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## **Input-Output in the 2008 SNA**

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## Introduction

It was only with the 1968 SNA that input-output tables were introduced as an integrated part of the system of national accounts. Before that time the precise relationship between national accounts concept and the various summary measures that could be calculated from the IO tables were not well-defined, as witnessed by the contents of the first UN Handbook on IO tables and analysis from 1966. The introduction of IO by the 1968 SNA had two important aspects. Firstly the concepts and the actual figures of the IO tables were now assumed to be completely consistent with the time series of the national accounts, allowing for a more efficient analytical use of both types of data. Secondly techniques in compiling the data were set in the framework of separate supply and use tables which were also seen as an efficient way of compiling a consistent set of national account, both at current and constant prices.

This integration of not only concepts, but also compilation techniques, was gradually implemented in still more countries during the following decades, and when the 1993 SNA came out, the clear recommendation was to follow this integrated approach, and it underlined the advantages in the form of an efficient use of all available information when compiling the current price values, and a consistent framework for the constant price estimates. Even though the SNA 1993 chapter on the input-output framework was less comprehensive concerning numerical illustrations and mathematical expositions, it was broader in explaining the methodological and practical problems related to the compilation of supply and use tables, and therefore represented a very useful general introduction to the input-output framework intended for both producers and users of these tables.

In 2003 the Statistical Commission of the United Nations initiated an update of the 1993 SNA. This update should not lead to fundamental or comprehensive changes to the 1993 SNA. A list of 44 substantive issues for updating was identified. Input-output as such was not on this list, even though some of the suggested changes would affect the tables. The most important of these was: Goods sent abroad for processing (issue no 40), where the decision was to treat these flows net instead as earlier gross, thus giving the ownership principle priority vis-à-vis the physical flows, to obtain consistence with the updated balance of payments manual, BPM6 (IMF,2008). It is still under discussion how to deal with this change of principle when compiling the IO-tables, where the actual movements of goods are usually seen as more important than adhering strictly to the change of ownership principle.

Even though input-output was not specifically on the agenda for the update, some suggestions for *clarifications* to the 1993 SNA text were made, most specifically with the paper “Streamlining the SNA 1993 chapter on Supply and use tables and input-output” (Thage and ten Raa) prepared for the IARIW conference in 2006. However, rather than updating and adjusting the IO chapter of the 1993 SNA, the chapter was completely rewritten, and split into two separate chapters, chapter 14 in Volume 1 and chapter 28 in Volume 2.

To secure the broadest possible involvement of the global statistical community in the SNA updating project the Advisory Expert Group on National Accounts (AEG) was

established, comprising 20 country experts from all regions of the world. The Inter-secretariat Working Group on National Accounts (ISWGNA) which comprises the statistical offices of the European Communities (Eurostat), the International Monetary Fund (IMF), the organization for Economic Cooperation and Development (OECD), the United Nations and the World Bank coordinated the updating project and was assisted in its work by a project manager and an editor. Over several years the 44 updating issues were dealt with in great detail in these and other fora based on successive versions of comprehensive issue papers. Finally the draft chapters were sent out for world-wide review, principally to statistical offices and central banks.

However, as input-output was not an updating issue, it did not come under this formal process, and no issue papers were worked out, nor were the far-reaching changes to the input-output text of the 1993 SNA on the agenda of any meeting of the AEG. Thus the only feed-back on the new text came as a result of the world-wide review. This process was far from efficient. As these chapters did not contain updating issues with the exception of goods sent abroad for processing (and a few others with only a very marginal effect), and were also probably by many seen as rather technical, the response was limited when compared to the actual problems in the draft text. Nonetheless the draft chapter 14 attracted 18 country comments and chapter 28 received 14 comments. Many of these comments coming from international organizations and statistical offices advanced in this field were very comprehensive and in general quite critical, pointing out not only many factual problems but also pedagogical shortcoming in the scope and organization of chapters.

As there were no issue papers to refer to, and no meeting had dealt with the new text, it was at the discretion of the editor and the ISWGNA how to react to the comments received, and in general the attitude was to make only minimal changes, and to reject reorganising the text or to change the weights given the various subjects. Lack of time was one reason being mentioned for not accepting changes, and it was difficult (and a still ongoing process) to have even rather obvious substantial errors corrected in the drafts now included in the pre-edit white-cover versions of Volume 1 and 2 now posted in the SNA update website (UNSD). At no time were there any feed-backs even to those who had given very comprehensive and elaborate comments.

These unsatisfactory developments also prompted a comment from the IIOA on the draft chapter 28 on the SNA update website. This comment reads as follows:

“The International Input-Output Association (IIOA) takes a major interest in the way the input-output framework is presented in the 2008 SNA. Our membership include both producers and users of input-output tables and will in many respects have the text of the SNA as their main reference when it comes to understanding the essentials of compiling and using input-output tables. It is therefore important that the 2008 SNA gives a coherent, consistent and user friendly exposition of the input-output framework and at the same time represents the state-of-the-art as it has developed since the 1993 SNA. It is therefore with some concern that we have noted that substantial comments received from a total of 18 countries on *chapter 14* were only to a very limited extent taken into account in the redrafting of the chapter. As the countries (and organizations) had put great efforts into reading and commenting on the in many

respects completely new text as compared to the 1993 SNA, and broadly agreed on the changes that needed to be made, it is disappointing that so little has come out of it. We have now noted that the comments so far received on the draft *chapter 28* imply even more far-reaching changes to that chapter. We trust that the necessary time and effort will be taken to redraft the chapter, and we would be ready to assist in any way possible.”

This was no response to this comment and the offer to assist.

### **The two new input-output chapters in the 2008 SNA**

Even though the over-arching new structure, with the main chapter 14 dealing with supply and use tables only, and the more appendix-like chapter 28 with the derivation of the symmetric input-output table and a few other specific items must be seen as an improvement, its implementation in practice is not completely satisfactory, as also pointed out in the many critical country comments. No doubt in an attempt to be more pedagogical and give down-to-earth examples and explanations the style of writing is often talkative and lacks clarity, and the way of reasoning and the examples given often seems out of focus in relation to the substance discussed. Thus the understanding of the intentions with text is often contingent upon having a good prior knowledge of the subject, and the many errors of substance in the successive drafts of the chapters raise questions about the quality in general, and whether this really represents the state-of-the-art in this field.

Because the issue of goods sent abroad for processing is the only formal updating issue specifically related to input-output tables this subject is treated at length in both chapters in a way that is out of proportion to its actual importance in most countries compared to many other similar institutionally related problems. Concerning the balance in the text the most remarkable is that the question of transport margins now covers 3½ pages or around 15 per cent of the total text of chapter 14 (compared to ½ pages in the 1993 SNA) without giving more than an elaborate methodological exposition that contributes very little to the understanding of practical implications or how to deal with them. The numerical illustrations in small text tables are not supportive to understanding the basics of input-output tables, as the columns represent the market/non-market breakdown rather than industries. Furthermore there are in several cases commented on the figures in these tables as if they were actual observations from which interesting conclusions can be drawn. Several references to the role of household budget surveys in the compilation of the tables are doubtful, as is the conception about how data for intermediate consumption are obtained.

Nonetheless chapter 14 also attempts in several ways to underline and illustrate even stronger than the 1993 SNA did how and why the commodity flow method and the supply and use tables are superior methods for confronting and balancing data from different sources and thus should be the preferred method for compiling the goods and services part of the national accounts at both current and constant prices.

In the first section of chapter 28 “Flexibility in the supply and use tables” the treatment of the CIF/FOB adjustment is copied from chapter 14 (but in the latest version not further elaborated as was the original intention of taking it up again here), and alternative treatments of the goods sent abroad for processing outlined. However, no clear “SNA-approved” flexibility options result from this discussion. (Both subjects are discussed on detail later in this paper). In the second section “Deriving an input-output table” it is a definite progress that the new terminology making a distinction between technology assumptions and market share assumptions is introduced, and that no specific recommendations are given on the type of table or transformation process are given. However, even though it is stated in the introduction that the purpose of this section is only to indicate the key aspects of converting a pair of supply and use tables into an symmetric input-output table, the exposition lacks clarity and the explanations of the conversion processes are simplified to a degree that the main points may be missed. (Assuming that the factual errors now in the text about how the transformation processes work will be corrected). The first draft of this chapter contained serious misrepresentations of the standard transformation procedures as well as other problems, and was heavily criticized in the world-wide review. Only hesitantly was it accepted that changes were necessary, but still some errors of substance are awaiting correction.

Whereas in the input-output chapter of the 1993 SNA it was possible to identify around 15 specific *recommendations* concerning SUT and SIOT (see Thage and ten Raa, 2006), the two 2008 chapters on input-output are more hesitant. In fact the word “recommend” cannot be found in any of the two chapters. Instead more vague terms such as “it is common to work with”, “commonly used”, “in general” etc. Thus the conclusion seems to be that whereas the advantages of compiling SUT as a technique of balancing the accounts are explained, and the methods that can be used to derive a SIOT from the SUT are outlined, the 2008 SNA is more reluctant to take a position on specific procedures. This might be seen as reflecting a modest attitude confronted with “range of complexities of compilation and inventiveness of applications” (2008 SNA 28.3), but for a statistical standard this might be too defensive.

In spite of the above-mentioned examples of improvements compared to the input-output chapter in the 1993 SNA, the input-output framework has on balance effectively been downgraded in the 2008 SNA, which does no longer provides a coherent and balanced introduction to this field, neither for compilers, nor for users. Perhaps this could also be seen on the background of the focus in this updating of the SNA on institutional, financial and pension related questions which have concentrated the interest of the main players in the updating elsewhere. On the other hand the basic principle of seeing input-output as an integrated part of the system of national accounts has not been contested.

In the rest of this paper some of the changes from the input-output chapter of the 1993 SNA to the two input-output chapters of the 2008 SNA will be discussed. The issues of goods sent abroad for processing and the CIF/FOB adjustment will be dealt with in greatest detail. The former because it is one of the formal updating issues, and has been launched as changing the traditional perception about what information is conveyed by an input-output table, and the latter as an example of how a relative simple problem can be complicated to an extent that a complete explanation was finally dropped.

Furthermore, with (Thage and ten Raa, 2006) as reference, it is examined if, and to what extent, the changes suggested in their paper are reflected in the 2008 SNA.

## **Goods sent abroad for processing**

### *Transactions and units in the 1993 SNA*

Which transactions to record and in which way can only be discussed on the background of a defined playing field that consists of enterprises, establishments, physical movements of goods, and economic or legal ownership. Although the most general case of an economic transaction is associated with a change of legal ownership, this is far from always the case, and in particular for those flows that are of interest in IO analysis, there are important exceptions.

It is important to realise that in the SNA output and intermediate consumption (input) are concepts that apply to a producer unit – an establishment or an enterprise – rather than a process of production. Output has to be defined in the context of a production account, and production accounts are compiled for establishments and enterprises, and not for processes of production. Output therefore consists only of those goods and services that are produced within an establishment that become available for use outside the establishment. When an enterprise contains more than one establishment, the output of the enterprise is the sum of the output of its component establishments (1993 SNA 6.38).

Output consists not only of what is sold, bartered, entered into inventories, retained for own final consumption or fixed capital formation or supplied free to other institutional units, but also (which is of particular interest in IO connection) *what is supplied to another establishment belonging to the same enterprise for use as intermediate consumption in the latter's production* (1993 SNA 6.41), even though no change of ownership has taken place, and the value has to be imputed.

### *Goods for processing in the 1993 SNA*

From this definition of output a further rule can be inferred: Goods sent for processing to another domestic establishment are recorded without imputing a change of ownership *unless the establishment is part of the same enterprise as that supplying the goods*. The reasons for this rule are the following. Firstly there will be no need to define “goods for processing” in a domestic context – all deliveries between establishments within the same enterprise (*intra* enterprise *inter*-establishment deliveries) are treated in the same way. Secondly in the usual domestic case industrial services are only a small part of the activity of a full production process, whereas often the whole of one type of activity would have been outsourced abroad.

An exception to the change of ownership rule is also made for goods sent abroad for processing. Except for goods sent abroad temporary and returned in more or less the same condition (maintenance, servicing, routine repairs), a change of ownership is imputed. In these cases the goods sent abroad lose their identity by being transformed

or incorporated into other goods (1993 SNA 14.61). However, international processing is recorded without imputing a change of ownership if the goods *remain* in the processing country or go on to a third country (where the actual later case of change of ownership will be recorded) *unless the establishment is part of the same enterprise as that supplying the goods or is a direct investment enterprise of the owner.*

It is quite difficult to imagine that analysts are aware of the above variations and can successfully discern exactly what changes are taking place in industries subject to growth in outsourcing without extensive assistance on untangling how many goods are subject to each of the different sorts of recording. Nor does the different treatment assist the statistician responsible for compiling the tables. (AEG paper SNA/M1.05/16)

Imputing a change of ownership of the goods to the processing country allows the traditional approach to input output which shows the full transformation of goods from one commodity heading to another via a supply and use table, to be undertaken there. In the owning country, the original goods "disappear" as exports of one type of product and "reappear" as imports of another at a higher value. The processing country is shown as producing these finished goods and the owning country does not produce them but only imports them.

It is mentioned that the current treatment of goods for processing in the 1993 SNA was to facilitate input-output analysis. The question raised in the SNA updating is whether there is still a valid reason to record goods for processing on a gross basis or if the advent of globalization and the increasing amount of goods processed abroad suggest a change in practice would be appropriate.

#### *Goods for processing in the 2008 SNA*

To understand the new approach taken in the 2008 SNA some new terminology has to be introduced.

Although production is related to activities and thus the output of one production process is one set of products, output is measured for an establishment and may include the output of several production processes. Thus output is defined as the goods and services produced by an establishment: (1) excluding the value of any goods and services used in an activity for which the establishment does not *assume the risk* of using the products in production, and (2) excluding the value of goods and services consumed by the same *establishment* except for goods and services used for capital formation (fixed capital or changes in inventories) or own final consumption. (2008 SNA 6.89)

Production is an activity carried out by an establishment. It may not always be clear whether an establishment is producing a good or is providing a service. For example, an oil refinery processing crude oil that it owns is producing a good (refined petroleum); if the same refinery processes crude oil belonging to another unit, then it is providing a refinery service to that unit. This lack of clarity may often appear for goods passing between establishments of the same enterprise and it is important to know when to record the output of a good and when of a change-effecting service. When the

establishments belong to different enterprises (that is to different institutional units), the defining principle is that of economic ownership. If an establishment has no discretion about the level of production, the price to be charged for the good or the destination of the good, there is evidence that the establishment has not taken economic ownership of the goods being processed and the value of the output should be treated as the processing element only. This is the case for the refinery service cited above. (2008 SNA 6.85).

Thus if the establishment to which a goods has been delivered has discretion about the level of production, the price to be charged and the choice of customer, and in general to have assumed the risk of using the goods in production, the establishment is seen as having taken economic ownership of the goods being processed and the finished product therefore forms part of the output of that establishment, and the goods delivered is part of the intermediate consumption of the establishment.

This rule is valid no matter whether the goods are delivered to another domestic establishment or to an establishment abroad. Therefore there is in the 2008 SNA no longer any difference between the treatment of goods for processing domestically and internationally. Also there is in the case of goods for processing no longer any difference between the treatment of deliveries between establishments belonging to the same enterprise, and inter-enterprise deliveries.

This has implications for the input-output tables which on the new basis will reflect the economic basis of production (what does each unit contribute to the production process) rather than the physical technology (though that was also earlier not really what was measured).

In the 2008 SNA this new treatment is described in chapter 14, par. 14.37-14.43 and in chapter 28, par. 28.13-28.24 and in 26.53. Where the text of chapter 14 describes the background for the change in treatment of international processing, the text of chapter 28 that appears under the heading “Flexibility in the supply and use table” was intended to outline alternative treatments.

Two separate and widely different reasons are given for this change (in addition to the formal one of aiming at consistency with the BMP6). In 14.38 it is said that it is inappropriate to impute change of ownership as the “*financial transactions* that do not take place” have to be imputed to match the imputed change in ownership, and that the processing unit assumes no *risk*, whereas in 28.19 the *practical difficulties* for the processor to put a value on the components he receives and the output he provides are seen as a major problem. These types of arguments are not that convincing as in many other cases in the 2008 SNA they are not applied to the same effect. Furthermore it is an illusion that the implied consistency between the non-financial and the financial accounts could ever be obtained, and the valuation of the goods for processing do in fact already exist in the foreign trade statistics, and will not have to be imputed separately for national accounts purposes.

It can also be argued that the decision to treat goods for processing net does not fully take into account the *dual character* of the national accounts where we have on the one



hand the institutional characteristics, where the legal ownership to economic resources is fundamental, and on the other hand the production processes, where the real product flows are fundamental, regardless of the institutional arrangements.

It is important to be aware that in spite of the changes to the BMP and the SNA concerning goods sent abroad for processing there will be no changes to the international trade statistics, although (2008 SNA par.28.21-22) gives the impression that the monetary values of goods sent abroad for processing will no longer be found in official statistical sources. However, these values will still be recorded in *the foreign trade statistics*. It is only in the BMP6 and the 2008 SNA that a net recording will occur, but the balance of payments statistics is not usually the source data used for detailed products in the supply and use tables (as also clearly indicated by the CIF/FOB adjustment problem, see below). The updated recommendations for International Merchandise Trade Statistics, IMTS, Rev. 3 that is planned for final adoption by the Statistical Commission in 2010, will still include gross recording of goods for processing (i.e. no change).

However, the elaboration in chapter 28 that includes the case of continued gross recording, boils down to another set of arguments for the shift to net recording, and concludes in par. 28.24 that all the situations analysed reinforce the preference for net recording. This outcome is not in agreement with the decision at the meeting of the ISWGNA on December 7, 2007, the minutes of which states: “The ISWGNA agreed to keep the AEG recommendation on this issue (goods for processing) unchanged. However, the input-output chapter should be cast in such a way to *allow* an alternative treatment, as is the case for the use of c.i.f. rather than f.o.b. when valuating imports”. And in chapter 26, the rest of the world accounts and links to the balance of payments, it is stated that: “However, the value of goods movements is recommended as supplementary items to understand the nature of these arrangements. Further details of the recording of these processing arrangements are given in Chapter 21, measuring corporate activity”. (2008 SNA 26.53)

The main problem with the new treatment of goods for processing is seen as being related to change in the nature of the input-output coefficients, as they (in the case of international processing) no longer represents the technical structure of an industrial process, but an economic process (2008 SNA 14.42-43). Or put differently: The focus is on the contribution of each unit to the production process rather than on the physical technology. Examples are given of other changes relating to renting of fixed capital and the extent of ancillary activities that limit the interpretation of input-output coefficients as representing a technological structure.

In (2008 SNA 28.18-19) two ways to proceed that would retain the “technical” interpretation are outlined. The first one is to split the economic activity into two: one processing on own account, and one processing on account of others. The second one is to continue gross recording. The former method would of course be in agreement with the 2008 SNA, but the idea – when seen in the perspective of a published IO-table – is rather theoretical, as it would only in very exceptional cases be realistic to have the tables include such “dual” branches, and furthermore this way of reasoning could be extended to all other kinds of aggregation problems in the IO table and thus lead to an

expansion of the number of economic activities *ad infinitum*. Furthermore the solution to continue gross recording is not avoiding the problem that the first method is seen as solving. Even in gross recording the input structure of a processor would probably be quite different from the input structure when processing on own account, as the share of semi-fabricated input would be more dominant in the former.

Therefore the two suggested method are dealing with quite different problems. Method 1 is a general method to handle aggregation problems that should in principle still be applied even if gross recording (method 2) is chosen. This points to the central problem that is not generally discussed in the 2008 SNA, namely that the existence of industrial processing by others, whether domestically or internationally, will in any case affect the input-output coefficients (both for the processors and for those contracting the processing). Thus there is no way of avoiding the institutional changes taking place in the economy unless we are imputing sets of data that are completely detached from the actual economic transactions and their statistical recording.

To the extent that the increasing importance of outsourcing under globalization of markets make these inherent institutional changes more rapid and significant this is a phenomenon that the input-output compilers and analytical users will have to live with and cope with – but not by making an artificial world of their own that denies these structural changes.

On this background input-output compilers are not faced with a fundamentally new situation. As always they must on a case by case basis decide how to handle the problem of compiling input structures in a balanced way so that they are not – seen from a user point of view – reflecting volatile institutional changes, but on the other hand not aiming at eliminating institutional changes in general. To take two examples: If the share of oil refining made on contract basis (as processor) varies greatly over time it might be justified to apply the gross method in this case, while on the other hand an increasing trend in outsourcing should not be neutralised. Also practical data problems should be considered. Whereas it may be perfectly realistic to implement the above oil refinery case, it would require industrial insight and data beyond any common sense to adjust for the latter general case.

So far only the cases where the goods sent abroad for processing are returned to the original country after the processing has been completed have been considered. There are, however other possibilities, and in those cases the recording will be different. Thus the BMP6 (par. 10.64) states: “Manufacturing services on physical inputs owned by others is an item that covers the transaction between the owner and processor, and only the fee for the service rendered is included under this item. If the processed goods are subsequently sold by the owner to a resident of the processing economy or a third economy, the sale of the good is recorded as an export of a good (in general merchandise or merchanting, depending on the arrangements for movement of the good) by the economy of the owner and as an import of a good by the importing economy. If the goods to be processed are purchased from a resident in the same economy as the processor or from a resident in a third economy, the owner of the goods to be processed records the acquisition of goods (most probably an import of goods under general merchandise, but possibly a negative export of the goods is recorded as merchanting)”.

This gives an impression of the degree of complication when the actual trading patterns characterizing globalization are taken into account.

The discussion about the full implications of the new treatment of goods sent abroad for processing continues internationally. Thus it is one of the issues dealt with by the *Group of Experts on the Impact of Globalisation on National Accounts* that was created to review the main distortions in the compilation of national accounts and related source statistics caused by the growing globalisation of economies, and to develop proposals on how to deal with these distortions and improve the quality of national accounts. The final outcome of the Group of Experts will be a report with recommendations and best practices, to be presented to the Conference of European Statisticians in June 2010.

The Group of Experts held a meeting in Geneva 11-13 May, 2009, and the agenda and papers can be found on the web site <http://www.unece.org/stats/documents/2009.05.sna.htm>. The issue paper on goods sent abroad for processing is worked out by Statistics Canada. The paper outlines the impacts of the existing and proposed treatments on industry and trade statistics and how they affect the measures derived from them such as input-output models, multifactor productivity indices, and other structural indicators. Second, it presents a summary of changes that need to be implemented at both the data-collection level and statistical estimation stage. The paper also suggests some of the benefits and some of the drawbacks that can be expected for supply-use tables. Finally, the paper outlines how the new treatment impacts the analytical roles that are traditionally associated with input-output tables.

### **The CIF/FOB adjustment**

In the SNA, total imports of goods are valued free on board (FOB). However data on detailed flows of imports from the foreign trade statistics are valued including costs, insurance and freight (CIF), according to the International Merchandise Trade Statistics (IMTS, Rev.2). To reconcile the different valuations used for total imports and for the product components of imports, a global CIF/FOB adjustment on imports was introduced in the 1993 SNA. The basic principle in this macro adjustment is simple: The CIF based value is higher than the FOB based one, and when import is valued CIF rather than FOB, the trade balance for goods decline with this difference. As the total trade balance (for goods and services) remains unaffected by this valuation problem, the balance for trade in services must be improved with the same amount.

Already the explanation of the nature of the CIF/FOB adjustment in the 1993 SNA is difficult to understand, even though the text is elaborated in detail over half a page (1993 SNA 15.68 and 15.69), and the supply table (table 15.1) have as many as six footnotes relating to this adjustment. Furthermore the import matrix (table 15.5) also contains CIF/FOB related entries. The experience is that even when compilers and analysts have used a long time to try to understand the logic behind the entries associated with this adjustment, they have to start all over again the next time they are confronted with the problem.

The much shorter explanation of the CIF/FOB adjustment in the 2008 SNA chapter 14, par. 14.77 and table 14.4 (this table is included in *Appendix 1* at the end of this paper) is less instructive, and leaves the reader mystified, and even more so when trying to understand what is going on in the import matrix in table 14.15. The critical comments received on this issue in the world-wide consultation of chapter 14 was only to a very limited extent taken into consideration – lack of time was given as the main reason, even though it was admitted that there may be not only drafting problems, but also factual problems with the treatment of this adjustment. At the time it was, however, promised that this would be revisited in chapter 28 in more detail.

Consequently the first draft of chapter 28 included an extended section on the CIF/FOB adjustment. It was based on a numerical example that was in principle reproduced from the contents of *tables 1-3 in appendix 1* that had been attached to the original comment on chapter 14 from Statistics Denmark. However, the way it was presented in the draft did not make clear that the CIF/FOB adjustment in the numerical example in the SNA has both the role of balancing originally inconsistent detailed service flows in the detailed supply and use tables (SUT), and the role as a macro adjustment to total imports of goods and services, and the text contained substantive problems in explaining the contents of the tables, some columns of which were furthermore aggregated so that the point with showing them was missed, and the problematic row for CIF/FOB correction in the import matrix in chapter 14 (table 14.15) was not dealt with at all.

Following the country comments received (including the comment from the IIOA) on the draft chapter 28 which on this issue as well several others were quite critical, the second draft (which was also the first draft version of the complete Volume 2) included a further explanatory table. However, the main problems remained in the text, though now with the additional surprising statement that the CIF/FOB correction was 3 in the numerical example (rather than 10) – see explanatory tables in appendix 1. When these shortcomings were again commented on by several countries (those who still had the energy to read the chapter once more), the editor and the ISWGNA reacted by deleting practically the whole section, so that what remained was basically a reproduction of the text and table 14.4 from chapter 14. The little extra text now added in the “extended” section in chapter 28 was new, but unfortunately only introduced new problems. The whole purpose of having this section on the CIF/FOB adjustment in Volume 2 in addition to what was already in Volume 1 was therefore missed. As the ordinary world-wide review at the time of this removal was closed, this major change to a text that had in principle been approved by the Statistical Commission was made without any explanation and without the possibility to interfere from individual countries or other interested parties.

Behind the confusion on this seemingly rather simple problem is the difficulty in the successive draft of capturing the fundamental distinction between: (1) At the *detailed product level* the supply and use of the individual services are adjusted so that they can be meaningfully balanced under the CIF valuation of goods (this is a practical problem that compilers of supply and use tables have always had to solve) and (2) At the *macro-level*, to insert the adjustment entries (the sum of which must be zero) that will make the

separate totals for exports and imports of goods and of services equal to what is shown in the account for the rest of the world, where a FOB valuation of imports of goods is applied (it was because of this change of valuation of imports of goods with the 1993 SNA that the CIF/FOB adjustment was originally introduced).

*Elaboration of the background for the numerical example in 2008 SNA, table 14.4*

In 2008 SNA chapter 14 *exports of services* are assumed not to include any fictional amount of services that are rendered by resident producers to importers of goods. (Therefore the CIF/FOB adjustment in chapter 14 does not affect the export side). On the *import side* the CIF/FOB adjustment takes place on *the assumption*, that the initially entered data in the supply table include double counting, as some imports of services (which is only that share of the CIF/FOB difference which is supplied by foreign producers) is counted both in the CIF value of imports of goods and as separate imports of services.

Therefore, *prior to* the introduction of the “CIF/FOB adjustment column” in table 14.4 the foreign trade data (goods and services) in the SUT does not give the correct balance of payments (BOP) surplus on goods and services, as (1) there is a double counting of some imports of services, and (2) some domestically supplied services are counted as imports of goods. In total the underestimation of the BOP surplus is equal to the CIF/FOB difference.

The double counting of imports of services (in *table 1* it is assumed that it makes up 5 and 2 respectively of the 6 and 4 in table 14.4) should be eliminated, which must be done by deducting these amounts (in total 7) from imports of the relevant services at the detailed product level. But in practice this would have been done already before the data for imports of services are entered into the table, as the micro balancing of the SUT could not be carried out based on inconsistent data. This adjustment of micro data should not be mixed up with the global CIF/FOB adjustment that results in totals that are equal to those shown for foreign trade in goods and services in the aggregated accounts of the SNA and in the balance of payments.

We are then left with the domestically supplied part of the CIF/FOB difference (which is 3 in this example). This supply from resident producers is included in the supply of CIF-valued imports of goods, and can logically only be imported if it has first been exported. This type of fictional exports must be what is mentioned in par. 14.72 and then again in par. 28.12 in a somewhat mistaken way. The adjustment for the domestically supplied part of the CIF/FOB difference must also be put in place before the balancing of the SUT can be carried out at the detailed product level.

In table 1 it is shown how the adjustments from the *unbalanced* starting point in the example in chapter 14 can first be adjusted to a *balanced SUT-basis* (where imports of goods are still on a CIF basis). These entries *are not part of the global CIF/FOB adjustment*, but just some data work that is indispensable to bring the detailed supply-use framework on a form that can be balanced. This adjustment would be needed even if the balance of payments were on CIF basis for imports of goods, and has therefore nothing to do with the adjustment to the BPM6 concepts. It should be noted that these

entries relating to *detailed services* have no counter entries as they are basically corrections of inconsistent data on exports and imports that have earlier been entered into the tables (which of course they would not have been in practice).

The global CIF/FOB adjustment takes place between the data on the balanced (correct surplus on goods and services) SUT basis and the balance of payments (BOP) basis. It should be noted that the global adjustments exclusively belongs in a special adjustment *row* in the table, and that there are no vertical *column* reclassifications involved.

*Table 2* illustrates the way the entries have actually been conceived in the “CIF/FOB” adjustment in chapter 14 and table 14.4. The difference from table 1 is that the domestically produced services (3) that forms part of the difference between the CIF and the FOB value of imported goods, has now been entered as a negative imports of services rather than as an exports of services. In bookkeeping terms this leads formally to the same result, but the interpretation is more complicated, as we now have a reduction in imports of services to make room for the use of output of domestic services that were actually included in the imports CIF values. Thus, even though we know that these services from resident producers are included in the imports CIF, they are (in this approach correctly) distributed to domestic uses.

The CIF/FOB adjustment is confined to the row with the -10 and +10, although it would be preferable to have this row organised as in table 1, with positive exports rather than negative imports for the domestically supplied services included in the CIF value of imports of goods, as this approach implies a more logical explanation of how the domestic output of services are disposed of<sup>1</sup>. An advantage, though, with the chosen treatment is that the CIF/FOB problem is not visible in the input-output table which will not contain a row for the CIF/FOB adjustment.

*Suggested new version of table 14.4 in chapter 14*

On this background a suggested new version of the table 14.4 is shown as *table 3* in appendix 1. By adding for explanatory reasons two new columns for imports of services and a new row for “Total, FOB-based” it is made clear what is just making original data consistent (which would be needed anyway, even no global CIF/FOB adjustment were required in the system), and what is the global CIF/FOB adjustment.

It is noted that in the suggested table total CIF based imports are obtained as the sum of data in columns 1 and 4, whereas the FOB-based imports are obtained as the sum of data in columns 1 and 2. This implies that in the measures of the total imports according to the alternative valuations the CIF/FOB correction item will not appear, as it of course the adjustment is not imported.

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<sup>1</sup> This is actually what is done in the Eurostat Manual of Supply, Use and Input-Output Tables (p. 123), but as no distinction is drawn between foreign trade in goods and in services, the numerical example is not that illustrative, although it is clearly demonstrates that the CIF/FOB adjustment belongs in a row and not in a column.

### *CIF/FOB adjustment in the import matrix?*

(The tables discussed in this section are not reproduced in the paper, but can be found in the relevant versions of the SNA on the UNSD website)

It must be assumed that table 14.15, the import matrix, in the 2008 SNA, was intended to be identical to table 15.5 in the 1993 SNA. The main problem in both tables is that the imports distributed consist of the CIF-values of detailed goods (in total **382**) and the imports of detailed services on the FOB basis (in total 84). This total import of 466 is too much, as total imports of goods and services (disregarding “direct purchases abroad by residents”) are only 456. The total supply of imports of services that originates from the supply side after the “adjustment of services to SUT basis” is only 74, and as the CIF/FOB adjustment plays no role whatsoever on the *use side* in the set-up chosen in chapter 14, the available services could not be 84.

In table 15.15 in the 1993 SNA this inaccuracy is cancelled out by introducing a mysterious “CIF/FOB adjustment” of the size -10 that makes no meaning at all in the context. The way it is entered in the table is also completely devoid of any logic – except to make the deduction necessary to arrive at a known total.

In the 2008 SNA table 14.15 (and table 14.10 which is the aggregated text version of it) this problem is inherited, but the way it is dealt with is even fancier, as it is seemingly now realised that the “CIF/FOB” correction of -10 cannot stand alone, and it is therefore distributed to certain uses (intermediate consumption in manufacturing industry and household consumption) as negative imports. But the macro CIF/FOB adjustment cannot conceptually have anything to do with the product distributions to final and intermediate uses. Thus this is not at all the CIF/FOB adjustment, but the “adjustment of services to SUT-basis” item of the imports of product groups 5 and 6, which is already deducted at the supply side, and therefore cannot reappear on the use side. Instead the 62 and 17 for these items of imports of services should have been 56 and 13. In table 14.10 it is also linguistically obvious that the row “CIF/FOB adjustment” should not appear in a table with the title “The import contents of the use matrix” as the use matrix (lower part of table 14.12) has no such row. (Note that the row now called “CIF/FOB adjustment” in the use table part of 14.12 in the present pre-edit white cover version of Volume 1 should correctly be “Direct purchases abroad by residents”)

### **The result for some other suggested changes to the 1993 SNA**

In this section it is examined if, or to which extent, the changes to the 1993 SNA suggested in Thage and ten Raa (2006) have been implemented or considered in the 2008 SNA.

#### *Supply and use tables (SUT) versus symmetric input-output tables (SIOT)*

*Suggestion:* The increased focus on supply and use tables has been an important trend during the latest 10-15 years. Still more countries compile such tables as an integrated

part of their national accounts work, following the recommendation given in the 1993 SNA to apply the commodity flow method as the basic compilation techniques for the production part of the national accounts in both current and constant prices. Additionally, the direct application of supply and use tables in economic analysis has become more wide-spread. The traditional symmetric input-output table and much of the theoretical discussion of the underlying assumptions may therefore become of less relevance. These new developments should be reflected in the updated IO chapter and the main text need not dwell on the construction of symmetric IO tables; this can be relegated to an annex.

*Outcome:* In the 2008 SNA this suggestion has in principle been followed by splitting the treatment of input-output into two chapters, the main chapter 14, *the supply and use tables and the goods and services account* and the much shorter chapter 28, *input-output and other matrix based-analyses*, where the derivation of SIOT is treated in a non-mathematical way, and cover in total only three pages (exclusive of tables).

#### *Technology and market shares*

*Suggestion:* It has been pointed out that the terminology first introduced in the 1968 SNA is misleading, when the term “technology” is used also in connection with the construction of a SIOT of the industry-by-industry type from supply and use tables (SUT). See (Konijn and Steenge, 1995; Thage, 2005, and Eurostat 2008)

*Outcome:* In chapter 28 the new terminology that has gradually been accepted during the recent years and according to which the construction of product by product tables requires technology assumptions, whereas construction of industry by industry tables requires assumptions about sales structures is introduced as the official SNA terminology in the 2008 SNA, and it is mentioned that in practice no single method is used on its own. No position is taken in the choice between product by product tables and industry by industry tables or the assumptions to be used in their calculations, which is a difference from the 1993 SNA where the product by product table based on the assumption of a product technology was favoured by reference to certain axioms of desirable properties. In fact the text in the 2008 SNA is slightly tilted towards the industry by industry table and industry technology (or fixed product sales structure), and reference is made to the fact that increasingly the economic interaction of different industries (such as goods for processing) has brought more interest in the industry by industry table (2008 SNA 28.63), and (not that convincingly) to the fact that as negative entries are impossible under the industry technology assumption this is an argument in favour of using this assumption even in the case of an product by product table (2008 SNA 28.56).

#### *Statistical table versus modelling*

*Suggestion:* The origin of input-output is more model-oriented than the rest of the national accounts and the 1968 SNA made practically no distinction between modelling considerations and compilation issues. In the 1993 SNA the presentation of input-output is more operational and concrete, but the modelling aspects are still just below



the surface, and in general the chapter seems to be based on the tacit assumption that everybody knows what IO analysis is about, and that there is a firmly established common agreement on what assumptions to make and how they should affect the data compilation. Thus theoretical modelling considerations are given considerable weight in the recommendations concerning the choice of type of IO-table and compilation techniques, which later spilled over into the UN Handbook on input-output tables.

In Thage ten Raa (2006) is given an outline of how the process from the compilation of SUT to analytical uses could be systematized, based on experiences since the 1993 SNA was completed. *Chart A* at the end of this paper depicts the suggested three step approach in the compilation and dissemination of input-output tables. First and foremost, also in terms of statistical office resources, is the compilation of the *supply and use tables*. The second step is the preparation of the data for analytical uses and the third step is the calculation of some standard analytical results, to disseminate some IO data in a user friendly form.

*Outcome:* This suggestion has not been followed in the 2008 SNA, but there is much less modelling considerations involved. In fact so little that – apart from the discussion in connection with the goods sent abroad for processing – there is little indication about what should be aimed at when compiling an input-output table. Thus the whole discussion of redefinitions and the creation of “pure activities” (for example for agriculture, construction and trade) already in the SUT, and therefore also in the classification of economic activities in the ordinary national accounts tables, is absent, and nor are the time series aspect discussed even though they are central to many uses of input-output tables.

#### *More details on final uses*

*Suggestion:* The input-output chapter in the 1993 SNA says little about the final uses. Transformation matrices connecting final uses classified according to function (COICOP, COFOG) or, for fixed capital formation, by type and economic activity, are useful for statistical and analytical IO-work. It should be noted that in the SNA final uses are not classified by economic activity of origin. These transformation matrices are therefore needed to link the standard SNA classifications of final uses to production.

*Outcome:* In the 2008 SNA chapter 14 there is a section of the connections between the final uses classified by purpose (such as COICOP for household consumption and COPNI for non-profit institutions serving households), by functions of government (COFOG), although they are more explained as means to calculate these uses by product in the SUT, than as the basis for establishing *cross classification matrices* of the dimension product x purpose or function and fully integrated in the use table.

#### *Use table at basic prices as standard table*

*Suggestion:* As it is accepted that the estimates at purchasers’ prices in the supply table is not possible unless the matrices for margins and taxes on products have already been compiled (table 15.2) from the user side, the recommended approach may as well be to

compile the supply table also at basic prices from the outset, and not see it as something that only comes into play when the analytical tables are compiled.

*Outcome:* In the 2008 SNA this is in principle accepted by putting the derivation of the use table at basic prices in chapter 14. However, its role is only seen in a limited perspective. It is noted that “One reason to undertake this arduous task is to facilitate compiling a supply and use table in volume terms” (2008 SNA 14.123). No other reasons are mentioned. Thus what was clearly spelled out in the 1993 SNA (15.61) that the supply table cannot be compiled independently, but requires the breakdown of the use table to obtain the columns for total trade and transport margins, and net taxes on products, is not mentioned as a reason, and even more surprisingly it is not mentioned that this is a precondition for deriving the symmetric input-output table. Thus the use part of table 14.12 may be the derived one, and 14.13 the original use table rather than the other way round. In chapter 28 it is nowhere mentioned that the use table applied in the derivation of symmetric input-output tables should be at basic prices.

### *Producers’ prices*

*Suggestion:* Even though already the 1968 SNA strongly recommended the use of basic prices in IO compilation the 1993 SNA accepted that producers’ prices could be used as an alternative to basic prices. This was mainly caused by the fact that the 1970 ESA only contained the producers’ price concept. As the 1995 ESA also prefer basic prices it would be relevant to play down even more the producers’ price concept in the SNA, in particular as under the net VAT recording producers’ prices do not (because it is conceptually impossible) include non-deductible VAT. The complicated parallel description of measurements at producers’ prices in several paragraphs of the SNA could then be avoided.

*Outcome:* The 2008 SNA still accepts valuing output and therefore gross value added at producers’ prices (2008 SNA 6.75, 14.81 and 14.132) “when basic prices are not available”. This is creating a lack of comparability of data by economic activity and input-output tables both over time in the individual country and internationally. Considering that the data needed to move from producers’ prices to basic prices are tax data easily available from the tax authorities, a request by the SNA to use basic prices only would be a modest one when compared to the request in general to adjust and align data from the primary data sources.

In the input-output table the use of producers’ prices is particularly inappropriate, as this will usually imply an outspoken dissimilarity in the valuation of the elements along a row, and therefore distortions to the results of input-output analysis. (For example in the case of beer, there would be high taxes on sales to households but no taxes on export sales). Thus even though the SNA still accepts valuation at producers’ prices it would have been appropriate to note that this is very unfortunate when compiling input-output tables. This could for example have been mentioned in 14.143, where purchasers’ prices and basic prices along rows are compared.

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## Appendix 1

### Tables related to the CIF/FOB adjustment

Reproduced from the 2008 SNA

**Table 14.4 (and 28.1) in the 2008 SNA:** An example of import entries in the supply table with the global CIF to FOB adjustment.

Product groups (CPC sections)	CIF/FOB adjustment	Goods	Services
1 Agriculture		37	
2 Etc.		61	
3		284	
4			
5	-6		62
6	-4		17
7			
8			5
9			
10			
11			
<b>Total</b>			
CIF/FOB adjustment	<b>10</b>	<b>-10</b>	
Purchases abroad by residents		20	23
<b>Total</b>	<b>0</b>	<b>392</b>	<b>107</b>

Explanatory and suggested tables

**Table 1. Illustrating the two different functions of the CIF/FOB adjustment in 2008 SNA (chapters 14 and 28)**

		Supply		Use		BOP
		Imports		Exports		Surplus
		Goods	Services	Goods	Services	
<b>Chapter 14</b>	<b>Imports CIF</b>	<b>382</b>	<b>84</b>	<b>462</b>	<b>78</b>	<b>74</b>
SUT basis adjustment	Foreign prod.		-7			
	Domestic. prod				+3	
<b>SUT basis</b>		<b>382</b>	<b>77</b>	<b>462</b>	<b>81</b>	<b>84</b>
CIF/FOB adjustment	Foreign prod	-7	+7			
	Domestic prod	-3			-3	
<b>BOP basis</b>		<b>372</b>	<b>84</b>	<b>462</b>	<b>78</b>	<b>84</b>

(cont.)

**Appendix 1 (continued)**

**Table 2. What is actually going on in the adjustments now shown in 2008 SNA (chapters 14 and 28)?**

		Supply		Use		BOP
		Imports		Exports		Surplus
		Goods	Services	Goods	Services	
<b>Chapter 14 Unbalanced</b>	<b>Imports CIF</b>	<b>382</b>	<b>84</b>	<b>462</b>	<b>78</b>	<b>74</b>
SUT basis adjustment	Foreign prod.		-7			
	Domestic. prod		-3			
<b>SUT basis</b>		<b>382</b>	<b>74</b>	<b>462</b>	<b>78</b>	<b>84</b>
CIF/FOB adjustment		-10	+10			
<b>BOP basis</b>		<b>372</b>	<b>84</b>	<b>462</b>	<b>78</b>	<b>84</b>

**Table 3. Suggested new version of table 14.4 (and 28.1) in the 2008 SNA**

Product groups (CPC sections)	Imports of goods	Imports of Services			Total imports
	CIF based <i>detailed</i> goods	FOB based <i>detailed</i> services (BOP data)	Adjustment of services to SUT basis	CIF based <i>detailed</i> services (SUT basis)	
	1	2	3	4	5
1 Agriculture	37				
2 Etc.	61				
3	284				
4					
5		62	-6	56	
6		17	-4	13	
7					
8		5		5	
9					
10					
11					
Total, CIF-based	<b>382</b>	84	-10	<b>74</b>	(1+4) <b>456</b>
<b>CIF/FOB adjustment</b>	<b>-10</b>			<b>+10</b>	
Total, FOB-based	<b>372</b>	<b>84</b>		84	(1+2) <b>456</b>
Purchases abroad by residents	20	23		23	
Total	392	107		107	

<b>Chart A: The three step approach in the compilation and dissemination of input-output tables</b>		
<b>1: Compilation of the supply and use tables</b>		
Choose standard classifications by product (CPC, HS, SITC) and by economic activity (ISIC, Other possibilities?)		
Decide the levels of detail for products and economic activities		
Decide where to use redefinitions for economic activities (such as creation of certain “pure” activities in certain areas such as agriculture, construction and trade, or in general “pure” tabulation categories (SNA 5.30-34). <i>Should be consistent with the tables by economic activity in the current national accounts.</i>		
Decide where to use redefinitions for products, including decisions on where to include various types of special products (repairs, work on others materials, the fish farm case etc.)		
Compile the supply and use tables, including the use table at basic prices (i.e. separate matrices for trade and transport margins, and taxes and subsidies on products).		
<b>2: Prepare data for analytical uses (3 alternatives)</b>		
Direct application of the rectangular supply and use table. Use table must be at basic prices. (Possibly more aggregated versions of supply and use tables than above).	Compilation of symmetric activity by activity consistent with classification on the supply and use tables, and standard national accounts tables by economic activity.	Compilation of “pure” activity symmetric table (each product belong in one single activity only)
	<i>Assumption:</i> Fixed product sales structures (i.e. the distribution of a product by users is independent of the producing economic activity). As input structures by economic activity are left unchanged, no assumptions on input structures are needed.	<i>Assumption:</i> The inputs needed to produce a “product” depend on the characteristic producer rather than the actually producing activity (if they are different).
	<i>Practical implementation:</i> (1) <i>Subdivision</i> of the rows of the use table by actually producing activities (applying the information given by the supply table) (2) <i>Addition</i> according to activity code.	<i>Practical implementation:</i> (1) Aggregation of the supply and use tables to square tables, creating product groups that defines the output of “pure” activities. (2) Transformation of the <i>columns</i> of the use table into “pure” industries (applying the information given in the square supply table).
<b>3: Dissemination. Standard analytical results (impact multipliers, productivity etc.)</b>		
<i>Assumption:</i> The input structure (in terms of products) of an activity is independent of the product mix of the output (Alternatively: Independent of the user of the product, as the rectangular tables tell that different users use the outputs from an activity in different proportions.)	<i>Assumption:</i> The input structure of an activity is independent of the user of the output (an activity or a final use). The input structure is thus assumed independent of the underlying product mix. (We do not talk about “changes” in the underlying mix, as this mix is given by the basic data for each individual element.)	<i>Assumption:</i> The input structure of a “pure” activity is independent of the user of the output (a “pure” activity or a final use). The input structure is thus assumed independent of the underlying product mix. (Although the ways the “pure” activities have been obtained may at this stage make it difficult or impossible to identify the product mix of the individual elements in terms of supply and use table products.)

Reproduced from “Streamlining the SNA 1993 chapter on Supply and Use and Input-output” Thage and ten Raa (2006)