, methodological issues, coordination and integration of international statistical programmes, support of technical cooperation activities in statistics, and organizational matters. The Commission strives to maintain a balance between matters of current concern and the longer-term development aspects of the global statistical system. The Statistical Commission oversees the work of the United Nations Statistics Division.

The United Nations Statistics Division provides the secretariat for the Statistical Commission. In addition, we prepare general statistical compilations in print and online, including the Statistical Yearbook, Monthly Bulletin of Statistics, and statistical publications in specialized fields including demographic and population statistics, international merchandise trade, national accounts, industrial commodities production, energy, social statistics and indicators, gender statistics and human settlements. My Division also prepares a wide variety of technical standards, recommendations and special studies approved by the Statistical Commission. A fourth, and critically important, role for the Division is to provide and support the coordinating mechanisms to ensure overall coherence among the activities of the international organizations that form part of the global statistical system. Finally, the Division plays a critically important role in building and sustaining statistical capability in many Member States, and in providing a coordination mechanism for this activity among our international partners.

I note that the International Input-Output Association was founded in 1988 with the objective of the advancement of knowledge in the field of input-output analysis, including improvements in basic data, theoretical insights and modelling and applications of input-output techniques. With its diverse membership of statisticians, economists, government officials, engineers, academics and managers, and through its conferences and, importantly, the *Economic Systems Research* journal, the Association plays an important role in promoting informed decision making, which is the ultimate objective of official statistics work world-wide.

Let me move now to a little bit of history.

Input-output analysis, as a theoretical framework and as an applied economic tool in a market economy, has a long history. The framework was developed by Wassily Leontief with the construction of the first input-output tables for the United States for the years 1919 to 1929. Leontief was to be awarded a Nobel Prize for his pioneering work in input-output analysis.

In parallel, national income accounting had new beginnings, also in the 1930s, through the work of Simon Kuznets in preparing national income estimates for the United States in the context of the Great Depression. Underpinned by John Maynard Keynes *General Theory of Employment, Interest and Money*, published in 1936, national accounting received a further boost through the work of Richard Stone and James Meade in preparing estimates of national income and expenditure for the United Kingdom in a system of macroeconomic accounts and tables for economic planning and government budgeting purposes. Stone was to follow up with the preparation of an annex to a United Nations report, originally commissioned by the League of Nations and published in 1947, on measurement of national income. In July 1952, Stone was asked by the then United Nations Statistical Office to chair a committee of experts, which (within the space of one month) produced *A System of National Accounts and Supporting Tables 1953*, otherwise known as SNA 1953. (As an aside, I note that it took the international statistical community about seven years to reach agreement on the 2008 edition of the SNA!)

During the 1960s there was extensive international discussion on the various frameworks, the experiences of countries, and the data needs of international agencies. Based on a report of an expert group constituted by the United Nations and led by Stone, the *1968 System of National Accounts, Studies in Methods* was adopted by the United Nations Statistical Commission. It integrated, for the first time, the input-output framework into the core system of national accounts. Stone was awarded the Nobel Prize in Economic Science in 1984 “for having made fundamental contributions to the development of the system of national accounts and hence greatly improved the basis for empirical economic analysis”. In 2008, the United Nations Statistical Commission adopted *The System of National Accounts 2008* (SNA 2008) to replace the 1993 version as the contemporary international standard for national accounts compilation. Most Member States are planning to implement the standard beginning from 2014; the delay recognizes the lead times that are involved in adapting national statistical systems to such all-embracing statistical standards.

The world is an increasingly complex place and official statisticians are being asked to inform on new and interesting phenomena, the measurement of which does not come neatly from the conduct of censuses or surveys. Further, the phenomena themselves are not necessarily identified in our standard statistical classifications. Let me give some examples.

1. The “green” economy and “green” growth

The concept of a green economy has received considerable policy attention in recent years. When the United Nations General Assembly decided to call a UN Conference on Sustainable Development, to be held in Rio de Janeiro in June 2012, it chose “a green economy in the context of sustainable development and poverty eradication” as one of its major themes. The United Nations Environment Programme launched its Green Economy Initiative in 2008. The Green Growth Declaration adopted at the 2009 Ministerial Council Meeting of the Organisation for Economic Co-operation and Development invited the OECD to develop “a Green Growth strategy in order to achieve economic recovery and environmentally and socially sustainable economic growth”.

There are many dimensions to the issue including: measuring the economic contribution of the so-called “environmental goods and services industry”, which is not a recognised industry in the International Standard Industrial Classification; measuring the value of “environmental goods and services” produced and consumed (such a categorisation is not recognised in any of the standard commodity classifications); and measuring “green jobs”, which is not a recognised categorisation in the International Standard Classification of Occupations. There is also interest in measuring the environmental inputs in terms of physical flows and consequences (such as greenhouse gas emissions and waste generation) arising from production processes and the amount of resources used in those processes. Further complicating the matter, there is recognition that there is more to green growth than the production perspective since goods and services are purchased and sold beyond national borders and decisions taken by

consumers in one country can impact environmental conditions in another country. Thus, statistics must inform from both the consumption and the international trade perspectives in addition to the production perspective.

2. Trade in value added

Global production has become increasingly fragmented and different stages of production are now regularly performed in different countries. As inputs cross borders multiple times, traditional statistics on trade values - measured in gross terms - do not reflect the value added in any particular country. International economists and trade statisticians are developing new measures of trade to meet the increasing demand from policy makers and the public for a better understanding of the nature of cross-border trade in today's increasingly integrated world.

3. Energy and water security

The statistical issues arising in informing on policy issues related to energy and water security are not dissimilar to those relating to informing on the green economy. The statistics and indicators describe the availability and use of these resources for production and consumption activities to inform on issues such as their accessibility by the population, the balance of supply and intensity of use, the degradation of the environment and the occurrence of extreme and man-made or natural events.

4. The tourism "industry"

The International Standard Industrial Classification does not recognize the tourism "industry". This is because the ISIC looks at the organization of production from the supply side, bringing together those activities that involve similar production processes. Tourism, on the other hand, is not a production activity at all; rather it is an activity involving "tourists", i.e. people who are away from their usual domicile for a defined period of time. Tourism expenditure (i.e. the spending of the tourist) is treated in the integrated systems of macroeconomic statistics as either household final consumption

expenditure, intermediate consumption of producers, or capital expenditure, depending on the nature of the expenditure and on the attributes of the tourist. Yet there is legitimate policy interest in the contribution that both domestic and international inbound and outbound tourism makes to a country's gross domestic product.

5. Health expenditure accounts

The rising costs of health and medical provision is another important policy issue in many countries. These costs can be “hidden” within the system of national accounts as they may be incurred by households, by businesses, by governments and by non-profit institutions. As such it is difficult to compile policy-relevant data such as health and medical expenditures as a proportion of gross domestic product.

Many other examples could have been cited, including industry level multifactor productivity analysis, and understanding the information/knowledge society. To inform on the issues requires statisticians to get behind many of the key aggregates that appear in our systems of macroeconomic statistics. The only way that this can be done in a systematic way and that will avoid the risks of both omission of some relevant activities, on the one hand, or double counting activities on the other hand, is through the use of the input-output framework. In the second of my examples, that of analyzing the value added in particular countries associated with globalized production processes, the input-output model must be at the global level.

These days, official statisticians regard national accounting and input-output analysis as inextricably linked. For example, in some countries, input-output tables are compiled for so-called benchmark years to reconcile estimates of gross domestic product compiled using the production, expenditure and income approaches. For many countries, no such input-output program exists. However, even in the absence of an input-output program, it is increasingly recognized by national accountants that supply-use tables, compiled at an appropriate level of detail, constitute the best approach to reconciling components, and agreeing the level, of gross domestic product.

The way input-output statistics are viewed by the Member States shapes the way that they are addressed within the United Nations Statistics Division (UNSD), that is, as a component of the national accounts program of work.

I will now make some remarks about the state of national accounting and input-output analysis world-wide.

In accordance with a request from the United Nations Statistical Commission, my office regularly evaluates the availability, scope and underlying basis of the official national accounts data reported by countries to the Statistics Division.

Over the last five reporting periods (2005 to 2009), 92 per cent of the UN Member States, that is, 177 countries, reported national accounts data to us. These data cover all developed countries and 90 per cent of developing countries.

An analysis of the national accounts data shows that 139 of the 192 UN Member States, that is 72 per cent of countries, had implemented the *1993 System of National Accounts* at the time of the 2009 reporting period. We therefore have quite a way to go to get all countries reporting on this basis, aside from the challenge of countries moving to the 2008 SNA standard.

The scope of national accounts data reported to the UNSD is evaluated against a standard “minimum requirement data set,” or MRDS, adopted at the 2001 UN Statistical Commission, and against a “milestone” measure, adopted by the Statistical Commission in 1997. The MRDS and the milestone measure both evaluate the scope of SNA implementation according to the particular tables submitted to the UNSD.

A total 111 countries (that is 58 per cent of countries) provide six or more tables of the MRDS and 79 countries (or 41 per cent) provide seven of the MRDS tables. This means that 41 per cent of countries have reported gross domestic product by expenditure

and industry, at current and constant prices; output, value added and gross capital formation by industry; relations among product, income, saving and net lending/borrowing; and at least parts of the integrated economic accounts for the total economy and the rest of the world.

In terms of the milestone measure, milestone 1 is obtained when gross domestic product by expenditures in current or constant prices and gross national income are provided; and milestone 2 is obtained when at least value added by industry, gross domestic product by expenditures in current or constant prices, and gross national income are provided.

Milestone 2 was observed by the great majority of developed countries (89 per cent); countries comprising the Commonwealth of Independent States (83 per cent); and developing countries in Western Asia (93 per cent); and by most developing countries in the Caribbean and Latin America (76 per cent) and in Eastern, Southern, and South-eastern Asia (71 per cent). For developing countries in Africa and Oceania only 45 per cent and 42 per cent met milestone 2, respectively.

Relating the above to the capacity of countries to compile input-output statistics, it could be postulated that if a country does not have the source data, resource capacity or expertise to be able to attain national accounts milestone 2, then it would not be in a position to produce a fully articulated input-output table. In terms of the above figures, it appears that almost 60 per cent of countries appear to be in this position. Most of these countries are developing countries in the Caribbean and Latin America, Asia, Africa and Oceania. However, some of these countries are in a position to compile at least rudimentary supply-use tables as part of their national accounts work. For example, we know that 25 countries in Africa compile supply-use tables as part of their national accounts work.

In summary, as an international statistical community we still have quite a way to go for many countries to have available core national accounts data compiled on the basis

of the 1993 SNA, let alone the challenges of implementing the SNA 2008 world-wide. Further, it appears that only a minority of countries are currently in a position to compile input-output tables. It is in this context that it would be fair to say that input-output analysis has received little specific attention at the United Nations Statistical Commission within the memory of the current generation of official statisticians. The handbook on input-output tables and analysis was prepared by my Division in 1966. It was revised in 1973, based on the 1968 SNA. The Division's last significant body of work on input-output statistics was the work leading up to the publication of the current edition of the input-output handbook in 1999, which was based on the 1993 SNA.

Herein lies the dilemma for the international statistical community: the state of the art of input-output analysis is not very advanced in many countries, while at the same time there are many key policy issues that statistics ought to be informing on, and those statistics can only be generated using input-output analyses.

This brings me to the topic of where input-output analysis "fits" within the official statistics community.

It is incumbent on each national statistical system, commensurate with the resources at its disposal, to adopt a program of official statistics that will address the contemporary and emerging statistical needs of its key stakeholders. (This priority setting process can be informed by deliberations at the international level, including at the United Nations Statistical Commission.). In this regard the needs of policy analysts for the sorts of statistics that I described earlier are competing against those of other policy analysts who seek information on a very broad array of social, environmental and economic statistics.

Where does an input-output program fit in this context? Obviously the answer to this question must be country-specific. However, it could be inferred from the deliberations at the Statistical Commission that the collective judgment of countries is that a program of national accounts statistics, at least to the level of Milestone 2 as I have

discussed, ought to be accorded a reasonably high priority. Further, the experience of the more advanced national statistics offices has shown that the accounting identities inherent in the supply-use schema (or more desirably, the fully articulated input-output framework) can be useful to countries in identifying gaps in their economic statistics programs and that the data confrontation involved can provide useful insights into the quality of the underlying data. Further, compilation of supply-use tables in both current prices and prices of the previous year provides a disciplined approach to the production of the internationally recommended chain volume estimates of gross domestic product and its production and expenditure components.

Thus, compilation of the supply-use table can be very helpful for core national accounts work. A valuable by-product is that (at least rudimentary) input-output statistics become available for use in their own right. Further investment in the input-output program should be based on judgments about the benefits deriving, relative to the costs of compiling the statistics especially the costs of generating source data.

Beyond compilation of supply-use (or fully articulated input-output) tables, additional judgments are required as to whether official statisticians (typically those employed in national statistics offices) should be deploying input-output techniques to do the sorts of analyses that I have described, or whether such work is best left to others. No hard and fast rules apply here, but again the experience in the more advanced national statistics offices is that the official statisticians are increasingly being charged with doing this work.

International agencies can assist national statistical systems by providing them with the range of frameworks, classifications and other standards, handbooks, guidelines, and identified best practices relevant to the various fields of statistics, so that countries do not need to continually “reinvent the wheel” once they decide to embark on particular statistical activities.

It is in this context that the United Nations Statistics Division promulgated the *Handbook of Input-Output Table Compilation and Analysis* in 1999. That Handbook was premised on the umbrella framework of the System of National Accounts 1993. International agencies can also support national statistical systems through provision of technical support and training. Improving the overall state of national accounting world-wide is a priority for such support by the international agencies at present, and is likely to continue to be so for the foreseeable future.

We now have the System of National Accounts 2008, which will be progressively implemented by countries, mostly beginning around 2014. Annex 3 to SNA 2008 sets out the extensive changes that have been introduced with the new standard. Perhaps of most interest to input-output analysts will be those changes concerning the scope of transactions included in the production boundary of the System and those relating to the extension and further specification of the concept of assets and capital formation. There are two particular changes, relating to the treatment of goods for processing and merchanting activities, that have particular implications for input/output analysis and that I should draw to your attention. My paper elaborates the issues for those of you who are interested.

It will be necessary for us, in due course, to reflect all of the relevant changes introduced with SNA 2008 in an updated input-output Handbook. But the updated handbook should also reflect the substantial advances in thinking regarding the place of input-output analyses within official statistics; the compilation techniques available; and the uses of the input-output framework that have taken place over the last ten years or so. Members of this Association may have much to contribute to this update, especially in regard to applications of input-output techniques.

While I have an open mind on the “look and feel” of an updated manual, I would like to see it as a practical compilation guide for countries at varying levels of statistical development. Moreover, for purposes of outreach and better understanding of the range of policy uses of the input-output framework, the current Part Three on applications could

be moved closer to the front of the book. Further, I think some of the algebraic presentation could be moved to appendices. The updated handbook could perhaps be less daunting to compilers if it was to build up from basic commodity flow analyses, to supply-use tables, to the fully articulated input-output table. To support countries in compiling input-output statistics, it would be very helpful if some software routines could be linked to an electronic version of the updated handbook that countries could download and use if they so desired.

Chairperson, let me make some concluding remarks.

Given all of the other critical challenges facing national statistical systems, I think it will be unrealistic to expect that there will be significant advances in the capacities of countries to compile input-output statistics over the next five years or so. That said, there are important and growing needs for reliable and coherent data to support a range of policy issues that require use of the input-output framework. If their statistics are to remain relevant to these contemporary policy issues, official statisticians will need to respond. As a first step in this process, we should proceed to revise and update the input-output Handbook in line with the 2008 SNA and to encourage countries to at least compile supply-use tables.

The International Input-Output Association can also continue to play an important role in promoting input-output analyses to help shed light on many issues of contemporary policy interest. Through its education and outreach programs, the Association can also continue to contribute strongly to building up the level of expertise in this field, particularly in developing countries. In this endeavour, the Association might consider strengthening its links with the official statistics community, for example in giving feedback to national statistical systems on the suitability of their statistics to support input-output analyses and also to alert official statisticians of how their data are being used for analytical purposes.

I wish you well in your deliberations during the week.

Thank you very much.