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A novel Asymmetry Resolution Mechanism for solving asymmetries in International Trade in Services: methods and practices

Marios Papaspyrou [1], Georgios Papadopoulos [2]

[1] *Eurostat, Luxembourg – marios.papaspyrou@ec.europa.eu*

[2] *Eurostat, Luxembourg – georgios.papadopoulos@ec.europa.eu*

Abstract

Asymmetries in trade statistics and in particular International Trade in Services statistics (ITSS) data is a long-standing phenomenon, reducing the credibility of official statistics and thus hindering the user from making good use of them. Asymmetries occur when there are differences in the bilateral flows between countries. The DGINS[1] 2019 Bratislava conclusions underlined the importance of work to reduce asymmetries: "…*implemented via more coordination and cooperation between domains, between countries, and between the ESS and ESCB*". Under this mandate, Eurostat introduced the Asymmetries Resolution Mechanism for ITSS data (ITSS-ARM) in April 2022.

The core aim of the ITSS-ARM is to resolve major cases of intra-EU bilateral asymmetries, thereby improving the ITSS data quality. A balanced approach was adopted, aiming at participation of all EU Member States. Eurostat developed a data-driven scoreboard methodology to prioritize the most prominent asymmetry cases, by building a score of "importance", taking into account not only the magnitude of the asymmetry but the trade volume involved as well. The selected cases are "important" in the sense that Member States will have the greatest interest (large asymmetries with large trading partners) in dedicating resources to resolve them. An IT tool was further implemented to automate the process. The cases are followed up in trilateral meetings (Eurostat and the two member states involved) and the progress made is regularly reported to all relevant European and international expert groups.

During this process, several findings of a broader interest (recommendations, best practices, practical guidelines) came to light. As a reinforcement strategy, this know-how is "*fed back*" to national compilers via a collective document and organized workshops. The mechanism has helped to create a "*cooperative*" culture among Member States in the compilation of ITSS statistics and to resolve or prevent bilateral asymmetries. The improvements achieved on the published data from the two years of operation of the ARM show a successful mechanism with positive impact on reducing observed asymmetries.

Keywords: bilateral asymmetries; trade in services; data quality; scoreboard methodology; trilateral meetings.

[1] Directeurs Généraux des Instituts Nationaux Statistiques

1. Introduction

Asymmetries in trade statistics, and in particular International Trade in Services statistics (ITSS) data, is an internationally recognized phenomenon, hindering straightforward data usage. ITSS provide statistics on the value of imports and exports of trade in services between countries and/or groups of countries. ITSS (like international trade in goods statistics, or balance of payments) is a statistical domain where mirror data flows can be observed: the exports from country A to country B are mirrored in the imports of country B from country A. When these two observations do not match, an asymmetry arises.

Asymmetries in ITSS may be arising due to measurement, methodological or other differences in the compilation process, different data collection systems, or different estimation methods. The inherent complexity of ITSS further complicates the analysis: each EBOPS item (type of service) may be compiled using a different compilation method: estimation models are commonly used for transport services, frontier surveys for travel, and business surveys for other business services. Thus, an observed asymmetry in the total services may be due to one or more sub-cases in the underlying EBOPS items. For these reasons, resolving asymmetries in ITSS may require a significant amount of time in some cases.

Asymmetries in ITSS tend to be of a structural nature, persisting over time both in terms of magnitude and sign. Significant asymmetries hinder usage of data, for example as input to economic models, as, in the general case, users are not able to judge which of the two values is a better estimate of the flow. Asymmetries are therefore a quality issue for the statistics.

To answer to these needs, Eurostat introduced in March 2022 the Asymmetries Resolution Mechanism for International Trade in Services statistics (ITSS-ARM). The ITSS-ARM takes inspiration from the successful operation of a similar mechanism for Foreign Direct Investments (FDI), while being suitably adapted to the specificities of ITSS. The ITSS-ARM complements other Eurostat activities[2] related to asymmetries.

The ITSS-ARM primarily aims at resolving major cases of bilateral asymmetries and, thereby, reducing the overall asymmetries in the published ITSS data. To achieve that, a cooperation with and between the EU countries is necessary, as well as across domains, e.g. with Balance of Payments. The ITSS-ARM results in a process: resolved cases are replaced with new emerging ones, ensuring that the participation burden of each country remains approximately equal.

This paper describes the scope, approach, and core principles of the ITSS-ARM, as well as the work undertaken so far. Section 2 describes the scoreboard approach and the method for

[2] For example, an analysis of ITSS asymmetries is regularly included in the annual Quality report on balance of payments (BOP), international investment position (IIP), international trade in services (ITS) and foreign direct investment statistics (FDI).

prioritising cases. Sections 3 describes the ARM process, whereas Section 4 summarises the lessons learnt, and the results achieved so far. The last Section concludes the paper with final remarks. The Annexes present the selected list of cases, and a more detailed technical description of the methodology.

2. Scoreboard Approach and Selection of Cases.

The ITSS-ARM focuses on intra-EU bilateral asymmetries, for which both trade partners are EU member states. A balanced approached was adopted, aiming at participation of all EU Member States with an equal participation burden. Considering the huge number of cases of bilateral asymmetries, a data-driven mechanism to prioritize amongst cases was needed. Therefore, Eurostat developed a scoreboard methodology to prioritize ITSS asymmetries in terms of importance. The ITSS-ARM process can be summarized as follows:

1. Annual and quarterly ITSS data are used, from Eurostat's database;
    - Annual data contain more detailed breakdowns and enable time-series analysis;
    - Quarterly data offer quick insight into the most recent reference periods.
2. For each country, the bilateral trade with the EU member states constituting the country's largest trade partners is analysed, using the latest data available. The rationale is that countries would rather devote resources to resolve issues affecting their economies to the highest degree, i.e. asymmetries linked to their largest partners.
3. Nominal and relative asymmetry measures for total services are computed for all pairs.
4. The approach prioritizes cases based on three main criteria:
    - relative asymmetry,
    - nominal asymmetry and
    - trade volume involved.
5. A score vector is computed, averaging the above three criteria. The score vector is used to rank cases according to their relative importance, thus allowing a prioritization of the asymmetries of each member state. A tool has been developed in R to fully automate this ranking process.
6. Where several significant cases are identified for a country, some further analysis is needed to prioritize (choose cases with the largest relative asymmetry, cases where both directions of flows between the partners exhibit a significant asymmetry, favour choices that ensure an equal distribution of burden between countries).
7. The selected cases are followed up by the partner countries in cooperation with Eurostat. Trilateral meetings are organised, aiming at identifying and addressing the root causes.

8. The process is repeated every year, using the latest annual data. During the year, quarterly data are analysed to identify any significant trends. Resolved cases are removed from the list and new emerging cases are added. Eurostat regularly reports on progress to all expert groups concerned.

Using the scoreboard procedure, **24 asymmetry cases** were initially identified in March 2022, as a priority to be followed up by the ITSS-ARM. These cases involved, in total, **15 country pairs**, as some cases referred to exports and imports of the same pair of countries.

Based on the latest ITSS data available at that time (reference year 2020, with the 2021 vintage), the sum of all intra-EU trade in services bilateral asymmetries (sum of the absolute value of all bilateral asymmetry cases, for all countries) reached 249€ billion. The 24 selected cases accounted for around 54€ billion (in terms of absolute value), or about 22% of the total intra-EU asymmetry.

The 24 cases selected in March 2022 are presented in Annex I.

3. Follow up of the selected cases.

For each selected asymmetry pair Eurostat prepares a briefing note (Asymmetry Briefing Note - ABN). The note summarises the asymmetry case(s) and includes the relevant data and tables, such as a time series analysis as well as an analysis by type of services (EBOPS items). Trilateral meetings are organised by Eurostat, where representative experts from the two countries and Eurostat participate. The ABN serves as a basis for the discussion during the meetings, where countries are providing insights on their compilation methods, the possible causes for the observed asymmetries and suggested solutions.

Eurostat provides secure solutions to facilitate exchange of information between the countries. The solution is similar to the one used in the FDI network. As work progresses, the ABN is updated with the main discussion points, results achieved so far, as well as the latest data vintage.

During the follow up process, Eurostat's role is to support the discussion, provide methodological guidance and coordination. The goal is to reach concrete results and ensure that corrective actions are put in place in order to reduce the observed asymmetry.

The national data compilers are the experts on the compilation methods used by each country. Eurostat encourages countries to gradually take the lead in the resolution process.

Every year, Eurostat reevaluates the scoreboard using the latest available ITSS data. Resolved cases are removed from the selected cases and replaced by new cases. Eurostat also checks the evolution of the asymmetry for all selected cases, compared to the total intra-EU asymmetry.

An asymmetry case is considered as solved, if the relative and nominal asymmetry values are significantly reduced, due to known corrective actions implemented by the countries. The latter is necessary as often an asymmetry may appear to be reduced due to spurious factors (e.g., randomly occurring cancelling out effects). For this reason, Eurostat communicates with the countries involved to ensure that an apparent improvement is due to implemented corrective actions. The assumption is that once the systematic part generating the asymmetry is corrected, the case should continue to exhibit a good performance over time (unless, of course, new root causes emerge). The follow up then continues with the retained and newly added cases.

Experience has shown that in some cases it is relatively easy to agree on the root cause of an asymmetry, while in other cases the causes may be difficult to establish. Corrective actions too may be easy to implement, or they may necessitate more work and resources. Each case is different, and there can be no “one-size fits all” solution or timeframe for achieving resolution. Cases are therefore followed up until they are resolved.

As already noted, the primary goal of the ITSS-ARM is to resolve the observed asymmetry cases, thereby improving data quality. At the same time, Eurostat takes note of all acquired knowledge (such as hints and tips, good practices, and recommendations). Such practical knowledge is shared with the compilers.

Eurostat also checks the asymmetries’ evolution every quarter, using quarterly data. This allows for the early detection of important emerging issues, thereby reducing the need for ex-post data revisions.

4. Evaluation of the ITSS ARM results so far.

The ITSS-ARM was launched in March 2022, using ITSS data of reference year 2020. Eurostat reviews the progress achieved annually. The review checks the case-by-case progress as well as the overall trend for all cases monitored by the ITSS-ARM, i.e., a comparison of the overall performance of the 24 selected cases (ARM cases), to all other cases that are not followed up by the ARM.

4.1 Evaluation of the overall progress.

Eurostat checked the overall progress achieved on the cases selected in the ITSS-ARM process. The current quantitative measure is based only on the transmitted data available in Eurostat’s database. Thus, agreed solutions which are going to be implemented in future data transmissions (or potential process improvements that may also have a positive effect in non-supervised cases, due to knowledge sharing / findings acquired during the ARM resolution process) are not taken into account in this measure. The comparison sums up the absolute value

of the nominal asymmetry of all cases (thus avoiding a cancelling out effect when asymmetries have opposing signs).

Table 1 presents a comparison of the overall asymmetry change for the selected cases supervised by the ITSS-ARM vis-à-vis all other cases, not followed up in the ARM process. The ARM cases were selected in March 2022, based on reference year 2020. The data for the same reference year were revised with the 2022 and 2023 data transmissions. The table examines the effect of any revisions in the ARM cases, compared to revisions in other cases, not followed up by the ARM. Comparing the latest data reported for ref. year 2020 (2023 vintage) with the 2021 vintage (based on which the 24 original cases were selected), we see that for the ARM cases the sum of absolute asymmetries dropped by 7€ billion or 13%, whereas for the other cases the improvement was 8€ billion or only 4%. This result indicates that, overall, the asymmetry for ARM cases improved at a greater pace than for all other cases taken together.

Table 1. Comparison of the sum of absolute nominal asymmetries for the 24 original ITSS ARM cases, data of reference year 2020, reported with the 2021 and 2023 vintages.

	Sum of absolute asymmetries 2021 vintage (billion €)	**Sum of absolute asymmetries 2023 vintage (billion €)**	**Asymmetry change 2023 - 2021 vintage (billion €)**	**Relative Change 2023 – 2021 vintage (%)**
ARM cases	54	47	-7	-13.0%
Other cases	196	188	-8	-3.9%
Total	249	235	-15	-5.9%

Table 2 compares the sum of absolute nominal asymmetries for the ITSS-ARM cases and other cases, for reference years 2020, 2021 and 2022, as reported in the 2023 vintage. This comparison aims at capturing any effect of recent improvements in the compilation methods (such as, including previously non-reporters in the sample) when no revisions were made to previous reference years (i.e., the improved compilation method only affecting the most recent reference year 2022).

Note that trade significantly increased in reference year 2022 (compared to ref. years 2020 and 2021 which were both affected by Covid-19 restrictions), leading to an overall increase in the nominal asymmetry for the same year.

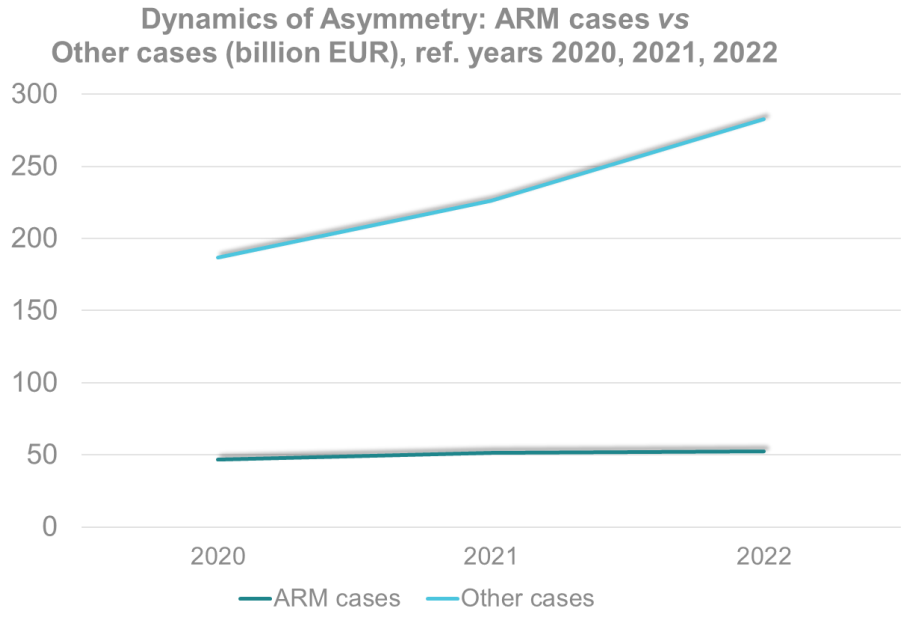
Table 2. Comparison of the sum of absolute nominal asymmetries for ITSS-ARM and other cases, Reference years 2020, 2021 and 2022, based on the 2023 vintage.

	Sum of absolute asymmetries by reference year (billion €)			Relative Change Ref. years 2021-2020 (%)	Relative Change Ref. years 2022-2020 (%)
	2020	2021	2022		
ARM cases	47	51	53	9.8%	12.4%
Other cases	187	226	283	20.9%	51.1%
Total	234	277	335	18.6%	43.4%

As shown in Table 2, the overall asymmetry for other cases has increased at a much greater pace than for ARM cases. Comparing data of ref. year 2022 to that of ref. year 2020, we see that the ARM cases exhibited an overall increase of the asymmetry by about 6€ billion or 12.4%. For the same reference years, the asymmetry for other cases increased at a much greater pace, by 96€ billion or 51.1%. A similar result is seen also when comparing ref. years 2021 to 2020.

Figure 1 presents a graphical representation of the evolution of the asymmetry by reference year. The slope for the other cases (non-supervised by the ARM) is much steeper than that for the ARM cases. This result indicates that overall, the ARM cases exhibit a stable year-to-year behaviour, regarding the total asymmetry, at least for the reference years in scope.

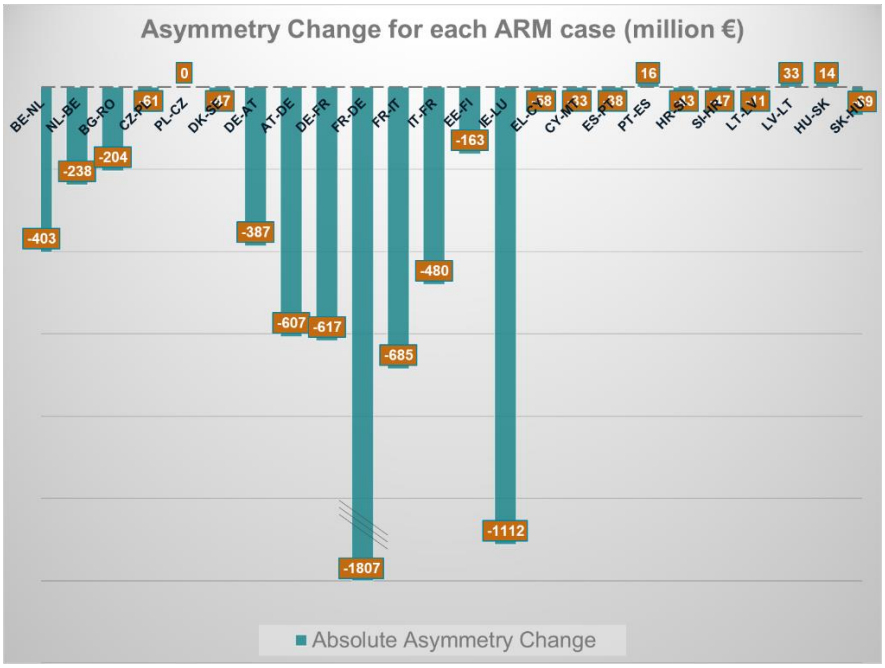
Figure 1. Trend line of the overall asymmetry for ARM cases and other cases, reference years 2020, 2021, and 2022 (2023 vintage).



4.2 Case by case analysis.

Figure 2 shows the asymmetry change (difference of the absolute value of the asymmetry with the 2023 vintage to the absolute value of the asymmetry with the 2021 vintage) for each of the 24 original cases. A negative value indicates a reduction (i.e., improvement) in the asymmetry.

Figure 2. Absolute asymmetry change (million EUR)



Roughly half of the cases showed an improvement; the remaining ones remained approximately unchanged.

An apparent improvement in the asymmetry does not necessarily mean that the case is resolved; the improvement may be due to random factors or cancelling out effects. Thus, Eurostat also checks that corrective measures have been implemented, targeting the root cause of the asymmetry. Based on this analysis, in March 2024, three of the original cases were considered resolved (FR-IT, IE-LU and EL-CY). Other cases were retained, although the asymmetry had shown an apparently significant improvement, as there were no corrective measures implemented yet[3].

Finally, six new cases were introduced, taking into account the magnitude of the asymmetry (using the scoreboard methodology), the feasibility of resolution, and keeping the burden of the countries approximately equivalent. Note that, these six new cases correspond to three new

[3] Some countries have noted that they intend to implement corrections in their data with the next benchmark revision (data to be transmitted by Sep 2024). Therefore, more cases may be resolved after Sep 2024.

country pairs. The current list of 27 retained and newly added cases is presented in Annex I. The ITSS-ARM process continues with these 27 cases.

5. Conclusion

The ITSS-ARM mechanism has been in operation for about 2 years. The ARM encourages active participation and further cooperation between compilers in the ESS, facilitating exchange of information with a view to improving data quality. The potential of using innovative data sources and the importance to extract information from various data sources is also regularly examined. The accumulation of knowledge coming from the trilateral meetings is shared with all countries via a document summarising best practices, as well as targeted presentations in Working Groups and workshops. Although resolving asymmetries in ITSS is often a complicated exercise, after 2 years of operation the ITSS-ARM has managed to:

- resolve three asymmetry cases. Some countries will proceed to implement identified revisions in the benchmark revision (Sep 2024 transmission), therefore it is expected that more cases will be resolved in the next few months.
- reduce (or at least help maintain stable) the overall asymmetry of the selected cases; data indicate that the overall asymmetry for selected cases reduces at a greater pace compared to the overall asymmetry of all other cases (not followed up in the ARM). Comparing data of the latest vintage, the cases supervised by the ARM showed a much smaller increase of the overall asymmetry when compared to all other cases.
- promote and facilitate cooperation between Member States with a view to resolve bilateral asymmetries and thus improve the quality of ITSS statistics.

These results would not have been achieved without the active participation and continuous efforts of national data compilers in the participating countries. Eurostat continues these efforts in cooperation with the countries, aiming at reducing further the ITSS asymmetries.

Annex I. The original and current set of cases prioritised in the ITSS-ARM

Table 3. The originally selected 24 cases, prioritised for the ITSS-ARM in March 2022 (ref. year 2020, 2021 vintage).

Case No	Country A Reporter of Exports	Country B Reporter of Imports	Share of total EU trade (%) [Exports A to B] / [Exports of A to EU]	Share of total EU trade (%) [Imports B from A] / [Imports of B from EU]	Reported values Exports A to B (million €)	Reported values Imports B from A (million €)	Nominal asymmetry [Exports – Imports] (million €)	Relative Asymmetry [Nom. Asymmetry]/ [exports+imports] (%)
1	BE	NL	24.3%	13.5%	15816	11852	3965	14.3%
2	NL	BE	11.6%	21.5%	10813	15322	-4509	-17.3%
3	BG	RO	6.0%	5.0%	259	516	-257	-33.2%
4	CZ	PL	5.4%	6.2%	720	1514	-793	-35.5%
5	PL	CZ	4.0%	5.2%	1460	631	828	39.6%
6	DK	SE	19.6%	11.4%	4764	3629	1135	13.5%
7	DE	AT	7.2%	39.8%	8549	14470	-5921	-25.7%
8	AT	DE	54.9%	11.3%	22608	15626	6982	18.3%
9	DE	FR	17.2%	24.2%	20408	27843	-7435	-15.4%
10	FR	DE	22.2%	11.3%	22722	15607	7115	18.6%
11	FR	IT	9.8%	14.6%	10065	7458	2608	14.9%
12	IT	FR	18.1%	8.8%	7688	10179	-2491	-13.9%
13	EE	FI	33.2%	5.3%	1239	953	286	13.0%
14	IE	LU	-1.4%	13.4%	-1059	5739	-6798	-145.3%
15	EL	CY	7.5%	17.1%	567	443	124	12.3%
16	CY	MT	2.5%	13.8%	111	820	-709	-76.2%
17	ES	PT	6.5%	30.2%	2602	2370	232	4.7%
18	PT	ES	22.5%	7.7%	3044	2235	809	15.3%
19	HR	SI	12.5%	18.4%	721	654	66	4.8%
20	SI	HR	9.0%	19.8%	478	309	169	21.5%
21	LT	LV	5.7%	17.3%	427	274	153	21.8%
22	LV	LT	12.1%	11.1%	362	414	-52	-6.7%
23	HU	SK	3.9%	5.3%	489	339	151	18.2%
24	SK	HU	6.7%	6.1%	433	680	-247	-22.2%

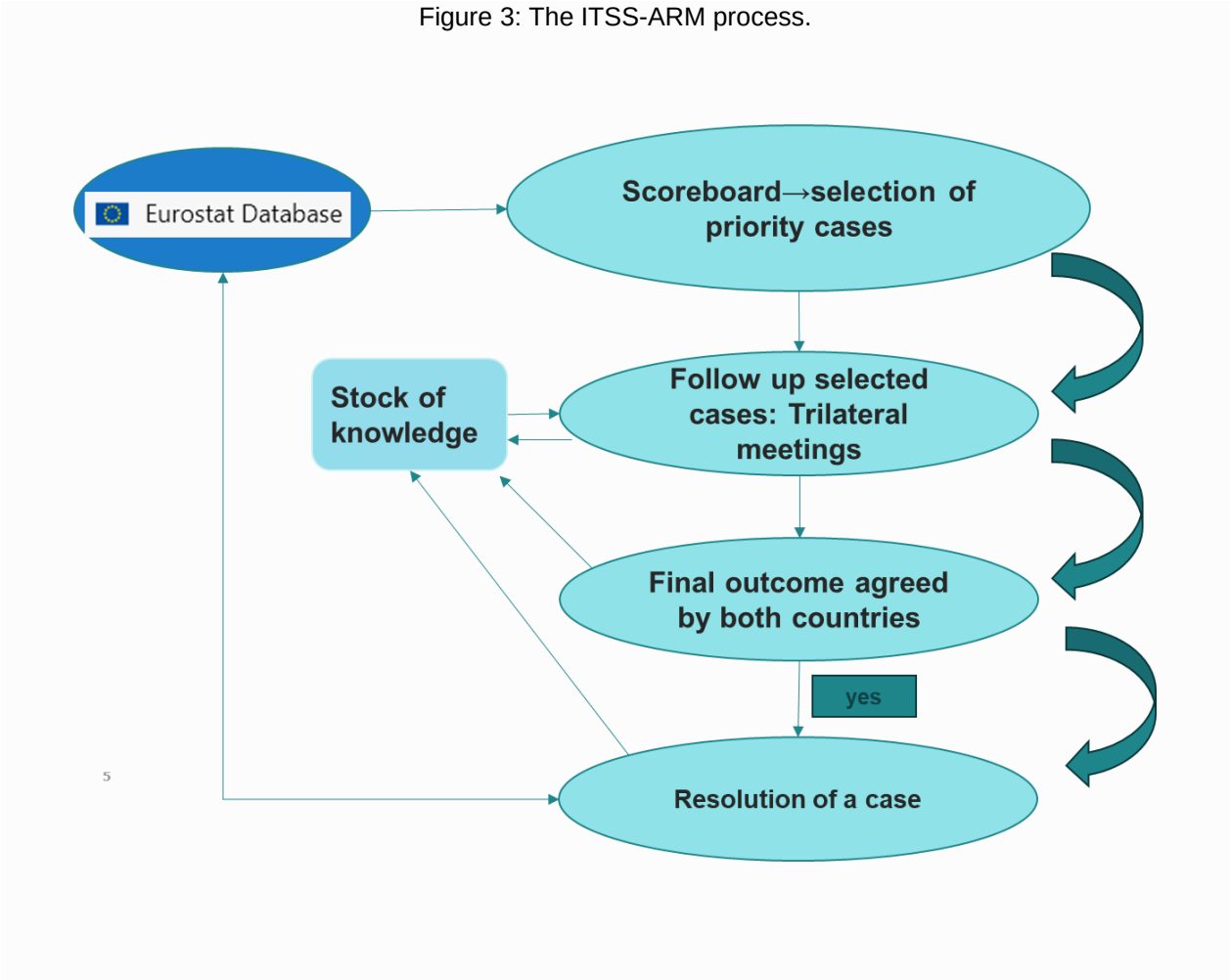
Table 4. The current set of cases, prioritised for the ITSS-ARM in March 2024 (ref. year 2022, 2023 vintage). New cases are designated with bold letters:

Case No	Country A Reporter of Exports	Country B Reporter of Imports	Share of total EU trade (%) [Exports A to B] / [Exports of A to EU]	Share of total EU trade (%) [Imports B from A] / [Imports of B from EU]	Reported values Exports A to B (million €)	Reported values Imports B from A (million €)	Nominal asymmetry [Exports – Imports] (million €)	Relative Asymmetry [Nom. Asymmetry]/ [exports+imports] (%)
1	BE	NL	21.9%	14.3%	17702	18957	-1255	-3.4%
2	NL	BE	12.3%	20.6%	18062	18208	-146	-0.4%
3	BG	RO	7.2%	3.7%	478	656	-178	-15.7%
4	**RO**	**BG**	**2.0%**	**5.8%**	**507**	**228**	**280**	**38.1%**
5	CZ	PL	6.9%	6.2%	1307	2268	-961	-26.9%
6	PL	CZ	4.3%	7.7%	2385	1381	1004	26.7%
7	DK	SE	19.2%	11.4%	8000	6074	1926	13.7%
8	**SE**	**DK**	**15.0%**	**19.6%**	**5872**	**8119**	**-2247**	**-16.1%**
9	DE	AT	7.1%	37.2%	12079	19821	-7742	-24.3%
10	AT	DE	53.9%	9.9%	32015	22390	9625	17.7%
11	DE	FR	15.8%	23.8%	26891	36009	-9118	-14.5%
12	FR	DE	22.0%	11.3%	32565	25664	6901	11.9%
13	IT	FR	16.4%	9.5%	11281	14438	-3157	-12.3%
14	EE	FI	25.7%	6.7%	1767	1753	14	0.4%
15	CY	MT	3.4%	8.6%	290	927	-637	-52.3%
16	ES	PT	5.4%	30.7%	4320	3490	830	10.6%
17	PT	ES	20.3%	7.7%	5141	3244	1897	22.6%
18	HR	SI	9.3%	22.0%	1367	1212	155	6.0%
19	SI	HR	8.3%	15.0%	694	543	151	12.2%
20	LT	LV	5.0%	13.5%	629	430	199	18.8%
21	LV	LT	13.5%	7.6%	626	589	37	3.1%
22	HU	SK	4.4%	6.2%	806	584	222	16.0%
23	SK	HU	6.7%	5.2%	565	778	-212	-15.8%
24	**IE**	**HU**	**4.5%**	**5.9%**	**4907**	**887**	**4020**	**69.4%**
25	**BE**	**LU**	**8.1%**	**6.2%**	**6541**	**3445**	**3096**	**31.0%**
26	**LU**	**BE**	**7.5%**	**9.3%**	**6274**	**8214**	**-1940**	**-13.4%**
27	**EL**	**IT**	**9.1%**	**4.5%**	**1660**	**3740**	**-2080**	**-38.5%**

Annex II. Flow chart of the ITSS-ARM process.

Figure 3 presents the flow diagram of the ITSS-ARM process. First, the automated tool runs the scoreboard program using the Eurostat database public data and a selection of cases is being made. Trilateral meetings are then organized, where all the expertise, knowledge and ideas are put onto the discussion table. In case of a positive outcome where both countries agree to the corrections needed in order to resolve the asymmetry as well as to concrete actions planned, the case is removed from the list. The results are evaluated with the new data transmissions. The knowledge acquired builds on the stock of knowledge from the ARM meetings, and the most important elements are gathered in a collective document. Finally, a new case is introduced based on the score vector of the current reference year.

Figure 3: The ITSS-ARM process.



Annex III. The Scoreboard methodology.

III.1. Definition of Nominal and Relative Asymmetry.

Nominal asymmetry between two countries, say A and B, for a specific services EBOPS item is defined as the difference between the value reported by country A minus the corresponding value reported by country B.

In this work, we adopt the following approach: an asymmetry is always presented mentioning first **the Exporting Country**:

For example, the case DE – FR refers to the difference between:

> [exports of Germany to France (reported by Germany)] – [Imports of France from Germany (reported by France)]

Furthermore, we adopt an additional convention to call the exporting country **GEO**, whereas the country which reports the (mirror) imports is called **Partner**[4]. A positive sign in the nominal asymmetry means that the GEO country reports a higher amount of exports than the imports of the Partner country; a negative sign means that the GEO country reports a lower amount than the Partner.

For each country, for the item "Total Services" (S), we calculate, the *nominal asymmetry* of an EU Member State vis-à-vis all other EU Member States:

$$Nominal\ Asymmetry_{GEO/PAR} = \left[Exports\ to\ Partner_{reported\ by\ GEO}\right] - \left[Imports\ from\ GEO_{reported\ by\ Partner}\right]$$

Subsequently, for each case, we calculate a corresponding *relative asymmetry* share, defined as the ratio of the nominal asymmetry over the sum of the flows reported by the two countries. Hence, the relative asymmetry is calculated as:

$$Relative\ Asymmetry_{GEO/PAR} = \frac{Exports\ to\ Partner_{GEO} - Imports\ from\ GEO\ _{Partner}}{Exports\ to\ Partner_{GEO} + Imports\ from\ GEO\ _{Partner}}$$

[4] So, when we analyze asymmetries, we report the asymmetry on exports of country A (GEO) to country B (Partner) as "case A – B". Furthermore, the asymmetry on imports of country A from country B will be recorded as the asymmetry on exports of country B (GEO) to country A (Partner) (case B-A).

III.2 Definition of Trade Share for the GEO and Partner country.

We expect that a data compiler would prefer to devote resources to resolve an asymmetry with one of its main partners, as in such cases the amounts involved would be significant for the national economy. We therefore construct measures of the relative importance of each case, in terms of trade volume.

For each asymmetry case we calculate the share of exports of the GEO country as the ratio of services Exports of GEO to Partner over the total exports of GEO to the EU. We label this variable as ShareGEO. Respectively, we calculate the share of Partner country as the ratio of services imports of the Partner from the GEO over the total imports of the Partner from the EU. We label this variable as SharePartner. Thus, the services trade shares of GEO and Partner are calculated as follows:

$$ShareGEO = \frac{Exports\ in\ S\ from\ GEO\ to\ Partner_{reported\ by\ GEO}}{Exports\ in\ S\ from\ GEO\ to\ EU27_{reported\ by\ GEO}}$$

$$SharePartner = \frac{Imports\ in\ S\ of\ Partner\ from\ GEO\ _{reported\ by\ Partner}}{Imports\ in\ S\ of\ Partner\ from\ EU27_{reported\ by\ Partner}}$$

These shares (expressed in percentages) clearly show the most significant Partner countries for the GEO and vice versa.

Note that the trade shares depend only on the currently reported trade volumes and they do not convey any information regarding any asymmetry present in the reported figures.

III.3 Definition of Share of Nominal Asymmetry for GEO and Partner country.

For each asymmetry case at hand, we calculate for the GEO country, the ratio of the absolute value of the nominal asymmetry over the sum of the absolute value of all nominal asymmetries for which this country appears as GEO (i.e. all asymmetry cases for which the country is the reporter of exports). We label this variable as NdShareGEO. We compute the total sum of asymmetries as the *sum of the absolute values*, because otherwise asymmetries with opposing signs would cancel out, yielding a (possibly artificially) small figure.

Similarly, for the Partner, we calculate the ratio of the nominal asymmetry (in absolute value) over the sum of the absolute value of all nominal asymmetries for which this country is a Partner (i.e.

all asymmetry cases for which the country is the reporter of imports). We label this variable as NdSharePartner.

The NdShareGEO and NdSharePartner variables show the relative size of the nominal asymmetry of the case compared to the sum of all nominal asymmetries in which the country is involved as GEO (or Partner respectively). The variables are expressed in percentage form.

III.4 Constructing a Scoreboard.

The goal is to construct *a score of "importance"* for each asymmetry case and prioritize objectively (as much as possible, based on data at hand) and automatically (to the extent possible) the asymmetry cases. By score of "importance", we mean how important the case is for the parties involved (Member States and Eurostat) and how much interest the parties would have to dedicate resources to resolve this asymmetry. In the general case, resolving an asymmetry case will mean dedicating resources to it; therefore a country would prefer targeting 'important' asymmetry cases from their perspective (e.g. those which represent a large share of their trade). At the same time, data compilers have limited resources, and they can only look at a limited number of cases at a time.

We construct an overall *score* vector by taking the weighted average of the absolute value of the relative asymmetry, the average of the trade shares and the average of nominal asymmetry shares, as defined and computed above. Asymmetry cases can then be ranked in terms of this score.

Therefore, for a given case *GEO – Partner* the score vector is given by the following equation:

$$Score =$$

$$w_1 \cdot |RD| + w_2 \cdot \left(\frac{ShareGEO + SharePartner}{2}\right) + w_3 \cdot \left(\frac{NdShareGEO + NdSharePartner}{2}\right)$$

$$where, \qquad 0 \leq w_i \leq 1 \ \ and \ \sum_{i=1}^{3} w_i = 1 \ .$$

At this stage we do not have a reason to favour one or the other criterion; we therefore set equal weights to the three variables,

$$w_1 = w_2 = w_3 = {}^1\!/_3 \ .$$

III.5 Using the scoreboard to obtain a set of priority cases

Initially, we narrow the output pairs by setting the following threshold values:

$$ShareGEO \geq 3\%,\ SharePartner \geq 3\%\ \ and\ |RD| \geq 4\%$$

Applying these thresholds is done for practical reasons, as otherwise the list is too long, containing cases of very small significance. However, in exceptional cases, (i.e. if a country is left with no cases at all), we may be forced to consider cases which do not satisfy one of these thresholds. The specific choice of thresholds is based on practical considerations and experimentation with the data at hand.

Having arrived at a pool of "significant" asymmetry cases using the ranking from the score vector and the threshold criteria, we reach the final list of prioritized asymmetry cases which best satisfy the *conditions* below:

i. the chosen asymmetry cases should be of high "importance" as signified by the score vector (i.e. one of the highest score values, for the country);
ii. all countries participate in at least one asymmetry case;
iii. the participation burden for all countries is roughly similar (although naturally it is unavoidable that some countries must get more than one cases);
iv. 'bilateral cases', where both directions (exports A to B and export B to A) in a country pair are significant, are preferred, as this means that resources are used in a more efficient manner;
v. exceptional asymmetry cases, which may initially fall below some threshold, are revisited and may be included in the final choice of the asymmetry cases, if considered important (or in case no other more significant cases exist).