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GOODS SENT ABROAD FOR PROCESSING IN THE 2008 SNA

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The extent to which enterprises send material abroad for further processing has accelerated considerably in recent years; reflecting improvements (and cheaper) communication and transportation technologies, trade liberalization, greater movement of capital and the presence of economies capable of offering reliable production infrastructure at low costs. The 2008 SNA responds to these developments by introducing a change from the 1993 SNA; where it was assumed that when goods moved from one country to another, there would almost always be a change of ownership. The 2008 SNA change aligns the recording of these international transactions in goods and services with their underlying and actual financial transactions. But it also means changes in how the accounts are interpreted; particularly in the context of input-output tables. This paper describes the rationale for the change in the 2008 SNA and its impact on supply-use and input-output tables in particular, where there was considerable discussion in the 2008 SNA process and in the drafting of the UNECE Handbook on the Impact of Globalisation on the National Accounts. The Handbook raises a number of other issues related to global manufacturing where the Handbook recognises that there there may be a need for more explicit guidance. This paper is designed to serve as an early input into any future work that may be undertaken in developing that guidance.

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Background

1. The extent to which enterprises send material abroad for further processing has accelerated considerably in recent years; reflecting improvements (and cheaper) communication and transportation technologies, trade liberalization, greater movement of capital and the presence of economies capable of offering reliable production infrastructure at low costs.

2. The 1993 SNA largely assumed that there was a change in ownership when goods for further processing moved from one country to another. In other words a transaction was imputed in the accounts to reflect the 'acquisition' of the goods by the processing company, with a further transaction imputed to reflect the flows and value of the processed goods back to the company that paid for the processing services.

3. This was, to some extent, driven by a view that the accounts should try to reflect the physical production technologies, in other words physical inputs as well as services, used to produce a product and in particular to facilitate input-output analysis. But it is fair to say that an equally important driver was pragmatic: in many countries merchandise trade statistics record goods when they cross the border. Pragmatic or not, the approach was not in itself a complete panacea from a practical perspective for a number of reasons:

- i. The value imputed to the goods in the trade figures may not always be reliable. Even though the parties concerned may ascribe no value to the goods themselves, in principle Customs officials should attribute an appropriate arms length value to the goods to combat money laundering and transfer pricing between affiliates. However, this may not always happen and there is also a high probability that the difference between the goods on entry and departure may not align with the processing fee received. This is particularly likely to be so when the goods embody some form of intellectual property owned by the principal, including those recognized as produced assets in the 2008 SNA, such as research and development, but also other types of intellectual property such as trademarks. A processor for example may produce the same drug for two companies, one generic and one a brand, but the value of the branded products will generally be greater than the generic, even if the values of the physical inputs and the processing fees are the same. If customs officials ascribe a higher value to the branded products, they implicitly, incorrectly allocate value-added related to the intellectual property (brand) to the processor.
- ii. Even if the values were accurately recorded, identifying the goods that have been reprocessed is non-trivial. Whilst of less concern for the Balance of Payments, this is important for the national accounts. Generally the only information available from a production survey for a national accountant will be the processing fee charged or paid by the companies. The national accountant will need to use this information to identify in the merchandise trade statistics those goods whose values were imputed by Customs officials in order to impute the same flows to the production accounts for industries. This is doubly difficult when the goods that are exported and then re-imported change their classification; which is often the case. There is a risk therefore that one of

the reasons for imputing a change of ownership – attempting to reflect the physical production process for a product – is in itself difficult to attain.

- iii. Further complications arise for the accumulation accounts. If there is unfinished processing at the end of the accounting period, it is necessary to record a change in inventories in the capital account and balance sheet and to additionally impute flows to the financial accounts of both parties. Implicitly, this "reconciliation" via the accumulation accounts attributes holding gains and losses on inventories to the processor and not the owner of the goods yet it is the owner who bears the risks and earns the rewards from owning the goods – for example the goods may be lost or damaged or may simply become obsolete while in process. These other volume changes also apply to the economic owner and not the processor. Treating this transfer of risks and rewards as a trade credit stretches the definition of this item.
- iv. The 1993 SNA did not treat all flows of goods for processing in the same way. It imputed a change of ownership when the transactions concerned affiliated establishments, whether the goods were sent abroad for processing or not. But, no imputation was assumed for goods sent for processing to a non-affiliated domestic establishment. Moreover if the goods were sent abroad and then sold on without returning to the economy of the owner, again no imputation was recorded. Finally the 1993 SNA and BPM5 contained differences in practical guidance as to when goods for processing could be identified as such. The 1993 SNA only imputed a change in the case of substantial processing (reclassification of the good at three-digit CPC) whereas BPM5 suggests as a convention that all processing be assumed substantial.

Input-Output Analysis

4. These complications aside another consideration concerned the basis of the idea that an imputation was preferable for input-output purposes. Whilst it is true that the tables have widespread use in studies related to production technologies it is not altogether clear that an imputation of a change of ownership is necessarily best for all input-output applications.

5. Consider, for example, a petroleum refining plant that provides services to two oil extractors. In one year it refines oil for an overseas company whose extraction methods are carbon intensive (that is the process of extraction itself leads to the release of considerable CO₂ emissions). In the second year it refines oil for another overseas company whose extraction methods are considerably less carbon intensive. In both years it refines exactly the same amount of oil. All other things being equal, in the 1993 SNA the total amount of embodied CO₂ per unit of monetary output will be considerably higher in year 1 than in year 2, reflecting the fact that in the year 1 the crude oil had a higher carbon dioxide emissions content. With the 2008 SNA however the monetary output of the processor only reflects the value of processing services provided and, so, if the processing production process remained unchanged over the two years, estimates of the CO₂ embodied per unit of monetary output produced by the processor is the same in both years. This difference does not make either the 1993 or 2008 SNA incorrect; it merely illustrates the care needed in interpreting IO tables and results of IO analysis. The change in the 2008 SNA does not eliminate the need for careful interpretation; it merely requires a change in interpretation. To say one approach is necessarily better than another is, at the very least, contentious.

6. In addition it's important to recognize that the assumption of a change in ownership actually imposes an additional potential source of error when one considers the sources of input-output tables – namely production surveys, which provide the building blocks of inputs used in production and outputs. These surveys typically ask establishments what goods and services they have purchased in order to produce a given output, and they will include payments made to processors but rarely contain information on the values of goods they sent for processing and then received back. National accountants are required

to attempt to estimate this information on the basis of estimates made by customs officials and on the basis of judgements as to whether an individual establishment exported the goods for processing and re-imported the processed goods. Naturally, these judgements can introduce errors.

7. Secondly it's important to recognize that input-output tables for a given industry grouping reflect an amalgamation of many establishments, who are likely to have different production functions and, at the margin (even at a 4 digit CPC level), different products. Some of these establishments will have outsourced service activities some will have retained them in-house. Some will produce secondary products. Some will be labour intensive. Some will be capital intensive. Some will use derivatives to protect themselves from price fluctuations in their production costs. Some will be able to use economies of scale in negotiating input prices. Some establishments will be responsible for the entire process of production of a final good. Others will purchase semi-finished goods before producing the final good. Moreover, in many countries, input-output tables will be compiled on the basis of enterprises and not establishments or local units. The point is that even if one ignores the goods for processing phenomena, it is clear that, in practice, input-output tables, as mechanisms to measure physical, and homogeneous, production processes – that is quantities of inputs used to produce given quantities of outputs – are, at best, far from perfect. In practice, they can be more accurately described as tables that reflect, in the main, monetary transactions for goods and services between industry groupings.

8. The increasing tendency for establishments to send goods abroad for processing further extends the bridge between quantities of physical inputs used in production and physical outputs. It's important to recognise that the 1993 SNA was not perfect in this sense. As described above, with the exception of transactions between affiliated establishments, the 1993 SNA did not impute a change of ownership when all of the transactions remained within the same economy but did (in most cases) when the processor was located abroad. This created an irrational asymmetry. If an establishment offered to process goods for a non-affiliated domestic establishment in addition to the same goods it already produced, its input-output ratios would change, but if, instead, it did so for a non-affiliated non-resident establishment, its ratios (all other things equal) would be broadly unchanged. Clearly this asymmetry was on its own reason to change the 1993 SNA – either to the principle that a change of ownership was always imputed or never imputed.

The 2008 SNA

9. So, of the two possibilities, why does the 2008 SNA recommend that no imputations for a change in ownership should be made?

Consistency between processing fees and goods pre and post processing

10. As a starting point, for a number of reasons described above, the 2008 SNA recognized the distinct probability that the charge made for processing services was unlikely to reflect the difference between the value of the processed goods and the goods sent for processing. Goods increasingly embody intellectual property, that remains the property of the owner of the goods sent for processing, and there is little guarantee that these flows will be correctly recorded in merchandise trade statistics. Moreover the price of the processed goods will reflect the associated costs of the risks associated with ownership, both of the pre-processed and processed goods, and the value-added related to these risks will accrue to the principal not the owner but merchandise trade statistics may incorrectly ascribe them to the processor.

Imputing flows consistently throughout the accounts

11. This latter point provided on its own a strong argument to cease recording an imputation. But other practical problems also arise when imputations are made. The imputation for a change in ownership in trade statistics has a consequential impact on the rest of the accounts, particularly where the processing

occurs over more than one accounting period: the capital account and balance sheets, for changes in inventories, and the financial accounts of both countries to show that there is no call on the foreign exchange of the processing country for the value of the goods processed. And, even if the processing occurs in the same accounting period, consistent imputations will still be needed in the production account and input-output tables: intermediate consumption and output will need to rise.

12. This last point is particularly important. During the 2008 SNA deliberations a number of countries expressed concern that removing the imputation for a change in ownership would force statisticians to estimate the values anyway as they would still be recorded, de facto, by Customs officials in the merchandise trade statistics. However, as demonstrated above, this was also the case in the 1993 SNA; the only difference being that the imputed estimates were then included in the production accounts (and often the capital and financial accounts and balance sheets). The 2008 SNA therefore restricts the impact of the imputation to the trade statistics – in other words it removes the imputations made by customs officials rather than allocate the same imputations to the production and accumulation accounts.

13. From the point of view of identifying goods sent abroad for processing, although by no means easy, trying to do this from the Customs side seems less burdensome and more likely to generate meaningful results than from the business survey side; where survey forms would need to include specific questions on the values of goods sent abroad for processing and returned – which would need to include information on their product codes and still require a reconciliation between Customs valuations and businesses own valuations.

14. But it's also important to recall the need to treat goods for processing services in the same way whether they are performed domestically or internationally. Consistently treating these services, but at the same time imputing a change of ownership, would mean that imputations would also be necessary for all domestic transactions of goods for processing. This would imply increased burdens on businesses via business surveys, and the very real difficulty of ensuring a consistency between the values of the pre-processed and processed goods estimated by the two parties concerned (the processors and the owners). In this context it's interesting to note that, as a consequence, the 1993 SNA implicitly introduced big-small country biases in the comparability of input-output coefficients. A large economy for example is more likely to outsource production to domestic processors than a small economy, meaning that in the larger economies input-output coefficients would show proportionally lower inputs for given monetary output than in smaller economies.

Input-Output Tables

Changes in input-output coefficients

15. But what of the philosophical arguments relating to the measurement of production technologies, using the 1993 SNA, in input-output tables? This question has perhaps been one of the most forcefully made criticisms against the 2008 SNA recommendations. It is clear that the change in the 2008 SNA will potentially lead to significant changes in input-output coefficients. Certainly, for processor industries the change will be significant as the tables will no longer show all of the physical inputs used to produce a given quantity of physical outputs.

16. But it's equally important not to overstate this argument, at least in relation to the 1993 SNA. For a start no change of ownership was imputed in the 1993 SNA for goods sent for processing to a non-affiliated resident enterprise. Secondly, one could stretch the philosophical argument for imputing a change to reflect production technologies throughout the accounts. Repair services are an obvious industry where an argument could have been made for recording a change of ownership; which could cause, at least, a theoretical complication for the household accounts. But a whole range of contractual services could in

theory fall within scope: a business or household for example might contract construction workers to build a building but purchase the materials themselves but should the accounts record the output of the construction worker as including the values of the materials used in production?

Validating input-output tables

17. Perhaps the strongest criticism relates to the methods used by input-output and supply-use table compilers to validate IO tables. In many countries compilers look for broad stability in these ratios, in volume terms, in order to validate their tables. The input-output ratios for an establishment engaged in producing goods for itself and that provides processing services to produce the same goods for other businesses will vary depending on the proportion of output it produces for itself and as processing services. True as this may be, it is important to recognize that this is, partly a function of aggregation; that is, inadequate classification systems. If it were possible for example to show separate production accounts for the goods it produced for itself and processing services, IO ratios would be unaffected. Indeed this problem already exists for establishments producing one or more secondary products, or a mix of products within the same product classification code. Recognising, in classification systems, that processing services are a different product from the physical goods that result from the manufacturing process would be one way of alleviating this concern.

Interpreting IO tables

18. Another argument that has been made against the 2008 SNA concerns the idea that the IO forward and backward linkages calculated under the 1993 SNA for processing industries would disappear. In particular, when studies look at the linkage of goods with other goods used to produce them, the processing units will be absent since the goods sent for processing will not appear in the inputs or outputs of the processing industries. However this argument is contentious. Typically the analysis of forward and backwards linkages relates to interlinkages between domestic industries. When goods are sent for processing abroad therefore the primary focus of analysis of the processing industry will be in relation to linkages to other domestic establishments.

19. Backward linkages for industry *i* reflect the impact on the output of all industries that occurs when final demand of the output of industry *i* increases by 1. Somewhat counter-intuitively therefore, for the processor and principal industries, under the 2008 SNA, backward linkages will be higher, since final demand estimates will no longer include within exports the value of the goods sent/received for processing. However, it's interesting to note that the increase in the output of all industries (excluding the processing industry or the principal) will be exactly the same in both the 1993 and 2008 SNA for a given percentage increase in output of the processing industry or the principal.

20. Forward linkages for industry *i* reflect the impact on its output if all industries increase their output by 1 unit. Again, counter-intuitively, forward linkages are higher with the 2008 SNA, reflecting the lower exports (greater relative degree of inter-connectivity between domestic industries).

21. Forward and backward linkages will differ if goods are sent for processing to another non-affiliated domestic enterprise (where no imputation is made in the 1993 SNA nor the 2008 SNA) as opposed to an affiliated enterprise (where imputations may be made) but the size of the linkages will be the same in both the 1993 SNA and 2008 SNA.

22. The important point to note here is not that the 2008 SNA is better or worse than the 1993 SNA in this regard. It is merely to note that the results require careful interpretation whichever approach is used.

23. Moreover, where goods are sent for processing to domestic processors it's also important to note that IO tables will accurately capture both the direct and indirect effects on employment, value-added etc

of the processing industry that arise from an increase or decrease in the output of the processor (and so its demand for processing services).

International trade and input-output

24. The 1993 SNA reflects gross values of imports and exports when goods are sent abroad for processing. The most clear and intuitive drawback of this treatment is that it exaggerates the highly visible and widely used measures of import intensity and export performance for goods producing industries generally and for the individual manufacturing industries in particular. Trade ratios such as exports/gross output and imports/production overstate true export and import intensities and make the industry appear more financially vulnerable to external trade. In addition, by subsuming the value of processing services in the gross values of traded goods, the treatment understates the values of international trade in services. To get a better sense of how much exports really matter to an economy's GDP, studies often net out the import content of exports (or vice versa) in order to correct the exaggerated effect of such 'outsourcing', including the cases of "goods sent abroad for processing". Such overstated ratios in turn exaggerate the influence of factors such as exchange rates and the strength of foreign demand for exports on the domestic economy generally and goods producing industries in particular.

25. It's important to note however that input-output type analysis to estimate the contribution a particular industry makes to domestic value-added should in principle return the same results whether the 1993 SNA or 2008 SNA is applied. Analyses that look at the contribution made by exports to domestic value-added will also return, in principle, the same results but in practice differences are likely to arise because of aggregation problems; because all products in a given classification are assumed to have the same production technologies.

26. Which approach (the 2008 SNA or the 1993 SNA) returns the most meaningful results (that is those that would occur if a more detailed industry classification was used) is not clear. If the industry within which a processor existed also exported all of its products, whether they were processing services or/and raw products, the 1993 SNA and 2008 SNA would return the same results for value-added embodied in trade. If however some of the products produced by the industry remained in the domestic market and it was not possible to differentiate between the processing services and other outputs, the 2008 SNA is likely to underestimate the contribution to value-added made by exports; since disproportionately more of the exports would be processing services, which would have a higher value-added to unit of output content, but because the 2008 SNA would not be able to differentiate between the processing services and the physical products, it would apply the same value-added to output ratio to both. The 1993 SNA would return the same results if the production technologies used by all establishments in the industry were the same, including the proportion of imports used but are likely to overestimate the contribution made by exports if the non-processing part of the industry's output used proportionally less imports; which is likely. Indeed in the 1993 SNA, estimates of value-added embodied in trade would be over-estimated for the processor, even if it was a homogeneous industry, if the processor also provided services to domestic enterprises.

27. For analyses that look at the value-added embodied in trade of the principal the 2008 SNA has arguably an advantage over the 1993 SNA. Estimates of value-added embodied in trade are likely to over-estimate the contribution to value-added made by trade in the principal economy using the 1993 SNA, if, least some of the output of the principal is sold within the economy.

28. Perhaps the biggest impact of the 2008 SNA is in the context of what it means for trade statistics. The current account balance of the Balance of Payments will be unaffected by the change but self-evidently trade in goods statistics will be lower, significantly in some territories. The flip-side is that trade in services statistics will be higher.

Implementation challenges

29. As described above the 1993 SNA already requires national accountants to identify the imputations made by Customs officials. The information to implement the 2008 SNA therefore also exists. However it is useful to consider whether further improvements to the information system could be made that provide both more accurate estimates and indeed more meaningful accounts.

30. One possible approach to removing goods sent abroad for processing values from merchandise trade is to identify goods that are declared as "for processing" when they clear Customs and use the tagged information to adjust merchandise trade when it is estimated on a BoP basis. Goods going into Free Trade Zones (FTZ), and those originating back from them could be documented and tagged for treatment. Specific measures must be taken to distinguish the qualified goods - those which go into FTZs and come back to the same unit in the 'owning' country - from other goods. For goods processed outside these zones this requires international agreements between customs authorities of major trading partners that specifically deal with the terms and conditions of identification, evaluation and reporting of goods for processing. The tagged information on exports and imports must be collected at the lowest level of the Harmonized System of commodity classification in order to make it possible to link them with commodity categories of the supply and use tables. This will allow analysts to compare the net values of tagged exports and imports with processing costs from principal units and revenue data from processing units obtained from industry sources.

31. For the production accounts and input-output tables in particular it is clear that a differentiation of industries between establishments that provide processing services and those that engage in the conventional production of the same goods (that is those establishments that own the inputs) would be of benefit to users and those responsible for balancing supply-use tables; and this is indeed the recommendation of the 2008 SNA (see §28.20). But, even if such an approach were feasible, problems would still arise in cases where processing establishments were also engaged in the production of the same goods on their own account. That said even if this were the case, supply-use tables would be able to reflect this, as the processing establishment would record two different types of output in the supply-side (Make) table: output of goods and output of processing services. The current international classification system does not unfortunately provide such a mechanism but it would be desirable to consider this possibility in future revisions.

Conclusions

32. The 2008 SNA responds positively to the changes and challenges presented by globalization. In the context of the production process, the emphasis is now on how it is organized rather than what the underlying technologies are.

33. Paragraph 28.21 states explicitly the nature of the 2008 SNA requirement:

When goods are sent abroad for processing, they are recorded as neither exports of goods by the country holding economic ownership, nor as imports of goods by the processing country in either the SNA or BPM6. Similarly, after processing they are recorded neither as exports by the processing country nor as imports of goods by the country of economic ownership. The only item recorded as imports and exports is the fee agreed between the economic owner and the processor.

34. Although contentious, the changes provide a better measure of the role and importance of goods sent abroad for processing and a better measure of international trade and its importance to an economy.

35. Importantly the 2008 SNA is actually simpler to implement than the 1993 SNA, where the introduction of an imputation in trade statistics needs to be repeated in many other parts of the accounts, in particular the IO framework.

36. However, whatever the position one might take on whether imputations should be made, the 2008 SNA is unambiguously an improvement on the 1993 SNA, if only because it creates a consistency between goods sent for processing abroad and goods sent for processing in the domestic economy.

37. There remain some issues related to the interpretation of IO tables. Many have argued that dual recording would be advantageous – namely that NSOs should be encouraged to produce IO tables on both bases: assuming that ownership changes and not. Clearly this should not be discouraged. And this is recognized in the 2008 SNA (§28.19-28.20).

38. But at the same time, legitimate as many of the concerns are about the new system on IO tables, it is not clear that the 2008 SNA is manifestly retrograde with regards to either the compilation or use of IO tables. In many respects it is clear that the 2008 SNA represents an improvement and in many other areas where criticisms exist, these appear to be overdone. Certainly, they generally relate to interpretability as opposed to substance, where the same criticisms can be made of the 1993 SNA treatment.

39. The challenge for input-output compilers is to ensure that users are aware of these changes. Indeed it is quite likely that this process of increasing user-awareness will in itself reveal that many users were not previously aware that imputations were made. And especially that there was an asymmetric treatment of many goods sent abroad for processing and goods processed domestically.

40. Certainly however it appears that further guidance is necessary. One key issue concerns guidance on the classification of companies engaged in global manufacturing but in a fab-less way - i.e, companies that own all of the inputs into a production process but provide none of the actual manufacturing (an issue incidentally that is as relevant to the 1993 SNA as it is the 2008 SNA).

41. For example should a company that engages in R&D to produce a new drug be registered as an R&D producer if it outsources all parts of the drug production process to processors but shoulders all of the costs, or should it be allocated to the pharmaceutical sector? From a value-added perspective it would be classified as an R&D producer but, possibly, from a turnover perspective it could be classified as pharmaceuticals producer. This is nothing new of course, statisticians have long had to cope with similar issues, the example of Dell computers being often cited but the increasing incidence of such producers, coupled with the treatment for goods for processing suggests that more detailed guidance may be necessary.

42. This may be particularly so for complicated cases of goods for processing that have some features of merchanting, in that the goods may never enter the country where the principal is resident. For example, if a company resident in country A purchased goods in country B for processing in country C before being sold in country D. Following the change of ownership principle this would result in an imputation for imports into A from B, and from C into A (the processing fee), and exports from A to D.

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