

Making the circle square: treatment of goods sent abroad for processing in the construction of the European Union's Inter-Country Supply, Use and Input-Output tables

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The extension from national to inter-country Supply, Use and Input-Output tables (SUIOTs) consists in splitting national SUTs domestic exports (FOB) by country of destination (and importing industry) and by type of use (intermediate or final), which in turn produces indirect estimations of imports of intermediate and final goods and services among countries of origin (and exported products). It could also be the other way round, splitting national SUTs imports by countries of origin, as in the WIOD approach. The two approaches should not differ, in principle, as long as the view of bilateral trade among countries is balanced at the level of each good and service and both exports and imports are valued in FOB. However, this is not the case in official statistics, mostly due to trade asymmetries and the different valuation of exports (FOB) and imports (CIF). This paper however justifies the first choice for various reasons and put a special focus on the treatment of goods sent abroad for processing, including some indications about the necessary assumptions made in the absence of official data about trading partners and type and destination of the processed goods.

Keywords: supply and use tables; input-output analysis; national accounts;

Acknowledgements

We are grateful to Antonio F. Amores, Juan M. Valderas-Jaramillo, M. Victoria Román, Mattia Cai, Nadim Ahmad, Fabienne Fortanier, Lin Jones, Jianqin Yuan and Diane Doyle for their valuable comments to previous versions of this paper and for the discussions.

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The views expressed herein are those of the authors and do not necessarily reflect an official position of the European Commission.

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1. Introduction

International trade statistics, in particular merchandise trade statistics (in practice also often services trade statistics), do not follow the same concepts as those used for imports and exports in the System of National Account (SNA), the key accounting framework used in constructing official national Supply, Use and Input-Output Tables (SUIOTs). The difference in merchandise trade totals and National Accounts totals for goods can be significant because of the adjustments for non-residents' expenditures in the domestic economy and residents' expenditures abroad, which are captured in trade in services statistics and not merchandise trade data.

However, the changes made in the 2008 SNA for goods sent abroad for processing and merchanting in particular imply significant changes for some countries, notably for trading 'hubs' (such as the Netherlands) but also for countries with large processing sectors (such as the Czech Republic for the automobile industry) and, also, for those countries providing the intermediate inputs and purchasing the output from processing countries.

Balances for merchandise trade statistics include all the underlying flows related to goods for processing — the processing services provided by the processing firm and the goods used by the processor in the production that were supplied without a change of ownership taking place between the principal and the processor. National SUTs that conform to the 2008 SNA (United Nations, 2009) require that for the processing firm (and country), merchandise trade data exclude the value of the goods imported that have not changed ownership. As a result, the flows of goods exported by the processing firm should be excluded from the goods account, while the processing fee charged by the processor should be recorded in services account¹ (i.e. Balance of Payments). Likewise, for the principal firm (and country) exports should exclude the value of goods supplied to the processor (without a change in ownership), with a corresponding correction for any imports from the processor.

Estimates of processing fees split by trading partner are available in the balanced estimates of trade in services produced by countries (EBOPS, category SA: manufacturing services). However, in order to align merchandise trade data with comparable data in SUIOTs, it is also necessary to have estimates of these processing services split by CPA product and, in addition, estimates of the value of imported and exported goods whose ownership has not changed but are included in merchandise trade data.

For example, let us assume that Germany exports EUR 100 of a certain good for processing to the Czech Republic. The good comes back to Germany (it could also be another country) processed for EUR 110. Let us also assume that there is no change in economic ownership in the goods exported and imported. Looking at international trade

¹ Although these manufacturing services will eventually have to be allocated to the corresponding goods account (in CPA/NACE classification).

in goods statistics (ITGS), we would find the two gross flows registered, that is Germany exporting EUR 110 to Czech Republic and importing EUR 110 from it. Under the 2008 SNA accounting principles, Germany should have EUR 100 less of imports from the Czech Republic and EUR 100 less of exports to the Czech Republic. Ultimately, a manufacturing service import (classified as a good in CPA) for EUR 10 from the Czech Republic should be allocated to Germany.

This information (or at least national estimates of this information) must be available in theory to produce national SUIOTs². The challenge is to create equivalent estimates of these flows on a partner basis. Unfortunately, the information available to make these additional adjustments to international merchandise trade data is limited, i.e. how much gross trade is related to these types of goods and the amount of processing service fees paid by country and by types of goods traded.

2. Overview of data sources and estimation methods

2.1. Data sources

Partial information can be found in the balance of payments data of countries and/or by combining business statistics and merchandise and international trade services data.

The project called FIGARO (Full International and Global Accounts for Research in Input-Output Analysis) has used the information provided in the Gross National Income inventories and the Eurostat's report on "Statistics on goods under merchanting and goods sent abroad for processing" presented at the third meeting of the Eurostat's Task Force on Integrated Global Accounts³ (Eurostat, 2017).

In addition, Eurostat provides International trade in services statistics (ITSS) that include data about manufacturing services on physical inputs owned by others split by trading partner as well as some information sent by Member states on gross flows of goods related to GSA (Eurostat, 2017). This information can be complemented with some Member States that provide information useful to distribute the GSA adjustment by product. (Bracci et al., 2015; Van den Cruyce, 2016; Chong, 2015).

2.2. Process of estimation and methodology

The adjustment for goods sent abroad for processing (GSA) that has to be applied to ITGS is twofold: a component of the adjustment is related to the flows of processing services and a second component is related to the gross flows of the goods involved in processing. In fact, even if the manual of the European System of National Account

² See columns P6D (goods sent abroad) and MCH (merchanting) in the [Statistical Use Table](#).

³ This report shows the gross flows connected to both inward processing and outward processing based on ITGS sent by Member States for the years 2013-2015. The identification of these flows is made by countries using Nature of Transaction codes (NoT) and the report suggests that these data might be more reliable when it refers to inward processing, particularly for countries such as Bulgaria, Estonia, Croatia, Cyprus, Hungary, Latvia, Lithuania, Portugal, and Slovenia. This report also suggests that it is preferable to collect additional direct information from trade in services data rather than using NoT codes from ITGS. This recommendation will be followed in future developments of the EU-IC-SUIOTs as much as these services trade data will be available.

ESA2010 (Eurostat, 2013) recommends to record processing fees as services, we apply also the services adjustment to ITGS. This is because, looking at the NA classification, the manufacturing services are assigned to the goods they are related to. So, even if processing fees are recorded in the Balance of Payment as services, we apply both adjustments to the manufactured goods. In particular, the gross flows of the goods involved in processing have to be subtracted from ITGS, while the flows of services have to be added to ITGS. Or, in other words, the total GSA adjustment imply to subtract from ITGS the gross flows of the goods involved in processing net of the value of processing services.

The adjustment is also made in two steps: one considering the distribution by trading partner and the second step, once we get the trading partner distribution, considers the distribution by CPA product.

2.2.1. Distribution by trading partner

We consider the reported adjustment of goods sent abroad for processing (GSA) net of processing services. Some countries report the total GSA adjustment they applied to 2010 data (Germany, Greece, Spain, Cyprus, Latvia, Luxembourg and the Netherlands). For these countries, we directly used the values they provided. Other countries reported total GSA adjustment for 2011 or 2012 (Belgium, Czech Republic, Denmark, Croatia, Italy, Poland, and Slovakia) instead of 2010. So, we computed how much the GSA adjustment was as a share over their total value of exports of goods for 2011 and 2012 and we applied an average share to the total exports of goods of 2010.

For the remaining countries that did not report any explicit value in the GNI inventories, we derived the total GSA adjustment using the information provided in the Eurostat report “Statistics on goods under merchanting and goods sent abroad for processing” (Eurostat, 2017) on gross flows connected to inward and outward processing. The information was however for 2013, so we estimated the GSA adjustment for 2010 in the same way as explained earlier for values of 2011 and 2012.

Subsequently, the decomposition of the total GSA adjustment values across trading partners had to be based on the balanced view of manufacturing services trade on physical inputs owned by others (item SA) in the absence of information about bilateral trade flows of goods sent abroad for processing (gross terms) – with the exception of Germany. Since those manufacturing services can be considered as a share of the gross value of the goods traded, this can be derived by applying to the manufacturing services the inverse of a processing margin (Fortanier and Miao, 2017, p. 7). To derive the processing margin we derived implicit processing fees related to inward processing as the difference between exports after processing and imports before processing, and the processing margin as the ratio between processing fees and exports after processing. By using one processing margin per country wherever available (or reliable), we therefore computed a first approximation of the bilateral gross trade flows of the GSA adjustment. As a result, since manufacturing services were already split by trading partner, for each country we were also able to compute the GSA adjustment distributed by trading partner. However, these values had to be eventually benchmarked against those earlier estimated from the GNI inventories and Eurostat (2017) using the GRAS method.

2.2.2. Distribution by CPA product

The decomposition of each GSA bilateral trade flow by CPA product was initially based on the CPA structures of those countries (across all trading partners) that provided information about the type of goods traded with such purpose (Belgium, the Czech Republic, Germany, Italy and the Netherlands) and an average structure for the remaining ones. However, it turned out that these structures were very country-specific, thus leading to meaningless allocations in average structures. Therefore, in the absence of superior data, we eventually opted for assuming the structures given by the balanced view of trade in goods even though we were fully aware that not all goods produced in the economy are susceptible of being sold abroad for processing⁴.

In particular, Belgium (Van den Cruyce, 2016) and Germany provided some information on export (import) after inward (outward) processing and processing fees split by product. The Czech Republic provided information on the exported and imported GSA processing fees distributed by product; so we used the structure of exported processing services to distribute the GSA adjustment across products. The Netherlands (Chong, 2015) and Italy (Bracci et al., 2015) provided information of the GSA processing fees distributed by industry. We derived the gross flows related to the processing fees and the GSA adjustment split by industry, and we used the distribution obtained as a proxy of the distribution of the GSA adjustment by product.

The resulting estimations of the GSA adjustments by CPA product were further used to build up the part of the EBOPS-CPA bridge matrix related to item SA (Manufacturing services on physical inputs owned by others). Ultimately, some ad-hoc adjustments had to be made in a few cases to avoid negatives whenever the adjustment turned out to be higher than the bilateral trade flow.

Conclusion

This paper describes the method used in the FIGARO project to estimate the flows of GSA split by trading partner and by product. This estimation was needed in order to adjust the data from the balanced view of trade in goods and to align them to data in the SUIOT framework that follow the 2008 SNA accounting principles.

Finally, this first effort to overcome the difficulties of including the changes made in the 2008 SNA regarding GSA has permitted to identify the main lack of information and to deliver a list of the main data that all countries should provide to properly adjust data. With additional information provided by the countries, in the future it will be possible to implement better estimates of GSA in order to align trade data and SUIOT framework.

⁴ At this respect, one way to explore further is to identify goods typically used for intermediate uses and final uses at the most disaggregated level so that different geographical distributions of bilateral trade come up both for intermediate and final goods. This was the approach used in the World Input-Output Database project.

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