12th International Conference on Input-Output Techniques
18 - 22 May 1998, New York, USA

SPECIAL SESSION S12:

Input-output accounts and the 1993-SNA / 1995-ESA

Derivation of input-output matrices from supply and use tables in the 1993 SNA/1995 ESA

Norbert Rainer

Austrian Central Statistical Office

Vienna, May 1998

1. Derivation of symmetric input-output tables

1.1 From the old to the new SNA/ESA

Both the old 1968 SNA and the new 1993 SNA recognise supply and use tables as a core part of the integrated set of national accounts data. Also, for both versions of the SNA the supply and use tables form the starting point for the derivation of symmetric input-output tables. Whereas the 1968 SNA devoted a special annex to chapter III („The system as a basis for input-output analysis“) dealing with the mathematics of the industry, commodity and hybrid technology assumptions, the 1993 SNA avoids any formal explanation. However, neither the new nor the old SNA deal with the **practical problems in deriving symmetric input-output tables**. Just a few general considerations are provided and the fact of possible implausible (negative) coefficients resulting from the application of the commodity or hybrid technology assumptions is mentioned.

The main differences between the two systems as concerns the derivation of symmetric input-output tables seems to be that the old SNA did not make any recommendation as to which method the derivation should be based upon.[1] The 1993 SNA provides a little discussion when it says that „on the grounds by referring to certain axioms of desirable properties one may come somewhat closer to a choice between these two technology assumptions. On this basis, the industry assumption performs rather poorly.“ (para. 15.146) The 1993 SNA further states that „from the same theoretical point of view the **product (commodity) technology model seems to meet the most desirable properties**.... It also appeals to common sense and is found a priori more plausible than the industry technology assumption.“ (para. 15.147)

However, the 1993 SNA states that the automatic application of the product model has often shown results that are unacceptable, insofar as input-output coefficients sometimes appear as extremely implausible or even impossible, especially when they are negative. Such unacceptable results may be due to errors in measurement or due to heterogeneity (product-mix) in the industry of which the transferred product is the principal product. This might (partly) be overcome by making adjustments based on supplementary information or exploiting informed judgement to the fullest extent possible. (para. 15.147) Furthermore, other models like the hybrid models may be considered. The problem of negative coefficients resulting from the product technology model was already recognised in the 1968 SNA and one can read: „It is not difficult to see how such results can arise.“ (para. 3.25)

Comparing the two systems one can thus conclude that the **1993 SNA advocates the use of the product technology model** and urges the compilers to exploit data and information structures such that to come close to this model. The same reasoning can be found in the 1995 ESA which is the European counterpart of the 1993 SNA. More specifically, the **1995 ESA** concludes that „in practice, employing **mixed technology assumptions with supplementary information** is the best strategy for compiling symmetric input-output tables.“ (para. 9.58)[2] However, also the 1995 ESA does not provide any further practical guidelines.

Advocating for the seemingly more appropriate, but also more complicated method and not providing adequate practical guidelines is a regrettable situation. The Member States of the European Union will have to report symmetric input-output tables to the European Authorities on a harmonised basis. The 1995 ESA as well as the transmission programme of data are subject of European legislation

---

[1] There are also differences in the terms used: the 1993 SNA uses the term product instaed of commodities, supply and use instaed of make and absorption matrices, and very often industry, product or hybrid technology model instaed of industry, commodity or hybrid technology assumption.

[2] It should be noted that the old ESA (i.e. ESA 1970, ESA, 2nd edition 1979) did not include supply and use tables but only symmetric input-output tables.

(Regulation). According to this Regulation the Member States have to report yearly supply and use tables at current and constant prices and five yearly symmetric input-output tables at current and constant prices with import matrices separated.

1.2 Industry versus product/hybrid technology model

Research work has shown that from a theoretical point of view the product model fulfils certain desirable criteria whereas the industry model does not. It is clear that for the analytical aims that are underlying the use of input-output analysis a data structure based on the product model is preferable. This has clearly been recognised both in the new SNA and new ESA.

On the other hand, it seems still to be the case that most compilers use the industry model rather than the product or hybrid model. The reasons for that are obvious, namely the **problems involved with the practical application of the product model**. Sometimes it is argued that the results between these models differ not so much, considering that the share of secondary output is usually small. Furthermore, it is argued that the statistical unit applied is mostly an establishment type unit (local kind of activity unit) which should minimise the amount of secondary output. The application of the product model is moreover much more time consuming. And also: the application of any technology model may be considered as a modelling rather than a statistical task.

It is thus not a satisfying situation if some compilers use the industry model while others use the product or hybrid models. It has to be proven if the results do not differ significantly. What is needed is a strategy forward in the sense that the problems of the application of the product model are theoretically and empirically analysed and detailed criteria for the best treatment of the arising problems formulated.

The argument that the **derivation of symmetric input-output tables is a modelling task** is certainly true. However, it has to be taken into account that this has predominantly to be a task of the compilers (i.e. Statistical Offices) as such data have to be provided by them (see the European transmission programme of national accounts data) and that only the compilers of supply and use tables have access to detailed data and information which is recommended for the process of the derivation of symmetric input-output tables.

If one takes the requirements and recommendations of the new international national accounts system seriously, there is **no longer a choice** for the Statistical Offices as to which derivation method should be used.

1.3 Aim of the paper

There are a lot of changes between the old and the new SNA. Nearly all the basic concepts of the System have been revised: general feature of the system, accounting structure, definition of transactors and transactions, valuation principles, classifications. There is a 20 page annex in the 1993 SNA outlining the main changes from the 1968 SNA.

Many of these changes do not refer to supply and use accounts at all and many of these changes have no obvious effect on the structure and content of the supply and use tables. However, there are changes of the system that will have an effect on the derivation of symmetric input-output tables or at least should be recognised when it comes to the step of applying technology assumptions. It is the aim of this paper to discuss some of the **more basic changes with a view to the derivation process**. However, the points discussed here are neither comprehensive nor based on actual practical experience as we so far have not yet implemented the new SNA/ESA. Empirical illustrations of the points discussed will thus be missing. However, they are based on past experience. The paper will finish with some considerations concerning a list of points for the elaboration of practical guidelines and criteria for the derivation of symmetric input-output tables.

It is not the aim of the paper to discuss the various mathematical methods and concepts for the derivation of symmetrical input-output tables as such. This does not mean that theses methods are neglected. However, this would be a topic for a separate paper.

2. Changes between the old and new SNA/ESA with respect to the derivation of symmetric input-output tables

2.1 Classifications

2.1.1 Industry classification

One of the most important basic concepts for the elaboration of supply and use tables, and hence for the derivation of symmetric input-output tables, are the underlying classifications, especially, the activity (industry) classification. The new SNA recommends for the classification of production activities the use of **ISIC Rev. 3**. The same is true for the 1995 ESA which obliges the Member States to use **NACE Rev. 1** as the activity classification also for national accounts.

NACE Rev. 1 is the European version of ISIC Rev. 3, it is more detailed, but fully compatible with ISIC Rev. 3. At the level of Sections and Divisions NACE Rev. 1 is identical with ISIC Rev. 3, at the lower levels (Groups and Classes) NACE Rev. 1 is usually more detailed, but all NACE Rev. 1 Groups and Classes can be transformed into the corresponding categories of ISIC Rev. 3 by simple aggregation. The application of NACE Rev. 1 is obligatory in the EU Member States (NACE-Regulation).

The way how ISIC Rev. 3 and NACE Rev. 1, respectively, have been structured obviously determines how the thousands of activities in the economy are pictured in economic statistics. The 1993 SNA mentions that the **criteria used in ISIC Rev. 3** to delineate each of the four levels of the classification are complex. At the Division and Group levels, substantial weight is placed on the nature of the goods and services (physical composition, stage of fabrication, needs served by them). This should serve for grouping producer units according to similarities in, and links between, the raw materials consumed and the sources of demand for the items. The 1993 SNA further states, that two other major criteria are considered at these levels as well: the use to which the goods and services are put, and the inputs, the process and the technology of production (para. 5.5). The 1993 SNA makes no reference as concerns the criteria used in ISIC Rev. 3 for the delineation of the Class level. The 1993 SNA does also not recommend one of the levels to be applied for the input-output system. The 1995 ESA obliges the Member States to use the Division level for the data transmission to European Authorities; i.e. 60 activities (more precisely 59 as one Division concerns Extra-territorial Organisations and Bodies which are outside the national boundary).

Whereas the 1993 SNA leaves it open why ISIC Rev. 3 should be used, ISIC Rev. 3 itself says that it feels an important role by providing the kind of activity breakdown needed for the national accounts compilation according to the production approach (chapter 2 of the preface, page v). Note that **ISIC Rev. 3 does neither mention supply and use tables nor the derivation of symmetric input-output tables**.

However, there is in ISIC Rev. 3 a discussion on the limits of statistical activity classifications. ISIC Rev. 3states that it would be best if there were in ISIC as many categories as there are possible activities in the world. It is obvious that for practical reasons ISIC can only have a limited number of categories. Whereas the above mentioned criteria used in delineating the Divisions and Groups, the criteria concerning the combinations of activities into classes had to insure that it will be practical for most of the time to use the classes of ISIC Rev. 3for the industry classification of kind-of-activity units (or establishments) and that the units falling into each class will be as similar in the kinds of activity in which they engage, as is feasible. The classes of ISIC Rev. 3 are defined so that as far as possible the following two conditions are satisfied: (a) the production of the category of goods and services which characterises a given class accounts for the bulk of the output of the units classified to this class; (b) the class contains the units which produce most of the category of goods and services which characterises it. In the terminology of input-output one would say that these criteria should result into a main diagonal of the supply matrix that comprises the maximum values of total domestic supply.

The **product technology model** assumes that each product has the same input structure in whichever industry it is produced. Suppose that this assumption is correct on the level of single products which is the theoretical basis of this assumption (the production of one ton of steel needs so much input of iron ore and other necessary inputs). Then it is obvious that the level at which the technology assumption is applied is not the same for which the assumption has been formulated:

- the data of the supply and use system are in monetary terms rather than in physical terms,
- the data of the supply and use system are aggregates of activities and products.

The first problem cannot be avoided as the monetary unit is the only way to build aggregates over different physical measurement units. It is not further discussed here. The second problem is mainly one of the classification of activities and products. As the classification of the products have to follow the structure of the industry classification no reference to the product classification has to be made here.

The statistical activity classifications like ISIC uses obviously a set of criteria for the grouping of activities as explained above. The **similarity of the input structure** - named technology or raw material criterion - is only one of them.

It is thus evident that the application of a criterion other than these two mentioned does not result into industries that are homogeneous with respect to input structure. The most important one of these other criteria is the **use criterion**. A number of classes in ISIC Rev. 3 (and also in the earlier versions of ISIC) can be quoted: 1912 Manufacture of luggage, handbags and the like, saddlery and harness, 1920 Manufacture of footwear, 3610 Manufacture of furniture, 3692 Manufacture of musical instruments, 3693 Manufacture of sports goods, 3694 Manufacture of games and toys. Each of these classes comprise several different activities having different input structures. The input structure of these industries - as shown in the use matrix - will thus be the weighted average of the input structures of the single activities weighted by the respective output shares (if we assume that they do not have any secondary output also). Hence, if there is secondary output of products characteristic to one of these examples mentioned, it is very unlikely that this secondary output is produced by the average input structure of the respective industry for which this product is principal. Thus implausible (negative) input-output coefficients will result.

A similar situation with negative coefficients resulting will occur if two activities are grouped into one industry that are **vertically integrated**. A classical example is class 2101 Manufacture of pulp, paper and paperboard. Situations of vertically integration may not only be seen from a mere technological point of view as is the case in the pulp and paper example. Take for example the production of cheese. Cheese can be produced form agricultural milk or from pasteurised milk which is a dairy product. Suppose that there is secondary output of cheese and it is produced from pasteurised milk, the industry will have no agricultural input whereas the dairy industry will have. A negative agricultural input will result.

Quite often classes concerning **“other“ activities** comprise usually a mixture of activities with very different input structures. Again, a simple example is class 1549 Manufacture of other food products n.e.c., which include the production of a variety of different products, like coffee roasted, soups, spices and sauces, vinegar and homogenised food products for infants. Another simple example is class 3699 Other manufacturing n.e.c., covering products such as pens and pencils, baby carriages, umbrellas, candles, pipes, brooms and brushes, tailors dummies and roundabouts.

However, even if we take classes where one would expect a very homogeneous aggregation of activities, in the real world of business a statistical unit has always the choice of producing certain inputs by their own staff or to buy certain inputs from the market. Such situations are today named as **in- and outsourcing** and this is not restricted to services, even if these terms were originally used in the context of services. In- and outsourcing in the manufacturing was always existing. A specific form of outsourcing is the **production on a fee or contract basis** where the ordering unit owns the respective materials, whereas the other unit produces a physical product without having the necessary (intermediate) inputs in its cost structure.

Last but not least, it has to be mentioned that the theoretical assumption that each product has its own technology, was always explained taking the main intermediate inputs into account. So much iron ore is necessary for the production of one ton of steel, so much flour for the production of one ton of bread, and so on. But this may not be the case for other intermediate inputs: the mixture of energy used may be different, the packaging material used may differ, and so on. For inputs that are less connected to the physical production process this strict assumption of a product technology seems to be less valid.

One should thus expect that **heterogeneity is not the exemption but the rule**; not only because the grouping effect of heterogeneous activities into classes in ISIC Rev. 3, but also because the product technology model is not valid throughout the spectrum of inputs.

A statistical industry classification like ISIC Rev. 3 can minimise the problems if it follows as strict as possible the input homogeneity criterion, but it cannot abandon the basic problem.

2.1.2 Product classification

One of the main features of the revised international classification system is that a product classification covering both goods and services is available is available for the first time. This classification **-** Central Product Classification **(CPC)** **-** was published by the UN in 1991 as a provisional one. A revised version **-** CPC Version 1.0 **-** has been elaborated and its publication is expected within a few weeks.

CPC is a hierarchical classification with five levels and distinguishes about 1 800 products at the lowest level (subclass). The categories of the goods part are defined by using the elements of the Harmonised System as building blocks. This also illustrates one of the main purposes of the CPC, namely that it should provide a basis for recompiling basic statistics for analytical use from their original classification into a standard classification. CPC was primarily developed to enhance harmonisation among various fields of economic and related statistics and to strengthen the role of the national accounts as an instrument for co-ordination of economic statistics. If not only the foreign trade classification but also other product classifications used in economic statistics would be harmonised with the central product classification, CPC will have succeeded in its role as an interlink between sources of supply and use.

However, when it comes to the derivation of symmetric input-output tables on the basis of the product or hybrid technology models, CPC has one drawback as it is not structured alongside the activity classification (ISIC Rev. 3). Thus the switch from the CPC structure to a structure symmetric to ISIC cannot be done by simple aggregation, except in cases where the product dimension of the supply and use table follows the most detailed level of CPC.

At no level of the CPC there is a throughout symmetry to an ISIC Rev. 3 level, even not at the highest one. This is intentionally so, as CPC does not want to be perceived as a mere „extension“ of ISIC Rev. 3. It has a structure built on the criteria of the „physical properties and intrinsic nature“ of the goods themselves (raw materials, stage of production, purpose or use category, etc.). The current structure of the CPC is partly very close to industrial origin (as defined in ISIC Rev. 3) and partly close to use or demand categories and it is expected that future versions of the CPC will be more closer to the demand or market approach.

For the process of transforming a rectangular supply and use system to a square format, each CPC based category has to be defined such that it can be attributed to only one category of the activity classification used. It is thus **necessary to rearrange CPC according to industrial origin**. This can be done as CPC provides for each subclass a reference to ISIC. However, there are some CPC categories for which no ISIC origin is provided for. Examples are waste and scrap, and categories of manufacturing services.

In the European classification system the counterpart of the CPC – Classification of Products by Activity **(CPA) -** has been structured according to the activity classification NACE Rev. 1. However, for certain products like waste and scrap some conventions had to be made.

The groupings of the single products into subclasses or similar categories of the product classification has no obvious effect on the application of the product technology model as long as each group of products perfectly matches with the industry classification applied. Clearly, a more detailed level of the product data distinguished will be of help in analysing the reasons for implausible (negative) coefficients. From this point of view a **rectangular supply and use data system** is of clear advantage, even if for the application of the product technology model the level of detail in the product dimension has to be aggregated to that of the industries distinguished.

2.2 Statistical units

Both the old and the new SNA discuss in detail the definition of statistical units. Both systems recommend the use of the **“establishment” concept** for the accounts dealing with productive system of the economy.

The 1993 SNA introduces a distinction between an analytical unit and an observable unit in the production accounts in the supply and use and input-output tables. The 1993 SNA defines the establishment by reference to one activity and one location as in the 1968 SNA, but for practical reasons and harmonisation with ISIC Rev. 3, the 1993 SNA recognises an **observable unit version of the establishment**, which, in addition to its main activity, may also have one or more secondary activities. The 1993 SNA continues and states that the analytical unit (unit of homogeneous production) is used in the construction of the input-output table.

It is certainly a progress when the new SNA defines an establishment (local kind-of-activity unit) in a way that secondary output is to be considered as a situation unavoidable in practice.[3] On the other hand, the new SNA confuses the reader when it defines as an analytical unit the unit of **homogeneous production**. Of course, “for purposes of input-output analysis, the optimal situation would be one in which each producer unit were engaged in only a single productive activity so that an industry could be formed by grouping together all the units engaged in a particular type of productive activity without the

[3] Some Austrian data (source: production statistics) may illustrate the importance of secondary output: In 1996 total secondary output in the manufacturing sector (NACE Rev. 1 Sections C and D) amounted to 15,8 % if measured on the level of Divisions and 25,2 % when measured on the more detailed level of Groups. At the Division level, only 33,7 % of all establishments had no secondary output, on the more detailed Group level this share reduces to 27,8 %. A share of secondary output of over 20% can be observed at 31,2 % of all establishments when measured at the Divison level and of 37,9 % when measured at the Group level.

intrusion of any secondary activities." (para. 5.46) However, such a type of unit is not observable, it is an abstract or conceptual unit and should not be named unit. In transforming supply and use data into symmetric input-output models one creates a database where secondary output and the related inputs are shifted from the industry that had reported such a secondary production to the industry for which this type of product is principal, but the transformation usually takes place at the level of statistical aggregates and not at a level of statistical units. The unit of homogeneous production is not a unit in the sense of something that is observable, on the contrary.

Apart from that, the most relevant issue is the **practical application of the establishment concept** in economic statistics. The partitioning of an enterprise into establishments is by no means an easy task and necessitates the full co-operation of the respondents. Normally, for the bulk of the units the enterprise will be identical with the establishment. However, the bigger enterprises - having a remarkable share in total output and employment - will often consist of two or more establishments (and probably also of more than one local unit)[4]. At least our national experience shows that also for such **multi-establishment enterprises** it is often difficult for them to report the necessary data for each single establishment separately. The reporting problems are usually greater for the input than for the output data. Input data that are more directly related to the technical production process are less difficult to obtain whereas for other input data the allocation to the different establishments is the crucial point. This refers specifically, but not solely, to the well-known problem of **overhead costs** and the central ancillary activities (head offices).

If the concepts of the national economic statistics requires the total allocation of all costs to the level of establishments, it can be expected that the respondent will have to do so by **using certain keys** or similar information of his cost accounting system. If economic statistics renounces from that request then national accounts will have to do so at the end.

A comprehensive discussion of the concepts and problems of the statistical units is neither possible nor intended here. With respect to the issue of the derivation of symmetric input-output tables it has to be concluded that the new SNA recognises that the practical statistical unit is far from the model requested. Secondly, even for the elaboration of the supply and use data certain assumptions as regards distribution of overhead and similar costs may already have been incorporated in the basic data. Thus, the **supply and use data are not purely based on statistically collected information**.

2.3 Valuation

The **three main price concepts** of the new SNA – the purchaser's price, the producer's price and the basic price – are all of central importance for the input-output part of the system. There are definitional relationships between these three price concepts:

(a) Purchaser's price (which includes non-deductible VAT) minus trade and transport margins (including taxes other than invoiced VAT less subsidies on product payable/receivable by wholesalers and retailers) minus non-deductible VAT-type taxes = producer's price (which excludes non-deductible VAT);

(b) Producer's price minus taxes (other than VAT) less subsidies on products payable/receivable by their producers = basic price.

The 1993 SNA states that the **preferred method of valuation of product flows is at basic prices** and adds that producer's prices should only be used when valuation at basic prices is not feasible. As basic

[4] According to some preliminary results of our 1995 economic census (covering all enterprises except agricultural ones) only 0.9 % of the enterprises are multi-establishment ones. However, they comprise 21 % of total employment and 25 % of valued added.

prices provide the most possible homogeneous valuation achievable by statistical methods, the problems of the derivation of symmetric input-output tables should be minimised as regards the valuation of the product flows.

It should be noted that the valuation concepts of the 1993 SNA as such are not new. However, the old SNA did not express its preference for basic prices (in the old terminology approximate basic prices) explicitly. It should also be noted that the difference between the producer's prices and the basis prices can quite often be of small magnitude as it only reflects the **amount and structure of taxes and subsidies on products**, which furthermore may only be related to a small number of products. The main tax on products – the VAT – is already excluded in the definition of the producer's price. Concerning VAT the new SNA recommends a net recording; the 1968 SNA did not recognise VAT at all as at that time such a tax system was not very widespread in the world. Later on, a net recording of VAT was recommended by the international organisations.

The 1993 SNA adopts also for the foreign trade flows a valuation concept analogously to the basic prices: the free on board (f.o.b.) price for exports and total imports and the cost, insurance and freight (c.i.f.) price for detailed imports. The difference between the f.o.b price and the c.i.f. price represents the costs of transportation and insurance between the frontier of the exporting country and the frontier of the importing country. The c.i.f. price is considered to be a basic price to flows of imports.

Thus, the System takes into account that data on detailed flows of imports from foreign trade statistics are most usually valued at c.i.f. prices. As total imports should be valued f.o.b., a **c.i.f / f.o.b. adjustment** on imports is necessary to reconcile the different valuation concepts. The elaboration of the reconciliation data is difficult task as detailed information on the transportation flows outside national territory is necessary. Note that this reconciliation is only required to bridge the valuation differences between the valuation concepts of the supply and use tables and the overall national accounts.

Nevertheless, the data structures yielded by such an exercise are at the same time a valuable input for the elaboration of the transport margins and the recording of the transportation services in the supply and use system. Moreover, the global c.i.f./f.o.b. adjustment for the imports may not be calculated unless such detailed data are available.

The new SNA is also quite specific as concerns the definition of the **transport margins**. There is no change between the old and the new SNA as regards transportation as an ancillary activity. These will not be identified and thus the individual costs will be included in the basic price (para. 15.42).

If the producer pays a third party to transport the goods, the transportation will appear as one of the intermediate costs to the producer. Similarly, wholesale and retail traders may arrange for goods to be moved from where they take delivery of them to where another purchaser takes delivery. Thus, the coverage of transport margins depend in such cases on the fact who pays for it and whether they are invoiced separately. Apart from the fact, that this concept needs specific information that may usually not be available in economic statistics, this treatment results in a deviation from the basic principle of a homogeneous valuation. Transport costs on a specific good will be recorded as a (service) input of the industry who paid the transportation rather than as a transportation margin on the respective good to be deducted from the purchaser's price of the industry that uses that good. If the SNA is read correctly this is a change from the 1968 SNA which may quite **clearly cause heterogeneity problems** in the derivation of symmetric input-output tables. This change has also the effect that it is more complicated to use transportation statistics for the calculation of transport margins as in transport statistics there is usually no information who pays for the transportation conducted. On the other hand, the new SNA is in this aspect more in line with the principle of recording flows as they have been observed and taken place in economic reality.

While the 1993 SNA is very specific on the definition of transport margins, it is not so as regards the **types of transport margins**, an issue not discussed at all. The 1995 ESA only states that in calculating transport margins, a distinction by the type of transport (e.g. by rail, air, sea/inland waterway or road) could be very useful (para. 9.41). There is for example no explicit treatment of transport insurance services whether parcel transportation services are to be included in the transport margins, or how to treat own account cross-border transportation with respect to the valuation of imports. The 1993 SNA finalises its consideration in para. 15.42 by saying that the full component of transportation services in the trade and transport margins may be analysed separately in a more analytical version of the supply and use tables.

2.4 Market – non-market production

The 1993 SNA distinguishes **three types of output**: (1) market output, (2) output for own final use, and (3) other non-market output. Market output is output that is sold at prices that are economically significant; output for own final use consists of goods and services that are retained for their own final use by the owners of the enterprise in which they are produced. Such output consists mainly of own account produced capital goods. Finally, other non-market output consists of goods and individual or collective services produced by non-profit institutions serving households or government. They are supplied free or at prices that are not economically significant. While the valuation of market output is always based on prices for which they are sold at the market and output for own final use on the basis of prices of similar market producers, other non-market output is valued at the sum of costs.

This distinction between market producers, producers of own final use and other non-market producers replaces the distinction in the 1968 SNA between “industries” and “other producers”. The 1993 SNA also states that this three-way split of products and producers is **complementary to ISIC and CPC**. In principle, the ISIC and CPC breakdowns would apply to all three categories of producers and products. This was principally also the case in the old SNA, however, the other producers were usually not spread over the whole spectrum of activities and products. They mostly were identified in the area of education, health, social and community services and government administration.

This distinction was and is **fundamental to the System as it determines the valuation principles**. It is both applied to establishments (local kind-of-activity units) and institutional sectors. The distinction is defined in a top-down way: firstly, it is defined for institutional units, then for the level of establishments, and then for their output.

The 1995 ESA is – for the reason of comparability – more specific than the 1993 SNA, especially as regards the concept of “economically significant price”. The ESA relies here on the 50% cost rule, as it did in the old ESA.

This distinction is by no means only relevant for the elaboration of the national accounts data as such, Also, in the supply and use tables separate submatrices have to be elaborated. However, the focus of the 1993 SNA is on the intended cross-classification of production accounts by industries and institutional sectors. The SNA provides **no recommendation on how to deal with this distinctions in the process of derivation of symmetric input-output tables**. One way would be to aggregate over these distinctions so that only industries and products are the remaining classification dimensions. However, due to the different valuation principles this would mean that different “activities” in the sense of input structures are grouped together. The consequence would be of course **additional problems of heterogeneity**.

3. Considerations for more elaborated practical guidelines

In the previous chapter an attempt has been made to outline some of the more basic problems that occur when a supply and use table system is to be transformed into symmetric input-output tables under the assumption of the product or hybrid technology model. While the new SNA/ESA recognises that this conversion is not a straightforward exercise and recommends that supplementary information should be utilised as much as possible, more detailed and practical guidelines are missing. The 1993 SNA also makes reference to a forthcoming Handbook on Input-Output Tables, which is now available in a final draft version. However, while this handbook gives an excellent overview of the input-output system and the application of input-output in economic analysis, it does not deal with the conversion problems in much detail.

The need for harmonisation of national accounts data, including input-output data - certainly of great importance in the European Union -, would make **practical guidelines and recommendations** in this field very welcome. Such more elaborated guidelines should at least deal with the following topics:

(1) From statistical supply and use tables to analytical supply and use tables
(concept of such a distinction, design of analytical supply and use tables, relations to the overall system of national accounts; analytical supply and use tables as satellite systems)

(2) Problems of heterogeneity in the industries
(analysis of each industry with respect of occurring problems of heterogeneity; analysis of the different types of secondary products; criteria for treating the different types of secondary products as to whether they should be treated under industry technology or treated differently; methods to treat specific production structures such as vertical integration, production on a fee or contract basis, etc.; kinds of supplementary data needed; aggregations and disaggregations; mathematical methods for the derivation process)

(3) Specific kinds of products
(treatment of products such as waste and scrap, secondary hand goods, etc.)

(4) Distinction between the categories of producers and products
(methods to deal with the distinction of market and non-market producers and products)

(5) Trade and transport margins
(definitions and kinds of trade and transport margins; cross-border transportation services; valuation of imports)

(6) Other valuation aspects
(treatment of taxes and subsidies, constant price supply and use tabes and the derivation process)

(7) Conversion of import matrices
(how to deal with the splits of domestic and imported flows in the process of derivation of symmetric input-output tables)

References:

Commission of the European Communities - Eurostat, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank: A System of National Accounts 1993, Brussels/Luxembourg, New York, Paris, Washington D.C. 1993.

European Commission/Eurostat: European System of National Accounts - ESA 1995, Luxembourg 1996.

United Nations: A System of National Accounts (SNA 1968), New York 1998.

Statistical Office of the European Communities: European System of Integrated Economic Accounts - ESA, Second Edition 1979, Luxembourg 1980.

United Nations Statistical Division: Input-Output Table Compilation and Analysis, Manuscript submitted for editing and publication, November 1997.

United Nations: International Standard Classification of All Economic Activities (ISIC Rev.3), New York 1990.

United Nations: Provisional Central Product Classification (CPC), New York 1991.