

# EU inter-country supply, use and input-output tables — Full international and global accounts for research in input-output analysis (FIGARO)

ISABELLE REMOND-TIEDREZ AND  
JOSE M. RUEDA-CANTUCHE (ED.)

2019 edition





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## Preface

The current European Statistical Programme (ESP) addresses high-level requests from policy-makers, including measures for higher-quality and timelier statistics to support the Commission's 10 political priorities and the European Parliament's political agenda.

In particular, the development of experimental European Union (EU) inter-country supply, use and input-output tables, supports the objective to enhance the indicators and statistical information available on economic globalisation and global value chains for both decision-makers and the public.

This work will contribute to more informed decision making and better understanding of the economic, social and environmental impacts of globalisation.

Jointly with the European Commission's Joint Research Centre, Eurostat has developed a methodology for the construction of the EU inter-country supply, use and input-output tables by reusing available data, preparing the way for regular data production and dissemination. This work has been done in cooperation with international agencies such as the Organisation for Economic Cooperation and Development (OECD) and the United Nations (UN), with the aim of having the EU tables integrated as much as possible with global tables.

In this series of Eurostat Working Papers, the full process of compilation of the so called FIGARO (Full International and Global Accounts for Research in Input-Output Analysis) tables is described in detail. In order to promote transparency and facilitate user interaction, one full chapter is devoted to the quality assessment of the results obtained while others develop in detail the methodological assumptions made in the course of the compilation process.

The FIGARO project requires the combination of data coming from business statistics, trade statistics, national accounts and balance of payments in order to provide the most detailed portrait of the EU economy. The FIGARO tables provide a comprehensive description of the EU economy identifying the products supplied in the EU either by domestic production or imports (by country of origin) as well as the use of products by firms and households for intermediate or final purposes (by country of destination). They form a powerful tool for different types of economic analysis, such as the study of global value chains, trade and jobs analyses and environmental footprints, as well as providing a consistent framework for balancing national accounts, balance of payments and international trade statistics data.

The FIGARO Project will continue with the production of annual time series of the FIGARO tables for the period 2010 to 2016 (also including projections for 2017-2018) by 2020, both in current and previous year prices.

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At Eurostat and at the Joint Research Centre, Isabelle Remond-Tiedrez and José M. Rueda-Cantucho acted, respectively, as project leaders and chief editors for the document, assistance was provided by Tim Allen and the Commission translation service.

# Table of contents

<b>1. Introduction</b> .....	<b>10</b>
<b>1.1 Background</b> .....	<b>10</b>
<b>1.2 Concept and data framework</b> .....	<b>13</b>
<b>2. Review of construction methods</b> .....	<b>17</b>
<b>2.1 Introduction</b> .....	<b>17</b>
<b>2.2 Overview of existing interregional input-output tables</b> .....	<b>18</b>
2.2.1 Overview.....	18
2.2.2 Dimensionalities.....	21
<b>2.3 Underlying data sources</b> .....	<b>21</b>
2.3.1 National accounts and supply and use tables .....	22
2.3.2 Trade data .....	24
<b>2.4 Construction of global IC-IOTs</b> .....	<b>27</b>
<b>2.5 Summary</b> .....	<b>28</b>
<b>3. Methodological overview</b> .....	<b>30</b>
<b>3.1 Construction approach: overview</b> .....	<b>30</b>
<b>3.2 Figaro construction in practice: Eurostat's methodology</b> .....	<b>36</b>
3.2.1 Estimating missing countries, import flow matrices and/or trade and transport margins matrices .....	36
3.2.2 Creating a coherent view of EU bilateral trade statistics of goods.....	37
3.2.3 Creating a coherent view of EU bilateral trade statistics of services .....	40
3.2.4 Overcoming national data inconsistencies between national accounts and trade statistics	41
3.2.5 Estimation of international trade, transport and insurance costs .....	43
3.2.6 Direct purchases abroad.....	43
3.2.7 Harmonising different classifications .....	45
3.2.8 To balance or not to balance ...and when .....	46
3.2.9 Construction of inter-country supply, use and input-output tables.....	46
3.2.10 Assessment of the results.....	48
<b>4. Data sources</b> .....	<b>50</b>
<b>4.1 National accounts data</b> .....	<b>50</b>
<b>4.2 National supply, use and input-output tables</b> .....	<b>51</b>
4.2.1 Estimating missing countries, import flow matrices and/or distribution margin matrices	53
4.2.2 Data availability after 2010 .....	54
<b>4.3 International trade in goods statistics</b> .....	<b>55</b>
4.3.1 ITGS .....	55
4.3.2 UN Comtrade.....	57
4.3.3 Data for Figaro.....	58
<b>4.4 International trade in services and balance of payments data</b> .....	<b>58</b>
4.4.1 Classification of services .....	59

4.4.2	Coverage .....	60
4.4.3	Data for Figaro.....	60
<b>4.5</b>	<b>CIF-FOB margins.....</b>	<b>62</b>
4.5.1	CIF-FOB results.....	63
<b>5.</b>	<b>Estimation of missing national supply, use and valuation tables .....</b>	<b>67</b>
<b>5.1</b>	<b>Introduction .....</b>	<b>67</b>
<b>5.2</b>	<b>Identification of estimation targets and scenarios .....</b>	<b>69</b>
<b>5.3</b>	<b>Estimation strategies for scenarios .....</b>	<b>71</b>
5.3.1	Valuation tables (scenario 1) .....	71
5.3.2	Domestic and import uses (scenario 2) .....	72
5.3.3	Use tables at basic prices (scenario 3).....	74
<b>5.4</b>	<b>Conclusions.....</b>	<b>77</b>
<b>6.</b>	<b>Balanced view of traded in goods .....</b>	<b>78</b>
<b>6.1</b>	<b>Introduction .....</b>	<b>78</b>
<b>6.2</b>	<b>QDR methodology overview .....</b>	<b>78</b>
<b>6.3</b>	<b>Non-allocated trade estimation.....</b>	<b>79</b>
6.3.1	Methodology .....	79
6.3.2	Results.....	80
<b>6.4</b>	<b>Balanced trade flows .....</b>	<b>81</b>
6.4.1	CIF/FOB.....	82
6.4.2	Methodology .....	82
6.4.3	Results.....	83
<b>6.5</b>	<b>QDR .....</b>	<b>85</b>
6.5.1	Methodology .....	85
6.5.2	Consistency between data sources .....	86
6.5.3	Correction of bias in domestic estimates .....	87
6.5.4	Quasi-transit and re-export partners.....	87
6.5.5	Triangular trade and re-export margins .....	87
6.5.6	Results.....	89
<b>6.6</b>	<b>Future work.....</b>	<b>90</b>
<b>7.</b>	<b>Balanced view of trade in services .....</b>	<b>91</b>
<b>7.1</b>	<b>Introduction .....</b>	<b>91</b>
<b>7.2</b>	<b>Fully consistent trade data set .....</b>	<b>92</b>
7.2.1	Eliminating specific negative values .....	92
7.2.2	Computing services aggregates .....	93
7.2.3	Consistency imputations.....	94
7.2.4	Allocation of non-allocated services trade .....	94
7.2.5	Time series interpolation.....	95
7.2.6	Model estimates.....	95
7.2.7	Manual imputations.....	97
7.2.8	Allocation of non-allocated trade partner .....	98



7.2.9	Consistency imputations (for totals and sub-totals)	99
7.2.10	Top-down benchmark	100
7.2.11	Balance of payments consistency	103
7.2.12	Final benchmark	104
<b>7.3</b>	<b>A balanced view of trade</b>	<b>105</b>
<b>7.4</b>	<b>From BOP classification to CPA product classification</b>	<b>108</b>
<b>8.</b>	<b>Goods sent abroad for processing</b>	<b>110</b>
<b>8.1</b>	<b>Introduction</b>	<b>110</b>
<b>8.2</b>	<b>Overview of data sources and estimation methods</b>	<b>112</b>
8.2.1	Data sources	112
8.2.2	Process of estimation and methodology	113
8.2.3	Distribution by trading partner	114
8.2.4	Distribution by CPA product	115
<b>8.3</b>	<b>Conclusions</b>	<b>116</b>
<b>9.</b>	<b>Merchanting</b>	<b>117</b>
<b>9.1</b>	<b>Merchanting and different accounting principles</b>	<b>117</b>
9.1.1	Information required for estimating merchanting	119
<b>9.2</b>	<b>Estimation of merchanting in Figaro</b>	<b>120</b>
9.2.1	Information used to estimate merchanting	120
9.2.2	Method and assumptions for estimating merchanting flows	121
9.2.3	Total merchanting adjustment for each country	122
9.2.4	Merchanting adjustment split by trading partner	122
9.2.5	Merchanting adjustment split by trading partner and by product	123
<b>9.3</b>	<b>Conclusions</b>	<b>125</b>
<b>10.</b>	<b>Direct purchases abroad</b>	<b>127</b>
<b>10.1</b>	<b>Domestic and national concepts</b>	<b>127</b>
<b>10.2</b>	<b>From national to inter-country supply and use frameworks</b>	<b>128</b>
<b>10.3</b>	<b>Methodology for the estimation of direct purchases abroad</b>	<b>129</b>
10.3.1	Step 1: National bilateral flows for direct purchases abroad	129
10.3.2	Step 2: Splitting by product	130
<b>10.4</b>	<b>Summary and conclusions</b>	<b>131</b>
<b>11.</b>	<b>Inter-country supply and use tables</b>	<b>132</b>
<b>11.1</b>	<b>Introduction</b>	<b>132</b>
<b>11.2</b>	<b>The inter-country supply table</b>	<b>132</b>
<b>11.3</b>	<b>The inter-country statistical use table</b>	<b>134</b>
11.3.1	Introduction	134
11.3.2	Breaking down trade statistics by user	135
11.3.3	From FOB prices to basic prices	136
<b>11.4</b>	<b>The inter-country use table</b>	<b>137</b>
11.4.1	Introduction	137

11.4.2	Construction of the inter-country use table .....	138
11.4.3	Setting up targets for removing discrepancies.....	139
11.4.4	Removing discrepancies, qualitative checks and ad hoc interventions .....	139
<b>12.</b>	<b>Inter-country input-output tables.....</b>	<b>141</b>
12.1	Introduction .....	141
12.2	The inter-country input-output table.....	142
<b>13.</b>	<b>Assessment of the results .....</b>	<b>145</b>
13.1	Introduction .....	145
13.2	Assessment of the results .....	147
13.2.1	International trade data and national SUTs .....	147
13.2.2	Analysis of discrepancies .....	152
13.2.3	GRAS analysis.....	171
<b>14.</b>	<b>Air emissions .....</b>	<b>178</b>
14.1	Introduction and methodology.....	178
14.1.1	An input-output table and model.....	178
14.1.2	Embodied effects .....	179
14.2	Data .....	180
14.3	Results.....	180
<b>15.</b>	<b>Employment .....</b>	<b>186</b>
15.1	Data .....	186
15.1.1	Employment data .....	186
15.1.2	Estimation by product .....	186
15.2	Results.....	186
<b>16.</b>	<b>Reducing discrepancies.....</b>	<b>190</b>
16.1	Introduction .....	190
16.2	Method for reducing discrepancies .....	191
16.2.1	Ahmad's (2017) approach: numerical example .....	191
16.2.2	Ahmad's (2017) approach: revisited for negatives .....	194
16.2.3	Ahmad's (2017) approach: revisited for users' allocation .....	196
16.3	Conclusions .....	197
<b>17.</b>	<b>Limitations and further improvements.....</b>	<b>198</b>
17.1	Introduction .....	198
17.2	Use of more data.....	198
17.2.1	National supply, use and input-output tables.....	198
17.2.2	Trade data .....	199
17.2.3	Adjustments from trade to national accounts concepts .....	199
17.3	Methodological improvements.....	199
17.4	Improvements in the production process .....	200
<b>18.</b>	<b>Integration with the OECD inter-country input-output tables .....</b>	<b>201</b>

<b>18.1</b>	<b>Background</b> .....	<b>201</b>
<b>18.2</b>	<b>Scope of the Figaro project and links to the OECD ICIO tables</b> .....	<b>201</b>
<b>18.3</b>	<b>Coordination and consistency framework</b> .....	<b>202</b>
<b>18.4</b>	<b>Work plan</b> .....	<b>203</b>
<b>19.</b>	<b>Figaro Act I</b> .....	<b>204</b>
<b>19.1</b>	<b>Motivation, scope and objectives</b> .....	<b>204</b>
<b>19.2</b>	<b>Implementation of the project</b> .....	<b>205</b>
<b>19.3</b>	<b>Description of tasks</b> .....	<b>206</b>
19.3.1	Task 1 — Construct EU-IC-SUIOTs at basic prices for the reference years 2010-2018 in current and previous year prices.....	206
19.3.2	Task 2 — Explore possible extensions of the EU-IC-SUIOTs.....	207
19.3.3	Task 3 — Explore the compilation of a time series of EU Inter-country National/Social/Financial Accounting Matrices.....	208
19.3.4	Task 4 — Dissemination and analyses.....	209
19.3.5	Task 5 — Quality assessment indicators and IT development.....	209
<b>20.</b>	<b>References and annexes</b> .....	<b>211</b>
<b>20.1</b>	<b>References</b> .....	<b>211</b>
<b>20.2</b>	<b>Annex</b> .....	<b>216</b>
20.2.1	Format of the Figaro tables.....	216
20.2.2	List of CPA 2008 products.....	221
20.2.3	List of detailed services categories for Figaro purposes (Ebops 2010).....	226
20.2.4	Data availability.....	229
20.2.5	List of acronyms.....	230
20.2.6	List of country codes.....	231

# 13

## Assessment of the results

### 13.1 Introduction

The modular approach adopted in the Figaro project to map the different adjustments and imputations to the original data allows each adjustment/imputation to be measured at each stage of the compilation process. These consist of three types of statistics based on:

- the comparison between the international merchandise and services trade data and the trade values in the SUTs, including adjustments for goods sent abroad for processing and merchanting activities;
- the analysis of the row and column total discrepancies by countries, users and products;
- the analysis of the balancing adjustments made to estimate the final inter-country use table without discrepancies, by countries, users and products.

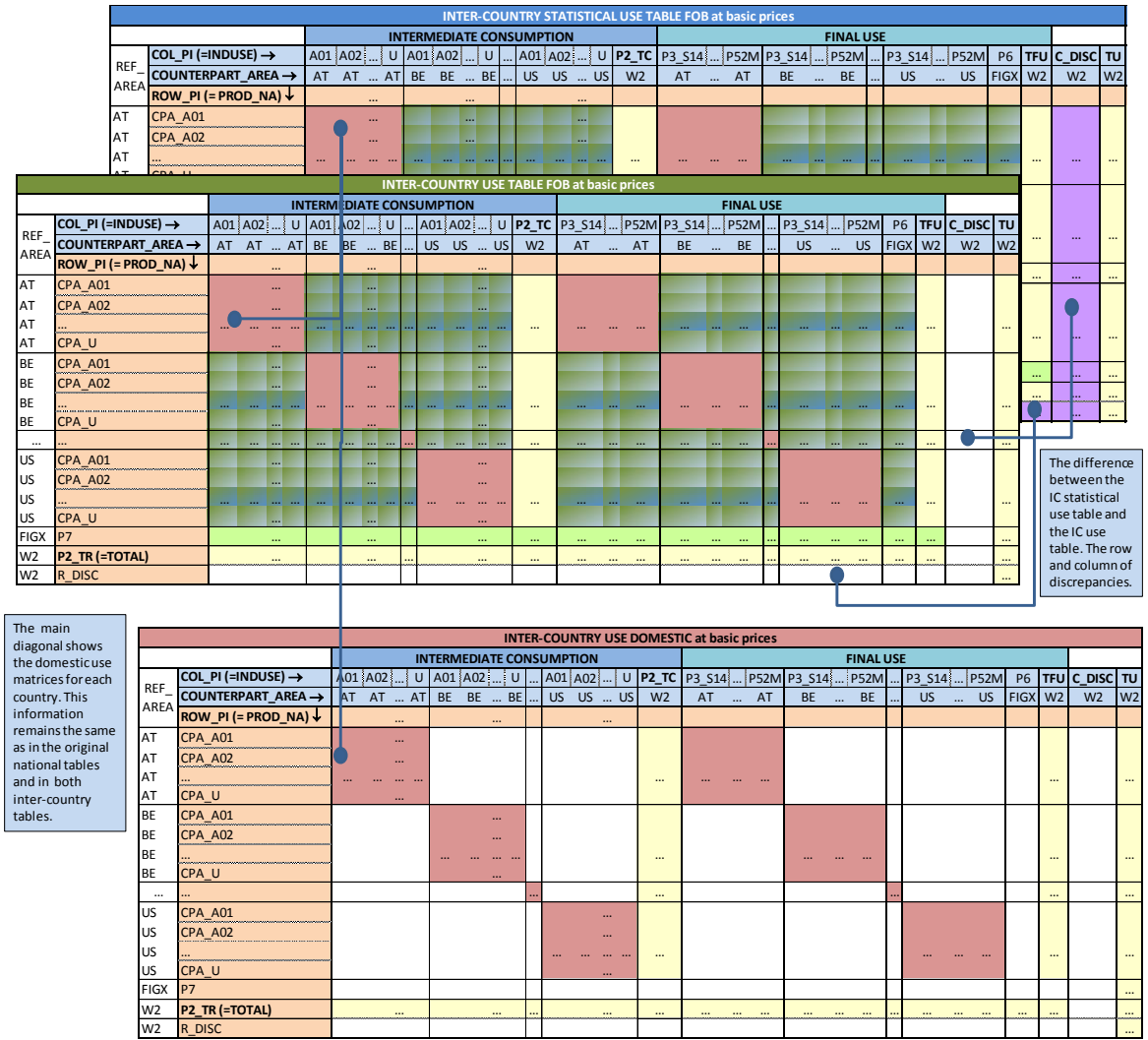
Figure 13.1 provides an overview of the inter-country statistical use table, the inter-country use table and their domestic parts. As can be seen, the main differences between the inter-country statistical use table and the inter-country use table are the total row and column discrepancies. These show the difference between international merchandise and services trade data and the trade values in the SUTs, including adjustments for goods sent abroad for processing and merchanting activities. The main diagonal (domestic) blocs of both use tables come from the original national use tables (T1611) and remain unchanged during the whole process.

Figure 13.2 shows instead the inter-country statistical use table and the inter-country use table, but excluding their respective domestic parts. By difference, we construct a discrepancy matrix, whose row and column sums coincide with those of the inter-country statistical use table.

The total column discrepancy in the inter-country statistical use table is the result of subtracting the estimated sum (across users and trading partners) of the balanced international merchandise and services trade data, adjusted for goods sent abroad for processing and merchanting activities to the total exports column by product from the national use tables (T1611).

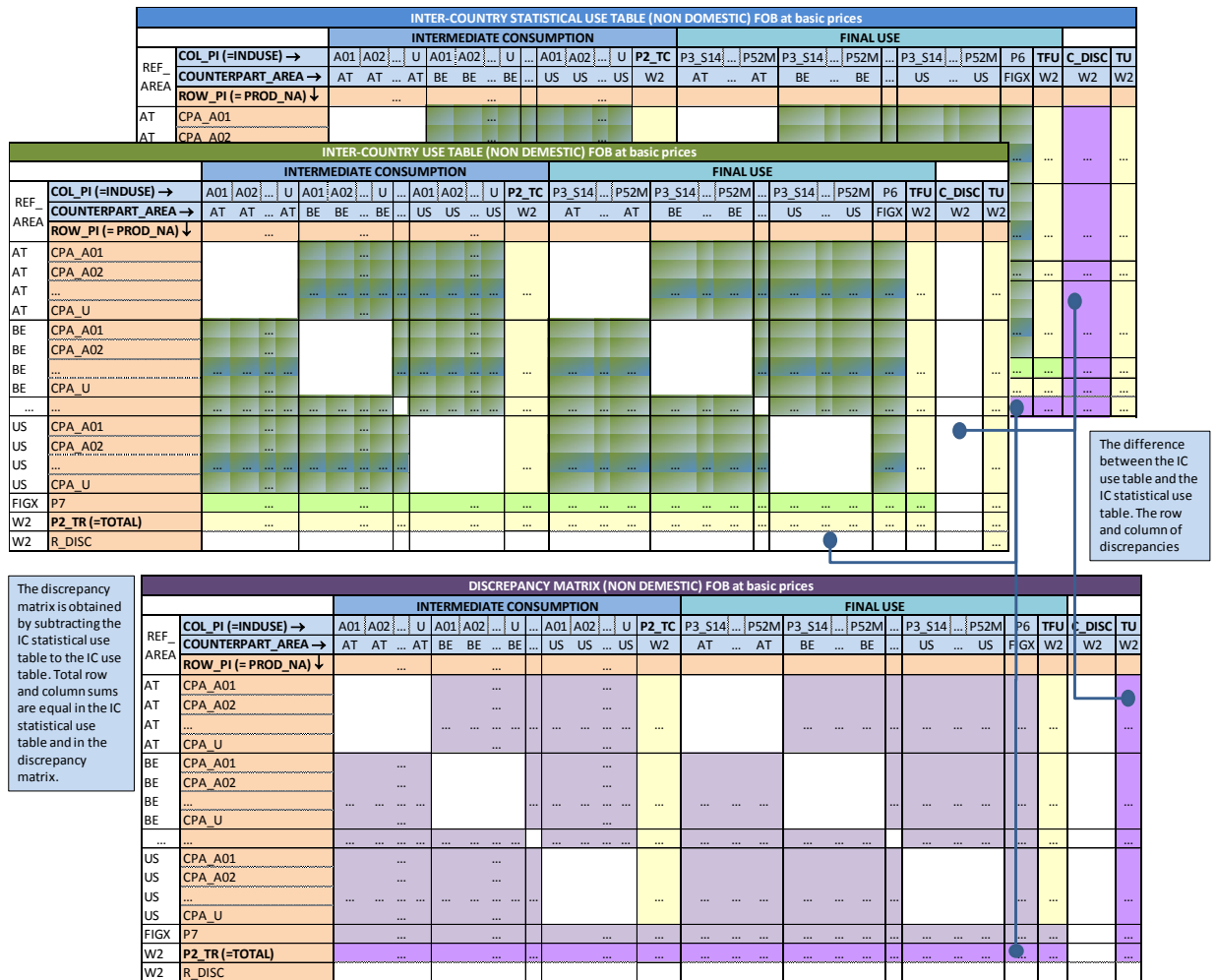
The total row discrepancy in the inter-country statistical use table is the result of subtracting the estimated sum (across products and trading partners) of the balanced international merchandise and services trade data, adjusted for goods sent abroad for processing and merchanting activities to the total imports row by (intermediate and final) user from the national use tables (T1612).

**Figure 13.1: The inter-country statistical use table and its components**



The GRAS method is used to balance the international merchandise and services trade data with the trade values in the SUTs, including adjustments for goods sent abroad for processing and merchanting activities; or in other words, to set all discrepancies to zero and allocate them throughout the (non-domestic part of the) inter-country statistical use table (see in Figure 13.2 the discrepancy matrix to be used in the GRAS method).

**Figure 13.2:** The inter-country statistical use table and its components, excluding domestic parts; and the discrepancy matrix



## 13.2 Assessment of the results

### 13.2.1 International trade data and national SUTs

Bilateral trade asymmetries are one of the main reasons for discrepancies. Ideally, the sum of all EU reported exports to non-EU countries should match their respective reported imports from EU countries, but they actually do not. Indeed, when NSOs compile their national SUTs, they do not have a complete picture of international trade and consequently they cannot make any attempt to balance the existent trade asymmetries. Therefore, our balancing method to remove asymmetries and construct the inter-country SUTs unavoidably makes their exports/imports values deviate from those estimated by NSOs in the national SUTs.

Table 13.1 shows that, in 2010, EU countries reported 3.1% more exports to other EU countries than their respective imports from other EU countries.

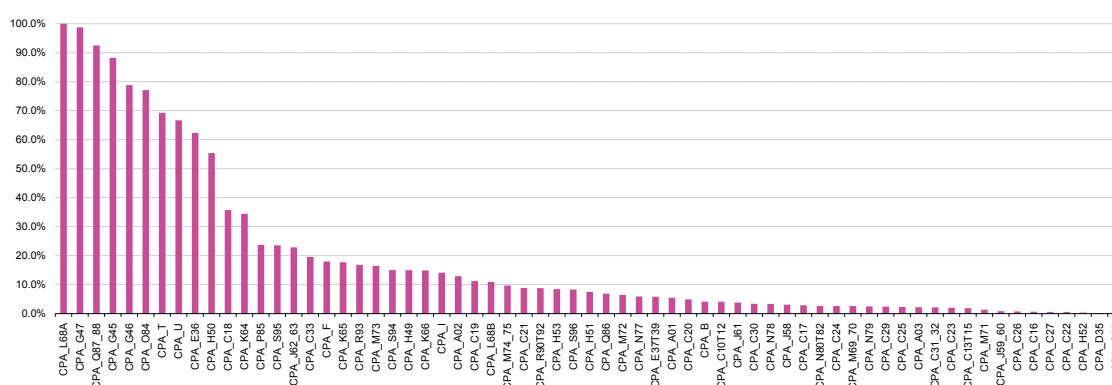
**Table 13.1: Trade asymmetries at EU level, 2010**  
(million euros)

EU exports to EU countries	EU imports from EU countries	Asymmetry (million euros)	Asymmetry (%)
2 905 251.4	2 727 591.1	177 660.3	3.1 %

Source: Eurostat (*nama\_10\_exi*) and own calculations

At EU level, trade asymmetries however vary very much depending on the product: while their median by product for the EU total is 7.5 %, it ranges from 0.6 % for rubber and plastic products (C22), for example, to 55 % for water transport services or around 90 % for trade services (see Figure 13.3).

**Figure 13.3: Trade asymmetry at EU level, 2010, by product**  
(in %)



The following analysis focuses on the comparison between the exports reported by national SUTs and the balanced view of trade, adjusted for GSA and MCH, used to populate the inter-country SUTs. The analysis is made aggregating by country and by product.

## A. ANALYSIS BY COUNTRY

On the one hand, we use domestic exports by product from the national use tables of domestic uses. They are valued in basic prices and do not include re-exports. On the other hand, we use export values coming from the balanced view of trade in goods and services, adjusted for GSA and MCH and in FOB values. Such balanced view of trade is constructed following some adjustments made in three stages to the original data. These are:

- Balancing trade asymmetries and estimation of domestic exports and re-exports;
- Adjusting the balanced view of trade with GSA adjustments;
- Adjusting the previous balanced view of trade for MCH activities.

Once these adjustments are made, we compare the resulting balanced and adjusted export values against those coming from the national SUTs. In a comparison across countries, the different valuations (FOB – in each stage – and basic prices) should not affect the results since exports are summed over products in both cases. Nevertheless, this holds only if we assume that only domestic carriers bear the costs of transportation from the border to the domestic purchaser.

**Table 13.2:** Exports in national data and in international trade data, and percentage differences, country level

(million euros)

Country	A National exports data	B Figaro domestic exports	C Figaro exports adjusted for GSA	D Figaro export value, with MCH	E (B-A)/A	F (C-A)/A	G (D-A)/A
Croatia	7 921	15 037	14 325	14 351	90 %	81 %	81 %
Cyprus	6 370	9 963	9 959	10 534	56 %	56 %	65 %
United States	968 665	1 348 730	1 348 730	1 348 730	39 %	39 %	39 %
Belgium	194 306	264 485	260 419	262 665	36 %	34 %	35 %
Portugal	34 213	43 524	42 896	43 265	27 %	25 %	26 %
Greece	39 260	48 766	47 844	47 840	24 %	22 %	22 %
Netherlands	271 445	343 887	322 133	328 202	27 %	19 %	21 %
Denmark	97 595	112 893	112 820	116 537	16 %	16 %	19 %
Finland	69 117	81 901	81 669	81 721	18 %	18 %	18 %
Austria	118 684	141 144	137 520	139 423	19 %	16 %	17 %
France	460 991	539 190	528 246	540 892	17 %	15 %	17 %
Spain	233 661	273 899	268 537	269 440	17 %	15 %	15 %
Estonia	9 181	11 105	10 472	10 564	21 %	14 %	15 %
Slovenia	19 305	22 447	22 003	22 159	16 %	14 %	15 %
Latvia	7 257	8 294	8 183	8 188	14 %	13 %	13 %
Luxembourg	52 229	56 296	56 010	58 695	8 %	7 %	12 %
Sweden	151 010	164 916	163 843	169 578	9 %	8 %	12 %
Czechia	90 837	104 228	101 284	101 508	15 %	12 %	12 %
Malta	8 550	8 099	7 546	7 547	-5 %	-12 %	-12 %
Lithuania	13 577	15 373	14 995	15 036	13 %	10 %	11 %
Italia	375 713	419 430	408 817	410 841	12 %	9 %	9 %
Slovakia	44 692	49 303	48 036	48 038	10 %	7 %	7 %
Bulgaria	16 672	18 685	17 654	17 663	12 %	6 %	6 %
United Kingdom	475 687	527 466	500 801	503 219	11 %	5 %	6 %
Germany	904 335	988 385	939 806	952 526	9 %	4 %	5 %
Hungary	70 595	77 975	72 568	73 717	10 %	3 %	4 %
Ireland	157 810	162 629	161 357	163 614	3 %	2 %	4 %
Poland	133 810	134 143	129 216	129 224	0 %	-3 %	-3 %
Romania	39 445	42 598	38 038	38 099	8 %	-4 %	-3 %
<b>Total</b>	<b>5 072 934</b>	<b>6 034 791</b>	<b>5 875 726</b>	<b>5 933 818</b>	<b>19 %</b>	<b>16 %</b>	<b>17 %</b>

Source: author.

The last row of Table 13.2 shows the total difference summing up all Figaro countries together. In Table 13.2 shows the comparison between the export data coming from the national use tables (column A) and the export values in each of the three stages mentioned above: balanced domestic exports, exports adjusted for GSA and exports adjusted for MCH (or the resulting export values after both adjustments) (columns B, C and D, respectively). Table 13.2 looks at the impact at country level. Countries are sorted in descending order based on the size of the absolute value of the difference between the export value recorded in Figaro and the export value recorded in the national use table (column G). The remaining columns, E and F, show the difference between the export values at each stage and the trade data coming from the national use table.



**Table 13.3: Relevance of GSA and MCH adjustments**

Country	GSA adjustment	MCH adjustment	GSA share of domestic exports FOB	MCH share of domestic exports FOB	GSA share of GDP	MCH share of GDP
Belgium	-4 066	2 246	-1.5%	0.8%	-1.1%	0.6%
Bulgaria	-1 031	9.0	-5.5%	0.0%	-2.7%	0.0%
Czech Republic	-2 944	224.0	-2.8%	0.2%	-1.9%	0.1%
Denmark	-73.0	3 717	-0.1%	3.3%	0.0%	1.5%
Germany	-48 579	12 720	-4.9%	1.3%	-1.9%	0.5%
Estonia	-633.0	92.0	-5.7%	0.8%	-4.3%	0.6%
Ireland	-1 272	2 257	-0.8%	1.4%	-0.8%	1.3%
Greece	-922.0	-4.0	-1.9%	0.0%	-0.4%	0.0%
Spain	-5 362	903.0	-2.0%	0.3%	-0.5%	0.1%
France	-10 944	12 646	-2.0%	2.3%	-0.5%	0.6%
Croatia	-712.0	26.0	-4.7%	0.2%	-1.6%	0.1%
Italy	-10 613	2 024	-2.5%	0.5%	-0.7%	0.1%
Cyprus	-4.0	575.0	0.0%	5.8%	0.0%	3.0%
Latvia	-111.0	5.0	-1.3%	0.1%	-0.6%	0.0%
Lithuania	-378.0	41.0	-2.5%	0.3%	-1.3%	0.1%
Luxembourg	-286.0	2 685	-0.5%	4.8%	-0.7%	6.7%
Hungary	-5 407	1 149	-6.9%	1.5%	-5.5%	1.2%
Malta	-553.0	1.0	-6.8%	0.0%	-8.4%	0.0%
Netherlands	-21 754	6 069	-6.3%	1.8%	-3.4%	0.9%
Austria	-3 624	1 903	-2.6%	1.3%	-1.2%	0.6%
Poland	-4 927	8.0	-3.7%	0.0%	-1.4%	0.0%
Portugal	-628.0	369.0	-1.4%	0.8%	-0.3%	0.2%
Romania	-4 560	61.0	-10.7%	0.1%	-3.6%	0.0%
Slovenia	-444.0	156.0	-2.0%	0.7%	-1.2%	0.4%
Slovakia	-1 267	2.0	-2.6%	0.0%	-1.9%	0.0%
Finland	-232.0	52.0	-0.3%	0.1%	-0.1%	0.0%
Sweden	-1 073	5 735	-0.7%	3.5%	-0.3%	1.6%
United Kingdom	-26 665	2 418	-5.1%	0.5%	-1.4%	0.1%
United States	-	-	-	-	-	-
Total	- 159 064	58 089	-2.6%	1.0%	-1.2%	0.5%

Source: Author and Eurostat (*t\_nama\_10\_ma*)

For 20 countries the percentage difference between the Figaro data and the national SUT data is more than 10 %. In particular, two countries record differences higher than 50 %: Croatia (81 %) and Cyprus (65 %). For another 5 countries the difference is also higher than 20 %: the US (39 %), Belgium (35 %), Portugal (26 %), Greece (22 %) and the Netherlands (21 %).

In total, the difference between the estimated data used in Figaro and the data in the national tables is around 17 %. The initial difference between the two sources used is 19 %. The adjustment that considers GSA seems to actually align the two sources more, reducing the gap about 3 percentage points, but the third adjustment adds one percentage point more to the difference, because of MCH.

As expected, most of the variation between international trade statistics used in the Figaro project and national SUT data is largely due to the balancing of trade asymmetries (column E). This result highlights a very marked impact of eliminating asymmetries that would deserve further analysis in the near future.

Table 13.3 shows the relevance of the GSA and MCH adjustments over the GDP and estimated balanced domestic exports of EU countries. In terms of GDP, the top-5 countries where the GSA adjustments are bigger are: Malta (8.4%), Hungary (5.5%), Estonia (4.3%), Romania (3.6%) and the Netherlands (3.4%). The same five countries (but with slightly different order) reported the biggest GSA adjustments also in terms of balanced domestic exports. Adjustments for merchanting activities represent in Luxembourg 6.7% of its GDP while 4.8% in terms of its domestic exports. Other countries such as Cyprus (3%), Sweden (1.6%), Denmark (1.5%) and Ireland (1.3%) also reported large shares of MCH adjustments in terms of their respective GDP.

## B. ANALYSIS BY PRODUCTS

For the analysis by products we compare only the national data coming from SUTs (column A in Table 13.4) with the balanced domestic exports given by the inter-country statistical use table (column B in Table 13.4), both in basic prices. We cannot compare national SUT export values with the Figaro trade estimates at each of the three stages mentioned above simply because they are valued in FOB and therefore, it would be difficult to isolate how much of the difference is obviously due to the different valuation or due to other reasons. This is particularly relevant for products involved in the transformation from FOB to basic prices, such as wholesale and retail trade

(corresponding to the NACE classification codes CPA\_G45, CPA\_G46, and CPA\_G47), land, water, and air transport (CPA\_G49, CPA\_G50, and CPA\_G51), warehousing (CPA\_H52) and insurance (CPA\_K65).

In Table 13.4, rows are products sorted by size in percentage terms (column C) of the absolute value of the differences between the balanced domestic exports of the Figaro tables and the national SUT export values. Column D shows the cumulative weight of each product on the total difference between the Figaro data and the national SUT data.

Although CPA\_T (activities of households as employer) and CPA\_Q87\_88 (social work activities) turned out to be the products that had the biggest relative difference between the two data sources, their relative weight on the total difference is negligible. Instead, for the product N\_77 (rental and leasing activities) there is a very high difference between the Figaro tables and the national data, and this alone explains 33 % of the total difference, of which more than a half comes from US and almost 40 % from the United Kingdom (9 %), Germany (7 %), France (5 %), Italy (4 %), the Netherlands, Spain and Denmark (3 % respectively).

Other relevant products affecting greatly the total difference are CPA\_I (accommodation, food and beverage service activities), CPA\_J58 (publishing activities), CPA\_K64 (financial service activities, except insurance and pension funding), CPA\_C26 (manufacture of computer, electronic and optical products), and CPA\_G46 (wholesale). In particular, US have the biggest differences in CPA\_K64 and CPA\_C26, with 50 % and 74 % of the total difference, respectively. For the remaining products (CPA\_I, CPA\_J58 and CPA\_G46), the difference is spread across countries, mostly affecting Germany, France, Italy, Ireland, the Netherlands, Spain and the United Kingdom.

**Table 13.4:** Export in national data and in international trade data, and percentage differences, product level  
(million euros)

Product	A	B	C	D	Product	A	B	C	D
	Exports National Data	FIGARO Final Export	(B-A)/A	Cumulative weight on total difference		Exports National Data	FIGARO Final Export	(B-A)/A	Cumulative weight on total difference
CPA_T	16	3,218	20462%	0%	CPA_J59_60	24,179	17,516	-28%	78%
CPA_Q87_88	25	288	1056%	0%	CPA_M69_70	104,940	76,159	-27%	80%
CPA_N77	54,615	630,026	1054%	33%	CPA_B	63,234	80,126	27%	81%
CPA_I	30,614	119,063	289%	38%	CPA_D35	16,531	20,870	26%	81%
CPA_J58	54,451	199,913	267%	46%	CPA_M72	47,455	35,577	-25%	82%
CPA_N79	6,954	17,752	155%	47%	CPA_G46	364,953	279,495	-23%	87%
CPA_N78	38,764	2,601	-93%	49%	CPA_J61	38,004	30,946	-19%	87%
CPA_C18	6,956	529	-92%	49%	CPA_S94	274	322	18%	87%
CPA_S95	1,820	276	-85%	49%	CPA_H52	60,671	51,088	-16%	88%
CPA_S96	2,427	495	-80%	50%	CPA_C27	148,848	170,611	15%	89%
CPA_E36	197	40	-80%	50%	CPA_C24	199,936	228,208	14%	91%
CPA_K66	49,432	11,960	-76%	52%	CPA_A03	3,935	4,482	14%	91%
CPA_N80T82	51,632	14,119	-73%	54%	CPA_M73	33,139	29,343	-11%	91%
CPA_H53	17,068	4,947	-71%	55%	CPA_C29	381,755	423,687	11%	93%
CPA_R90T92	10,093	17,126	70%	55%	CPA_J62_63	88,871	79,464	-11%	94%
CPA_L68	7,170	11,828	65%	55%	CPA_C22	109,947	120,499	10%	94%
CPA_O84	4,686	7,376	57%	55%	CPA_C31_32	96,312	105,531	10%	95%
CPA_P85	6,029	9,105	51%	56%	CPA_C20	361,498	394,645	9%	97%
CPA_R93	2,024	1,018	-50%	56%	CPA_A02	3,503	3,766	8%	97%
CPA_C13T15	94,274	137,371	46%	58%	CPA_C16	31,976	33,813	6%	97%
CPA_Q86	2,367	1,321	-44%	58%	CPA_F	16,812	15,930	-5%	97%
CPA_K64	156,572	90,185	-42%	62%	CPA_C30	149,974	157,404	5%	97%
CPA_C26	220,744	311,553	41%	67%	CPA_C10T12	258,896	270,978	5%	98%
CPA_M71	63,477	40,026	-37%	68%	CPA_A01	89,738	93,806	5%	98%
CPA_C33	13,105	8,484	-35%	69%	CPA_C19	169,599	162,350	-4%	99%
CPA_C21	142,949	190,377	33%	71%	CPA_C17	81,727	85,186	4%	99%
CPA_G45	44,527	58,801	32%	72%	CPA_C28	390,384	406,056	4%	100%
CPA_H51	68,446	47,676	-30%	73%	CPA_E37T39	52,060	50,173	-4%	100%
CPA_K65	48,003	33,811	-30%	74%	CPA_C25	108,302	106,932	-1%	100%
CPA_H50	109,258	77,047	-29%	76%	CPA_H49	91,586	90,446	-1%	100%
CPA_M74_75	21,925	15,485	-29%	76%	CPA_C23	49,735	50,294	1%	100%
CPA_G47	103,539	133,617	29%	78%					

Source: Author.

## 13.2.2 Analysis of discrepancies

In this section, we analyse the results of the total row and column discrepancies that resulted from building the inter-country statistical use table.

Figure 13.4: Approach to analyse total row and column discrepancies

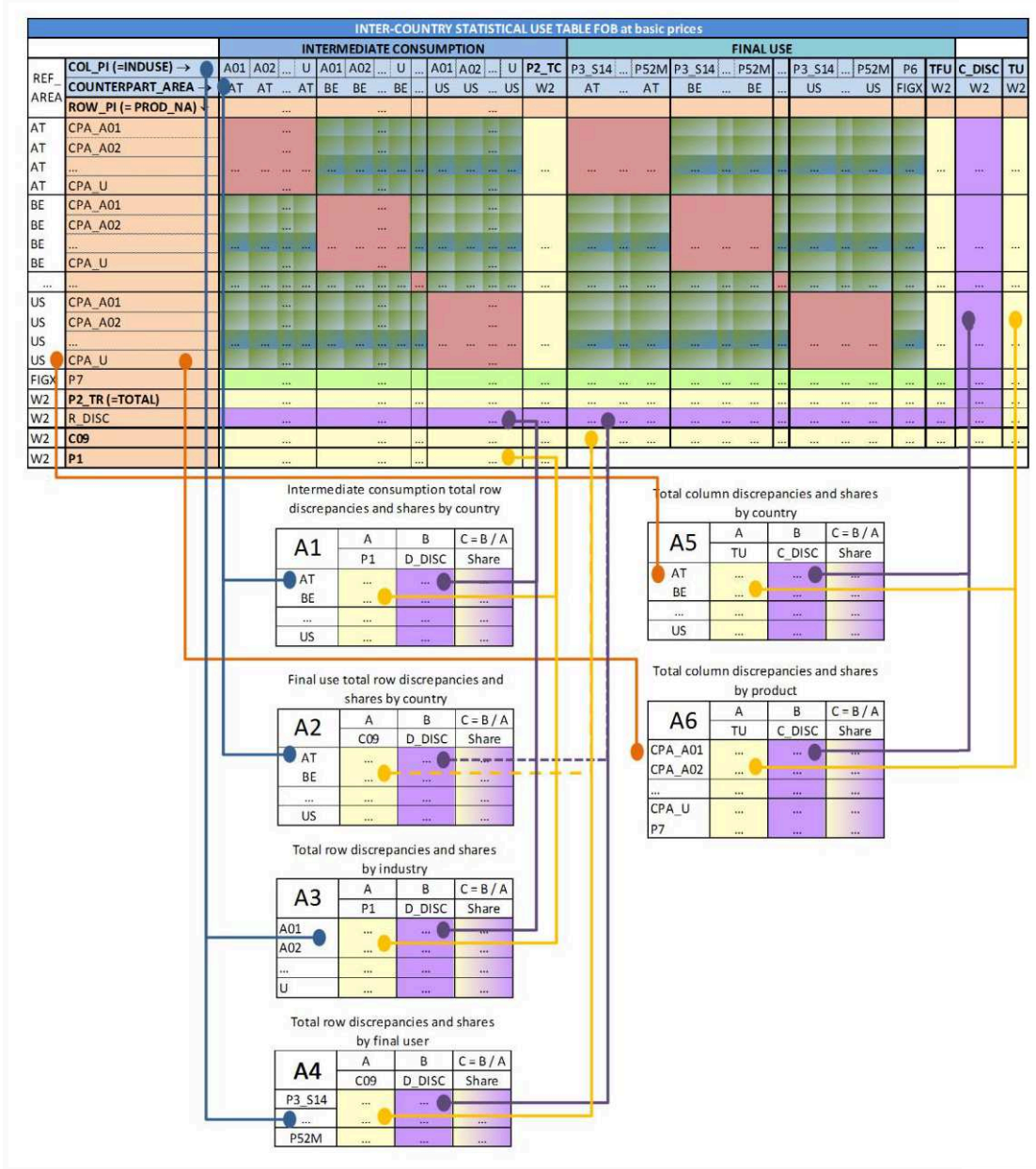


Figure 13.4 provides a diagram to guide the reader across the comparative analysis carried out in this section. For the sake of clarity, we have aggregated the total row and column discrepancies into six tables (A1 to A6) with different dimensions. A1 to A4 correspond to the row discrepancies distinguishing between intermediate consumption (A1 – by country – and A3 – by industry) and final uses (A2 – by country – and A4 – by final user). A5 and A6 serve to analyse the total column discrepancies by country (A5) and product (A6).

The analysis of discrepancies should not consider only the magnitude of the discrepancy itself and its relationship with respect to its overall total but also its share with respect to the corresponding target values. For instance, in the case of the total row of discrepancies (aggregates A1 to A4), it is also important to know the share of the discrepancy with respect to: (i) total output (P1) for the intermediate consumption; and (ii) total final use (C09). This applies in each of the cases by country, by industry or by product, respectively. In the case of the total column of discrepancies, the share is estimated with respect to the total use (TU) of the country or total use of the product. In Figure 13.4 for all aggregates A1 to A6, column C provides the shares, and these are obtained by dividing column B over column A. The reference variables are therefore total output (P1) and total final use (C09) for the total row of discrepancies and total use (TU) for the total column of discrepancies.

The following graphs and analyses refer to the information provided by the six specific aggregates shown in Figure 13.4 or a combination of them. We will start with the analysis of the total row of discrepancies, for the part of intermediate consumption (A1 and A3) and then, for final uses (A2 and A4). Subsequently, we will address the analysis of the total column of discrepancies (A5 and A6).

The results of aggregates A1 to A6, except for A4, will be presented with one single figure, each one separated in four different layers displaying their different dimensions in four smaller charts. Charts 1 depict the net and absolute sums of the discrepancies, ranking the top-five countries, products or industries, depending on the case. These charts deal with the positive, negative, and net and absolute sums of the discrepancies, divided into two different scale horizontal bar graphs (see Figure 13.5 as an example). The top horizontal bar graph contains the highest absolute discrepancy and the rest of the group (e.g. countries) considered, while the bottom graph shows the next four highest absolute discrepancies. These two graphs show the range of differences between positive and negative discrepancies that produce its net sum in each specific aggregation.

Charts 2 identify where the absolute sums of discrepancies are mostly concentrated by country, product and industry/user, depending on the case. This chart shows a pie graph with two layers. The inner layer of the pie depicts the six highest absolute sums of discrepancies (as in chart 1) and the share they represent over the total output or total use, depending on the case, in square coloured boxes. The colours are associated to the same countries both in charts 1 and 2 to ease the interpretation. The outer part of the pie considers the top-3 absolute sums of discrepancies and the rest is grouped together ("Rest"). For example, in Figure 13.9, the inner pie represents the countries and the outer pie stand for industries, within countries.

At the bottom, charts 3 break down the net sum of discrepancies and their shares over the total output or the total use, depending on the case. This chart considers the net sum of discrepancies and the shares in two different axes, one in euro magnitudes (in bars) and the other one in percentage values (shown by the diamond icon). This chart is sorted by the size of the net sum of discrepancies.

Chart 4 eventually deals with the top-9 shares of the net sums of discrepancies over their corresponding total output or total use, depending on the case. Here, the chart contains two different axes and it is sorted by the size of the shares.

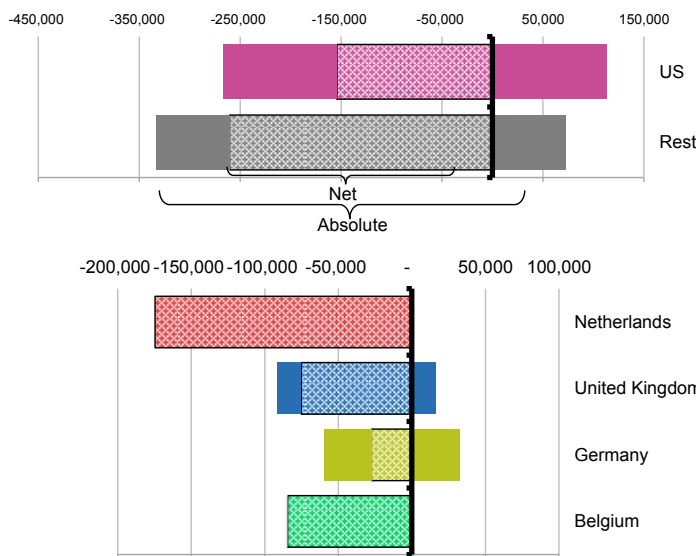
## A. DISCREPANCIES IN INTERMEDIATE CONSUMPTION BY COUNTRY

As shown in Figure 13.5 (charts 1 and 2), US accounts for 30 % of the total absolute discrepancies, representing -1.9 % of the share with respect to its total output (P1). The Netherlands (14 %), UK (9 %), Germany (7 %) and Belgium (7 %) have the four biggest absolute discrepancies. By looking at the industry level, we found that three largest discrepancies are found in the following US industries: 'Manufacture of basic pharmaceutical products and pharmaceutical preparations' (C21), 'Computer

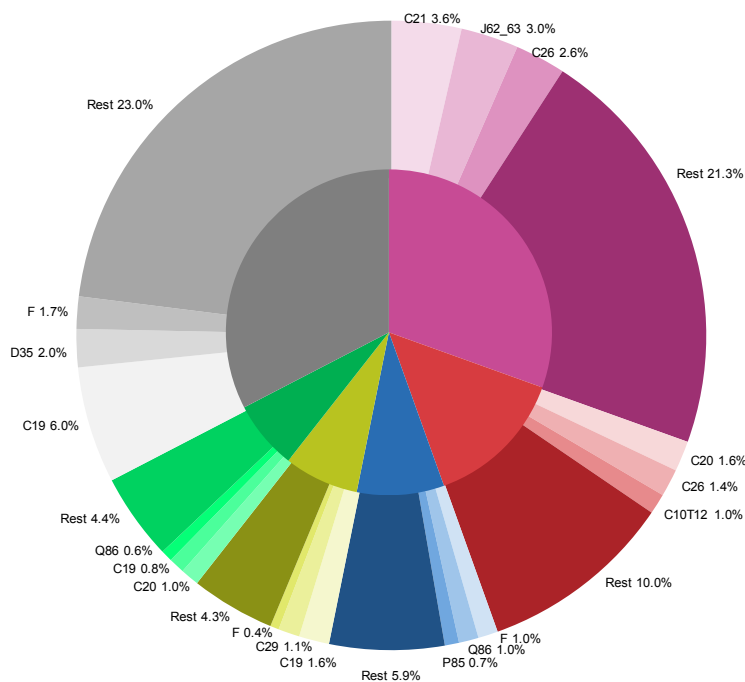
programming consultancy and information service activities' (J62\_63) and 'Manufacture of computer electronic and optical products' (C26), with 3.6 %, 3 % and 2.6 %, respectively. In addition, the discrepancies of the 'Manufacture of chemicals and chemical products' (C20) in the Netherlands and the 'Manufacture of coke and refined petroleum products' (C19) in Germany represent 1.6 % of their respective total outputs. For the other remaining countries, the 'Manufacture of coke and refined petroleum products' (C19), 'Electricity gas steam and air conditioning supply' (D35) and 'Construction' (F) industries accounted for 6 %, 2 % and 1.7 %, respectively.

**Figure 13.5: Analysis of the total row discrepancies; net and absolute sum of discrepancies by country and industries (relates to A1 in Figure 13.4).**

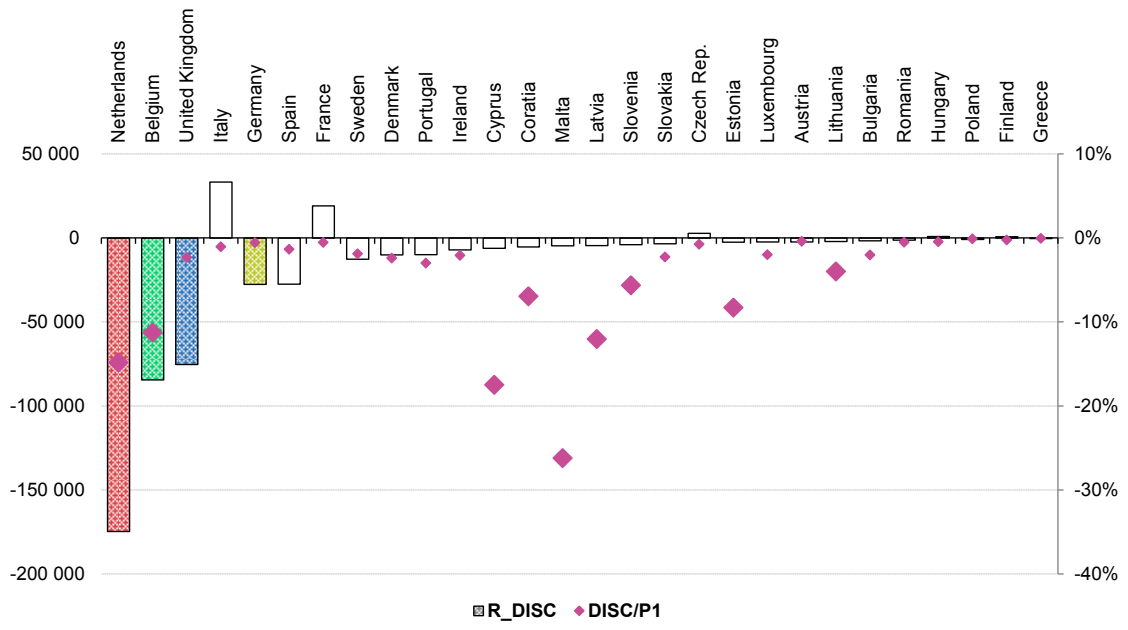
1. Positives, negatives, net and absolute sums of discrepancies; Top 5 countries



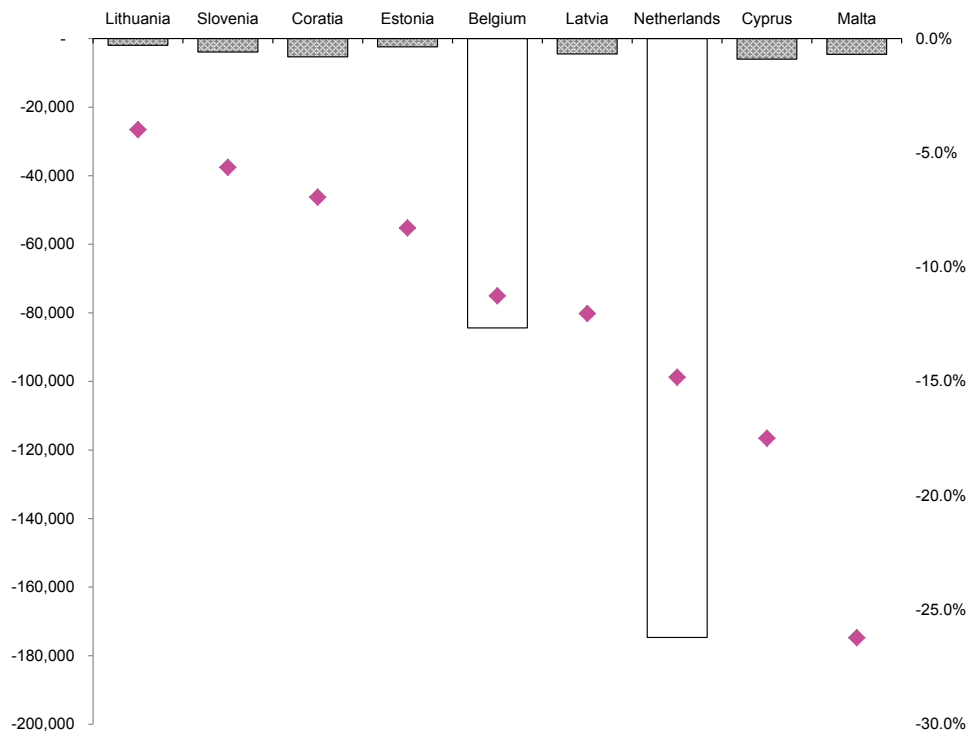
2. Distribution of the absolute discrepancies by country and by industry



3. Total row net sum of discrepancies and shares by EU countries with respect to output in the inter-country statistical use table, sorted by size



4. Top 9 shares over output by country; Net sum of discrepancies and shares



Source: Author.

Analysing the row net sum of discrepancies and shares by EU countries (Figure 13.5 – charts 3 and 4) the Netherlands, Belgium and UK account for more than 80 % of the total net sum of discrepancies in the EU. The Netherlands stands out with EUR -174 684 million, more than twice the sum of Belgium and the UK at EUR -84 444 and EUR -75 267 million, respectively. Italy has a positive net sum of discrepancies of EUR 33 379 million, while Germany and Spain recorded discrepancies of around EUR -27 500 million each. The rest of the European countries have a net sum of discrepancies below EUR 20 000 million in absolute values.

Considering the shares of the net sum of discrepancies compared with the total output (P1) of each country, Malta has the biggest share with -26.2 %, followed by Cyprus (-17.5 %), the Netherlands (-14.8 %), Latvia (-12 %) and Belgium (-11.3 %). Most countries have shares below -3 %, apart from Croatia, Slovenia, Lithuania and Estonia, which have shares between -4 % and -8 %. Nevertheless, these sums of net discrepancies are generally small in absolute values except for the Netherlands and Belgium, whose shares are both above 10 % with a significant amount of a net sum of discrepancies in intermediate consumption (see chart 4 in Figure 13.5).

To sum up, the analysis show that Belgium and the Netherlands are countries that would deserve special attention in future work regarding intermediate consumption of industries; leaving aside US, with a large discrepancy value that only represents a smaller part of its total output. Interestingly, the Figaro tables have generally overestimated the domestic exports attributed to Belgium and the Netherlands in comparison with the trade values reported by the respective national SUTs. Evidently, the assumptions made on the treatment of goods sent abroad and merchanting due to the lack of information in these countries might have played a role on this result. A similar reasoning applies to the estimation of re-exports in merchandise trade and the balancing of the trade asymmetries.

## B. DISCREPANCIES IN INTERMEDIATE CONSUMPTION BY INDUSTRY

Figure 13.6 shows the breakdown of the row total intermediate consumption discrepancies by industry (A3 in Figure 13.4). The distribution is more spread than in the previous case.

The top-5 industries account for 30 % of the overall absolute sum of discrepancies. These five activities are 'Manufacture of coke and refined petroleum products' (C19), 'Manufacture of computer electronic and optical products' (C26), 'Construction' (F), 'Manufacture of basic pharmaceutical products and pharmaceutical preparations' (C21) and 'Wholesale trade except of motor vehicles and motorcycles' (G46) with 10 %, 6 %, 5 %, 5 % and 4 %, respectively. The biggest net sum of discrepancies is reported by the 'Manufacture of coke and refined petroleum products' industry (C19) with EUR 92 714 million, around double the net sum of discrepancies of each of the other top-5 industries, which range between EUR -35 906 million and EUR -60 512 million.

In Figure 13.6 (chart 2) the outside ring shows that absolute sum of discrepancies of the other remaining industries is mostly concentrated in the US (20.6 %), followed by the Netherlands and the UK with 10.4 % and 6.8 %. The rest of the other countries are all below 2 %.

In charts 3 and 4 of Figure 13.6, the highest shares are concentrated in 'Manufacture of basic pharmaceutical products and pharmaceutical preparations' (C21), 'Manufacture of coke and refined petroleum products' (C19) and 'Travel agency tour operator reservation service and related activities' (N79) with -15.1 %, 10.7 % and -10.5 %, respectively. All other negative shares in all industries are below 9 %.

Leaving aside US, it can be concluded that the intermediate consumption of the 'Manufacture of basic pharmaceutical products and pharmaceutical preparations' (C21) and the 'Manufacture of coke and refined petroleum products' (C19) deserve special attention in future work, both in absolute and relative terms. Interestingly, the Figaro tables have underestimated the EU exports of refining petroleum products (C19) and overestimated the EU exports of pharmaceutical products (C21).



### C. DISCREPANCIES IN FINAL USE BY COUNTRY

The absolute sum of discrepancies in final uses is much more concentrated among a few countries than for intermediate consumption. The top-5 countries account for 77 % of the overall absolute sum of discrepancies. The US accounts for 40 %, with a net sum of discrepancy of EUR -154 121 million, followed by the Netherlands (18 %), Belgium (9 %), Germany (5 %) and Italy (5 %) with net sum of discrepancies of EUR -68 451 million, EUR -34 075 million, EUR -10 502 million and EUR 16 939 million, respectively (chart 1 in Figure 13.7).

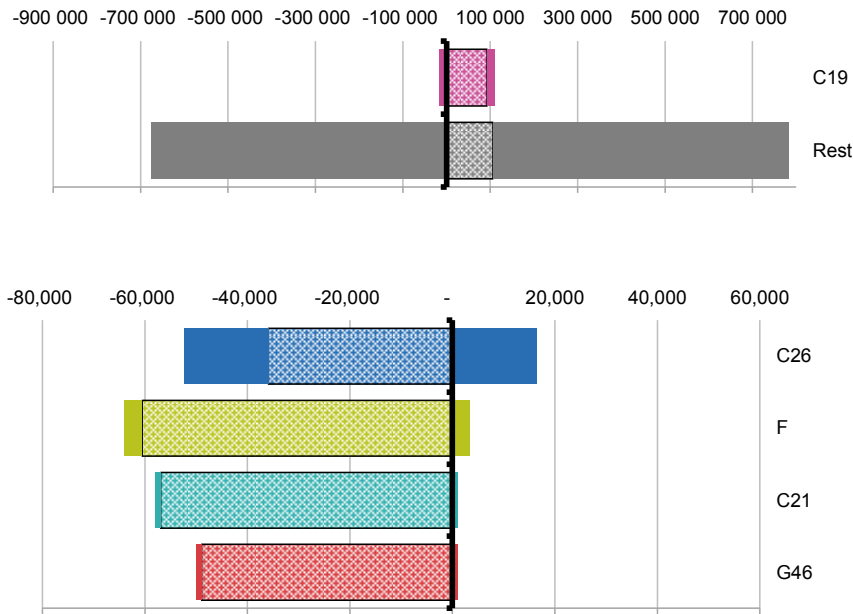
In addition, more than 90 % of the overall absolute sum of discrepancies are concentrated in the 'Final consumption expenditure by households' (P3\_S14) and 'Gross fixed capital formation' (P51G), with 59.2 % and 32.5 %, respectively (see chart 2 in Figure 13.7).

Regarding the net sum of discrepancies, US is a specific case since the share of its net sum of discrepancies is just -0.3 % of its total final use, although it accounts for the highest net discrepancy (EUR -154 121 million) among the Figaro countries. In contrast, in the case of the EU (charts 3 and 4 in Figure 13.7), the net sum of discrepancies in Luxembourg represents the highest share with respect to its total output (-19.7 %) but also the smallest net sum of discrepancies in absolute terms (EUR -252 million). As shown in Figure 13.7 (chart 4), Luxembourg is followed by Latvia (-15 %), Malta (-14.6 %), the Netherlands (-11.8 %) and Lithuania (-10.6 %) with shares over 10 % of their total output. It is remarkable the case of Belgium, where the share of its net sum of discrepancies is -9.5 % of its total output with also a sizeable amount (EUR -34 075 million) in absolute terms. Cyprus (-9.4 %) and Croatia (-6.6 %) followed Belgium, while all of the other EU countries have shares below -4 %. In most cases, the net sum of discrepancies is small in absolute terms, even with big shares in a few cases.

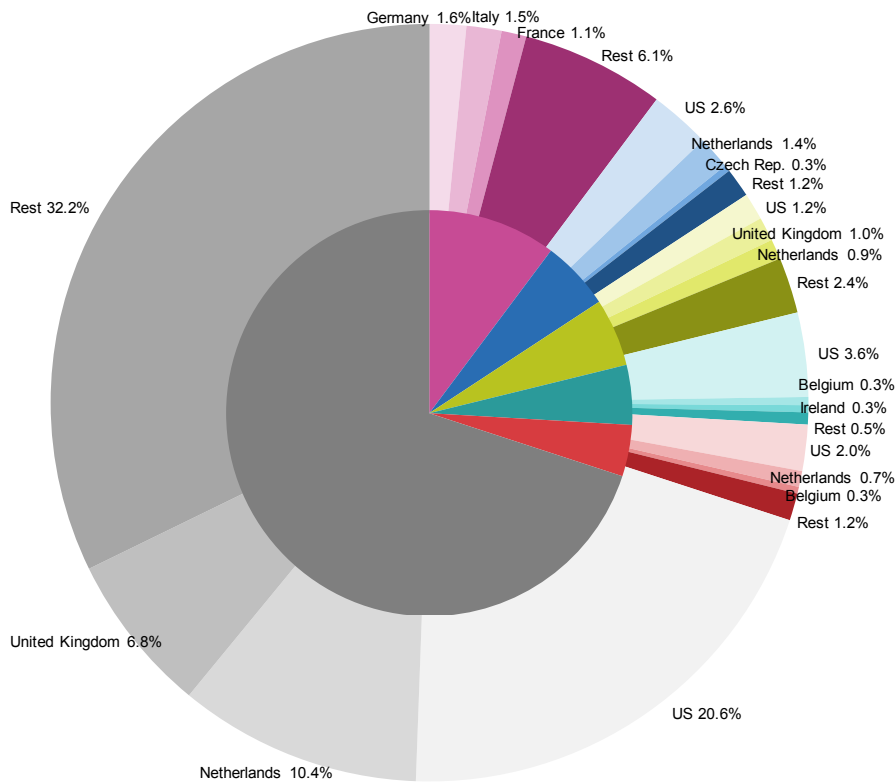
As for intermediate consumption, we can conclude that the Netherlands and Belgium are again countries presenting large shares and substantial net sums of discrepancies in absolute terms, thus deserving special attention in future work.

**Figure 13.6: Analysis of the total row discrepancies; net and absolute sum of discrepancies by industry and countries (relates to A3 in Figure 13.4)**

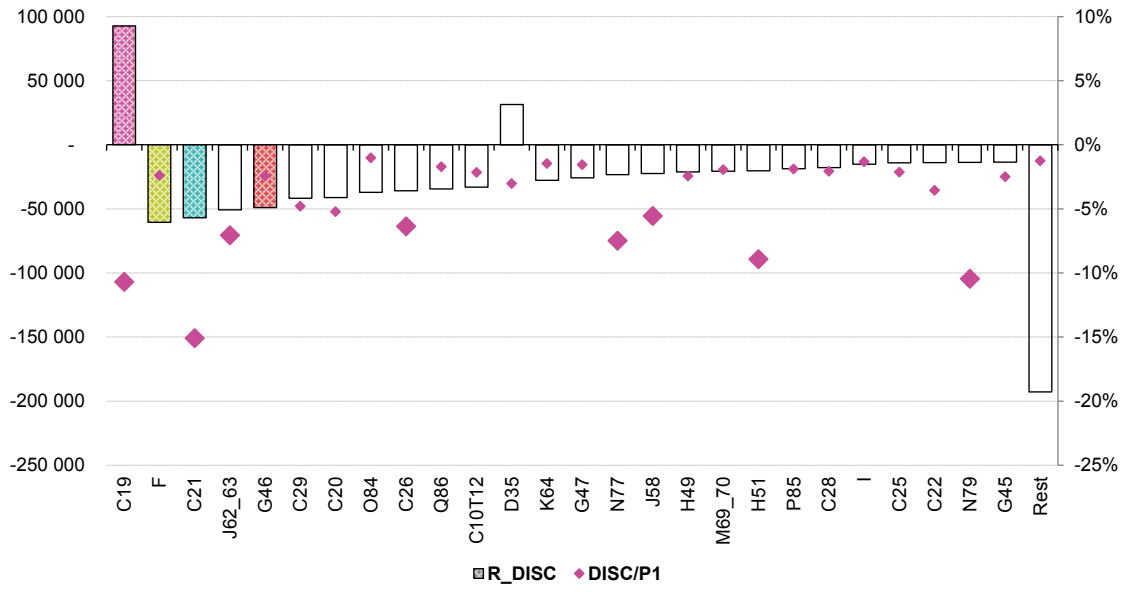
1. Positives, negatives, net and absolute sums of discrepancies; Top 5 industries



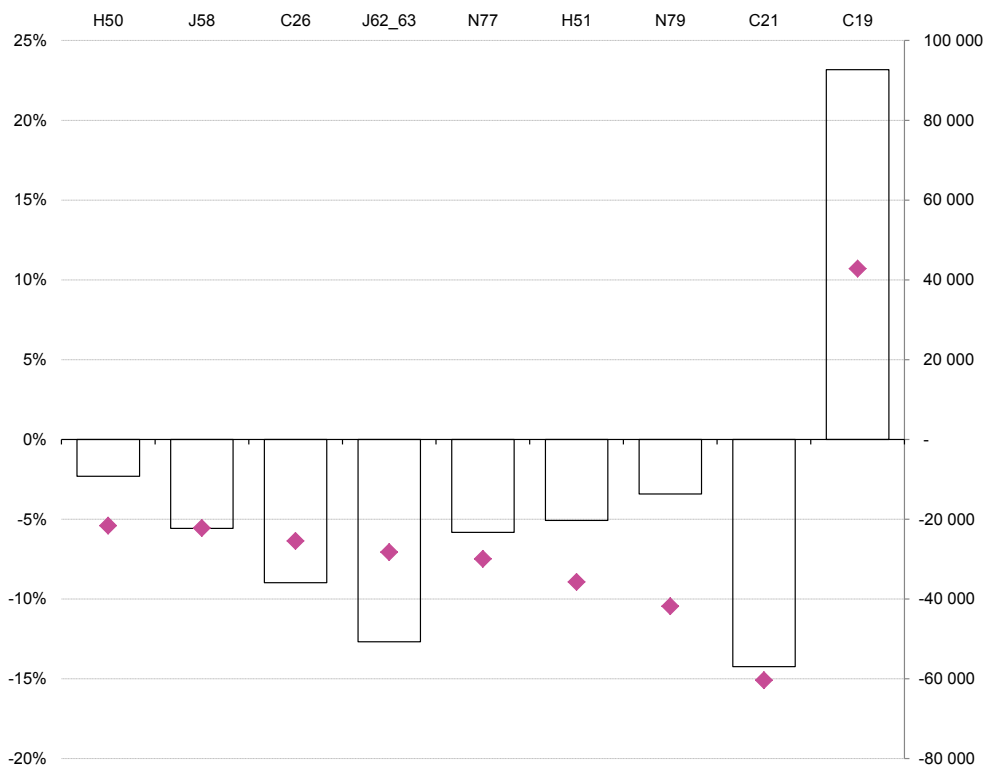
2. Distribution of the absolute discrepancies by industry and by countries



3. Total row net sum of discrepancies and shares by many industries with respect to the total output in the inter-country statistical use table, sorted by size



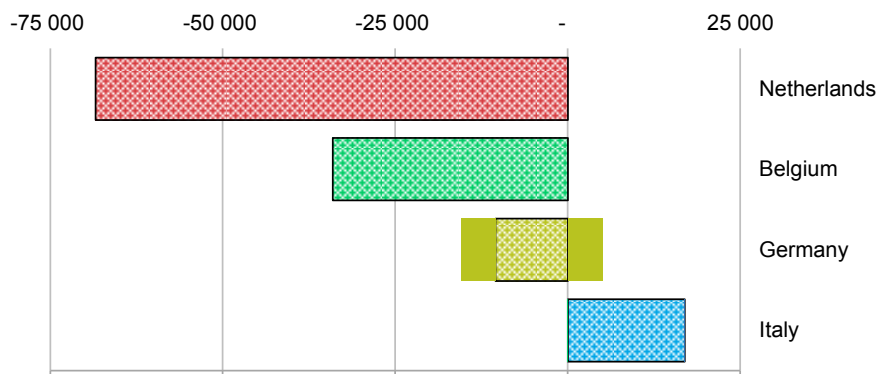
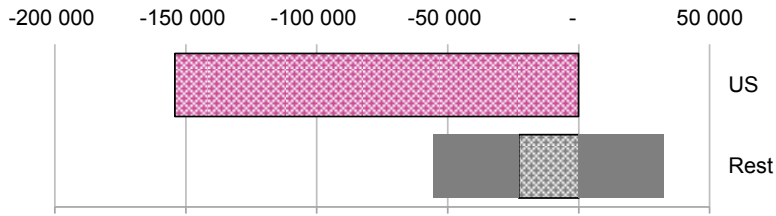
4. Top 9 shares over output by industry; Net sum of discrepancies and shares



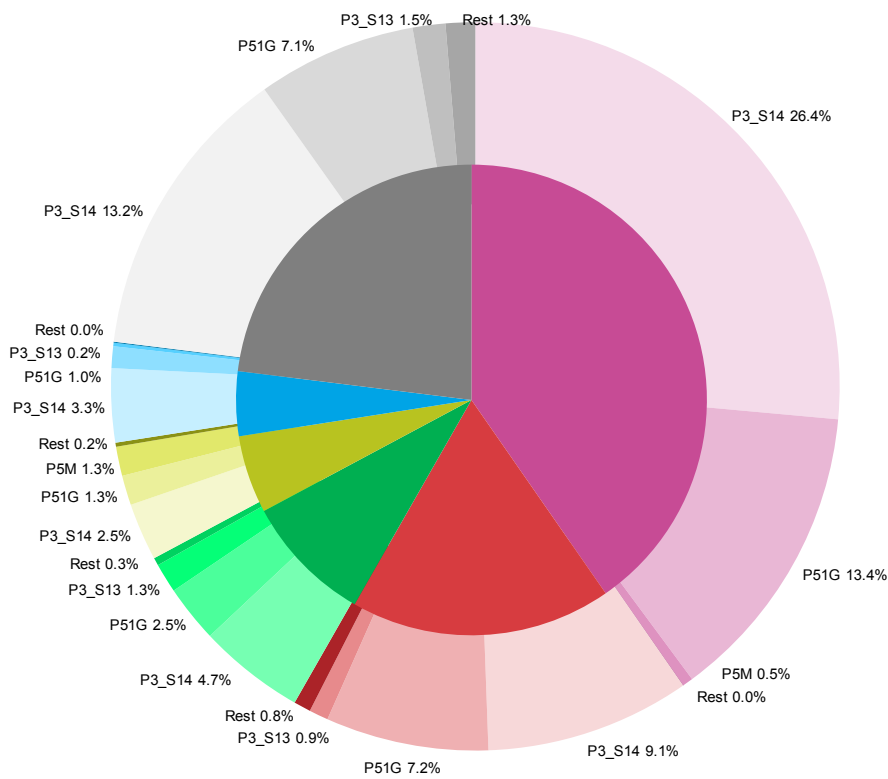
Source: Author.

**Figure 13.7: Analysis of the total row discrepancies; net and absolute sum of discrepancies by country and by final user (relates to A2 in Figure 13.4).**

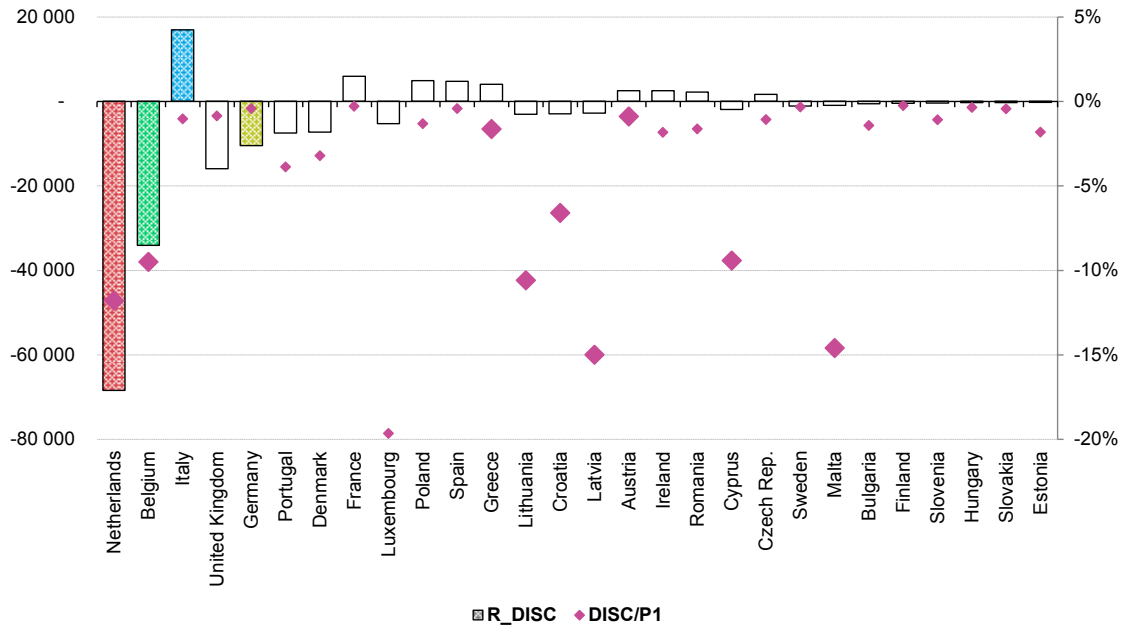
1. Positives, negatives, net and absolute sums of discrepancies; Top 5 industries



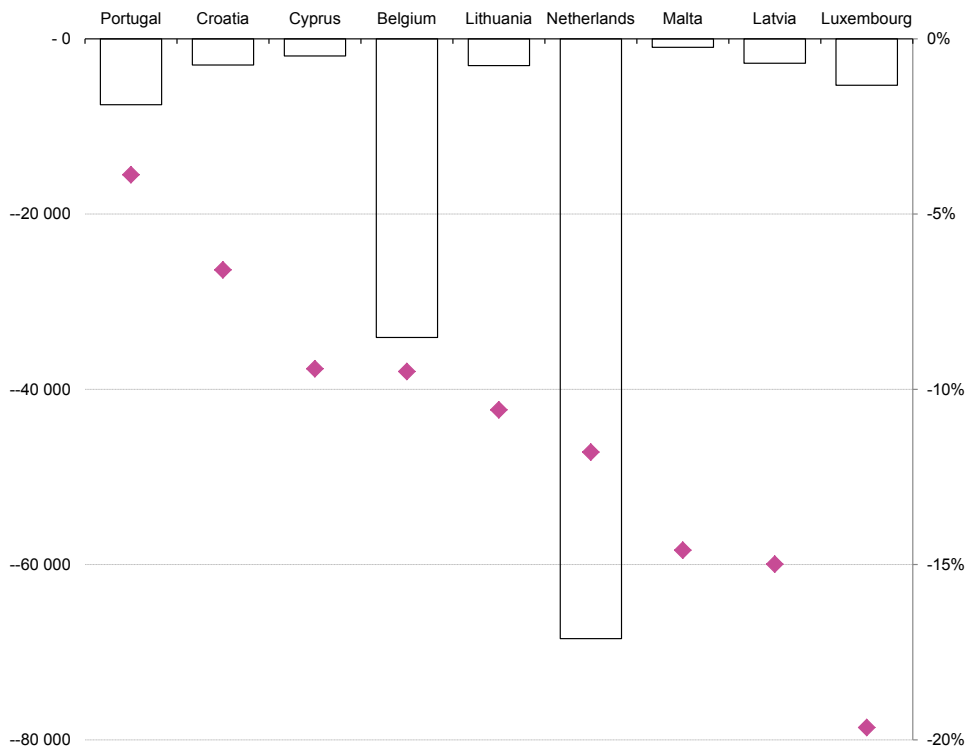
2. Distribution of the absolute discrepancies by industry and by countries



3. Total row net sum of discrepancies and shares by many industries with respect to the total output in the inter-country statistical use table, sorted by size



4. Top 9 shares over output by industry; Net sum of discrepancies and shares

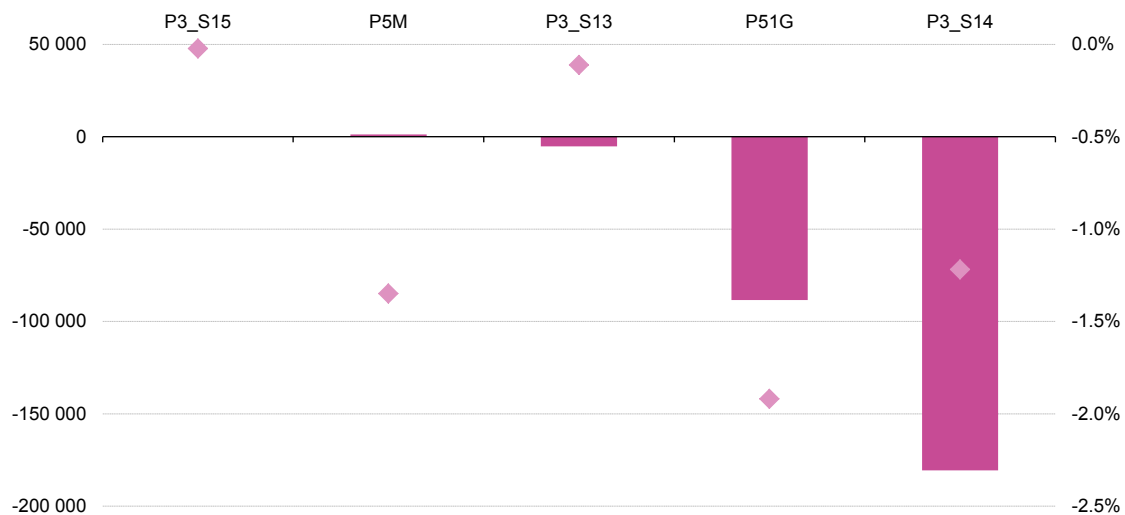


Source: Author.

## D. DISCREPANCIES IN FINAL USE BY USER

This section considers the total net sum of discrepancies and shares by final users. Figure 13.8 shows that the sum of net discrepancies in the 'Final consumption expenditure by households' (P3\_S14), - EUR -180 615 million - is more than twice that of the 'Gross fixed capital formation' (P51G), which is EUR -88 404 million. In both cases, the shares over their total output are below 2 %.

**Figure 13.8:** Analysis of the total row discrepancies; net sum of discrepancies and shares by final users (relates to A4 in Figure 13.4)



Source: Author.

## E. TOTAL COLUMN DISCREPANCIES BY COUNTRY

The results of the total column discrepancies by country follow a similar pattern to the analysis made in the previous section to the total row discrepancies (see Figure 13.4). In this sense, Figure 13.9 shows that column discrepancies are mostly concentrated on the US. The US alone represents 38 % of the total absolute discrepancy, followed by the United Kingdom (9 %), Germany (8 %), France (8 %) and the Netherlands (5 %). The rest of the countries accounts for the remaining 32 % with none of them being bigger than 5 %. It is also possible to see that the negative discrepancies prevail over the positive ones. In some cases, the net effect is relatively low with respect to the absolute discrepancies, as in the case of the United Kingdom.

The total net sum of discrepancies for the US is EUR -378 372 million, representing almost 80 % of the total net sum of discrepancies for all EU (EUR -481 421 million). However, even though the column net sum of discrepancies for the US is large, it represents just 2 % of its total use, as in the EU as well.

In addition to the geographical dimension, the distribution by CPA product within each country (chart 2 in Figure 13.9) shows big discrepancies in the product CPA\_N77, 'Rental and leasing services' (13.4 %), particularly in the US. Moreover, by adding the US 'Computer electronic and optical' (CPA\_C26) and the US 'Publishing services' (CPA\_J58) this share rises up to 18.8 %.

Other important CPA products that have big discrepancies are:

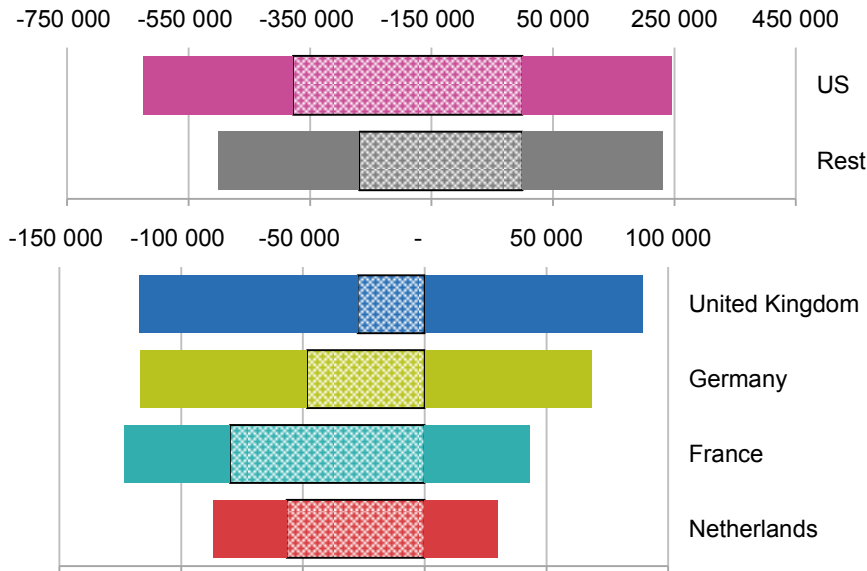
- 'Security and investigation services to buildings and landscape office administrative office support and other business support services' (CPA\_N80T82);
- 'Services auxiliary to financial services and insurance services' (CPA\_K66);
- 'Other transport equipment' (CPA\_C30);

- 'Accommodation and food services' (CPA\_I); and
- 'Wholesale trade services except of motor vehicles and motorcycles' (CPA\_G46).

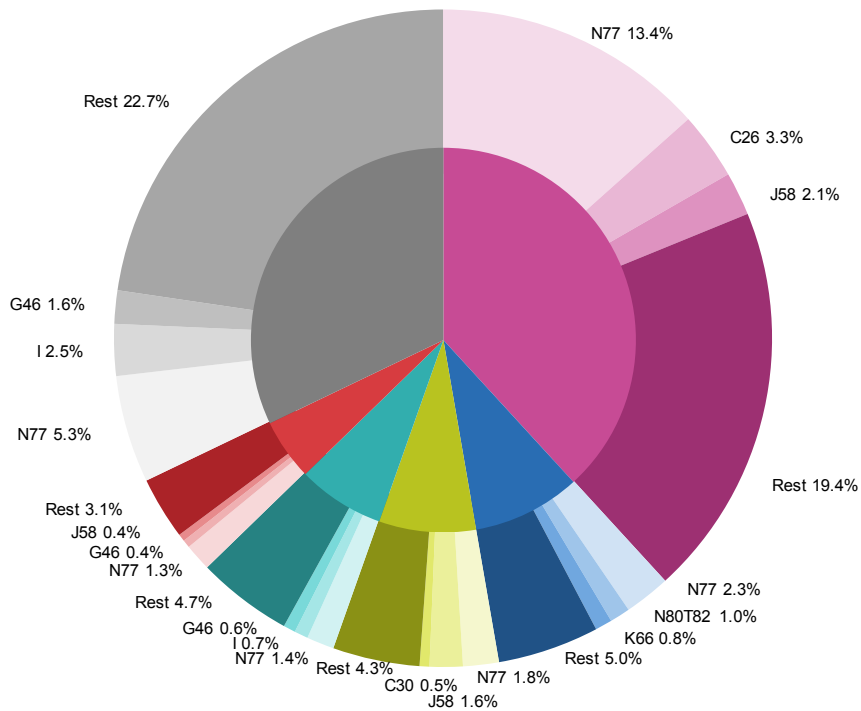
Considering the total column net sum of discrepancies and their shares over their total use by EU countries, chart 3 in Figure 13.9 shows that more than 70 % of the discrepancies are distributed in just seven of the 28 EU countries. In order of importance, these countries are: France, Belgium, the Netherlands, Germany, Spain, Italy and the UK; with a total net sum of discrepancies of EUR - 351 811 billion, being the EU total EUR -481 421 billion. In the same chart, darker diamonds represent the countries with the highest shares of net sums of discrepancies over their total use.

**Figure 13.9: Analysis of the total column discrepancies; net and absolute discrepancies by country and by CPA products (relates to A5 in Figure 13.4)**

1. Positives, negatives, net and absolute sums of discrepancies; Top 5 countries

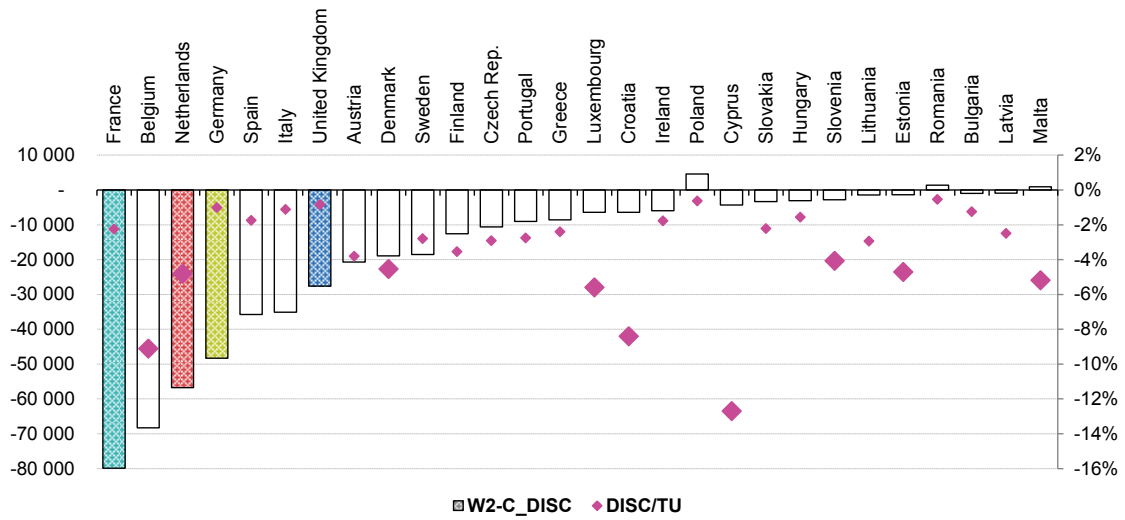


2. Distribution of the absolute discrepancies by country and product CPA

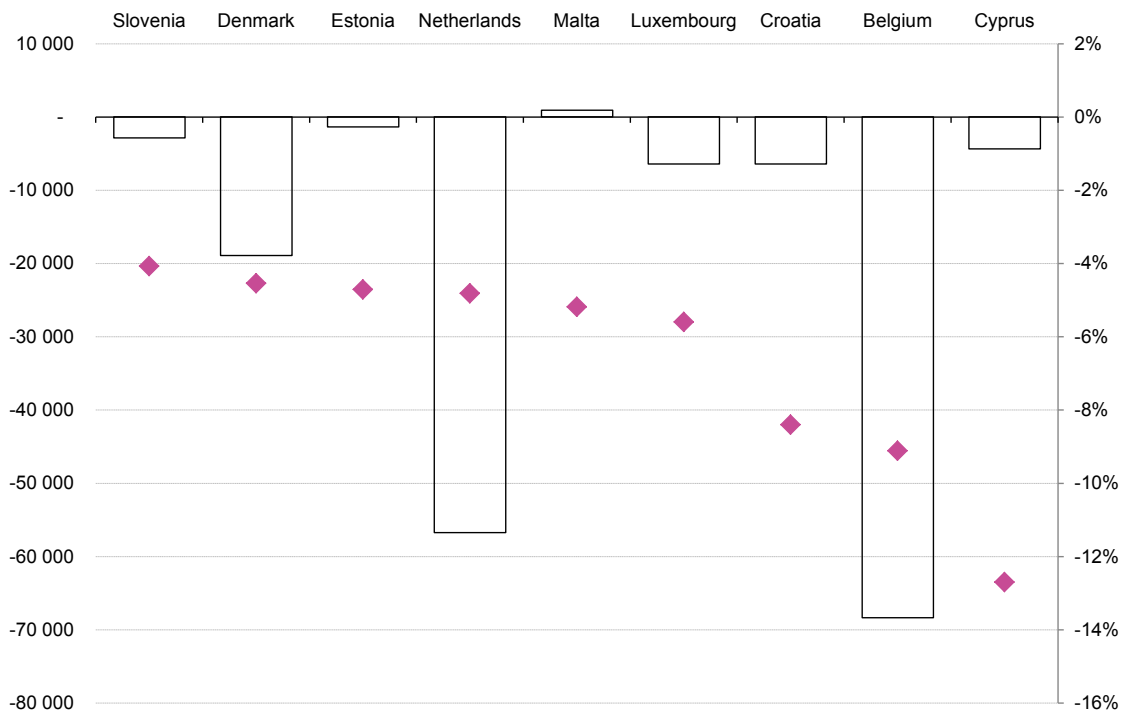




3. Total column net sum of discrepancies and shares by EU countries with respect to the total use in the inter-country statistical use table, sorted by size



4. Top 9 shares over total use by country; Net sum of discrepancies and shares



Source: Author.

Chart 4 complements the previous consideration and identifies the top-9 highest shares over the total use for each country. These shares are below -4.1 % in most of the countries, i.e. Slovenia (-4.1 %), Denmark (-4.5), Estonia (-4.7 %), the Netherlands (-4.8 %), Malta (-5.2 %) and Luxembourg (-5.6 %). The biggest negative shares correspond to Cyprus (-12.7 %), followed by Belgium and Croatia with -9.1 % and -8.4 %, respectively.

In most cases, the largest negative shares are concentrated on countries with negligible net sums of discrepancies. There are also cases with substantial discrepancies but with small shares, such as France (-0.6 %), Germany (-1.0 %), Spain (-1.8 %), Italy (-1.1 %) and the UK (-0.9 %), meaning that the discrepancies have a small impact in their total uses. However, the most relevant cases are those countries with substantial net sums of discrepancies and also high shares over their total uses. These are the cases of Belgium and the Netherlands, gathering both 8 % of the EU total net sum of discrepancies (EUR -68.361 million for Belgium and EUR -56.757 million for the Netherlands) and with shares of -9.1 % and -4.8 %, respectively. Similar to previous analyses, future work will have to pay special attention at the methodology and the results for Belgium and the Netherlands.

## F. TOTAL COLUMN DISCREPANCIES BY PRODUCT

Regarding total column sums of discrepancies by CPA product, Figure 13.10 shows that 'Rental and leasing services' (CPA\_N77) accounts for 44 % of the total absolute sum of discrepancies across countries. For the rest of the CPA products, none of them accounts for more than 3.8 % of the overall total, reaching altogether 56 %. There are exceptions, which are: 'Publishing services' (CPA\_J58) – 7 % – and 'Computer electronic and optical' (CPA\_C26), 'Accommodation and food services' (CPA\_I) and 'Wholesale trade services except of motor vehicles and motorcycles' (CPA\_G46) with 4 % each one.

The countries that account for the largest share of the absolute sum of discrepancies of CPA\_N77 are the US (13.4 %), the United Kingdom (2.3 %) and Germany (1.8 %), making altogether 17.5 % of the total. Similarly, these three countries account for the largest share in the total absolute sum of discrepancies in the category 'Rest' of products, being their shares 18.9 %, 5.6 % and 4.2 %, respectively (see chart 2 in Figure 13.10); these sum up 28.7 %, which in turn represents 46.2 % of the total absolute sum of discrepancies of those three countries.

Chart 3 in Figure 13.10 shows a large net sum of discrepancies across countries of EUR -575.410 million in CPA\_N77 compared with the total net sum of discrepancies of EUR -859.793 million. This amount is even more remarkable when compared with the total use of such CPA product (e.g. -135.9 %). In addition, there are five other CPA products with negative shares bigger than 16 %, namely: 'Publishing services' (CPA\_J58) with -43.6 %, 'Water transport services' (CPA\_H50) with 19.8 %, 'Computer electronic and optical' (CPA\_C26) with -19.8 %, 'Textiles wearing apparel leather and related products' (CPA\_C13T15) with -18.2 %, and 'Basic pharmaceutical products and pharmaceutical preparations' (CPA\_C21) with -16 % (as shown in chart 4 in Figure 13.10).

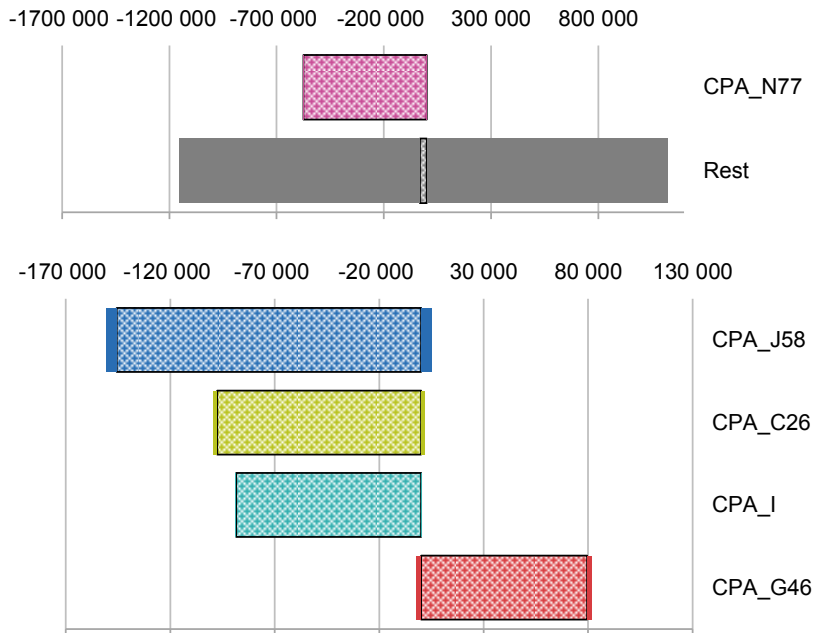
Combining both results, the aggregate by country (A5) and the aggregate by CPA product (A6), these are the CPA products that would deserve further attention in future work:

- 'Rental and leasing services' (CPA\_N77)
- 'Publishing services' (CPA\_J58),
- 'Water transport services' (CPA\_H50),
- 'Computer electronic and optical' (CPA\_C26),
- 'Textiles wearing apparel leather and related products' (CPA\_C13T15)
- 'Basic pharmaceutical products and pharmaceutical preparations' (CPA\_C21).

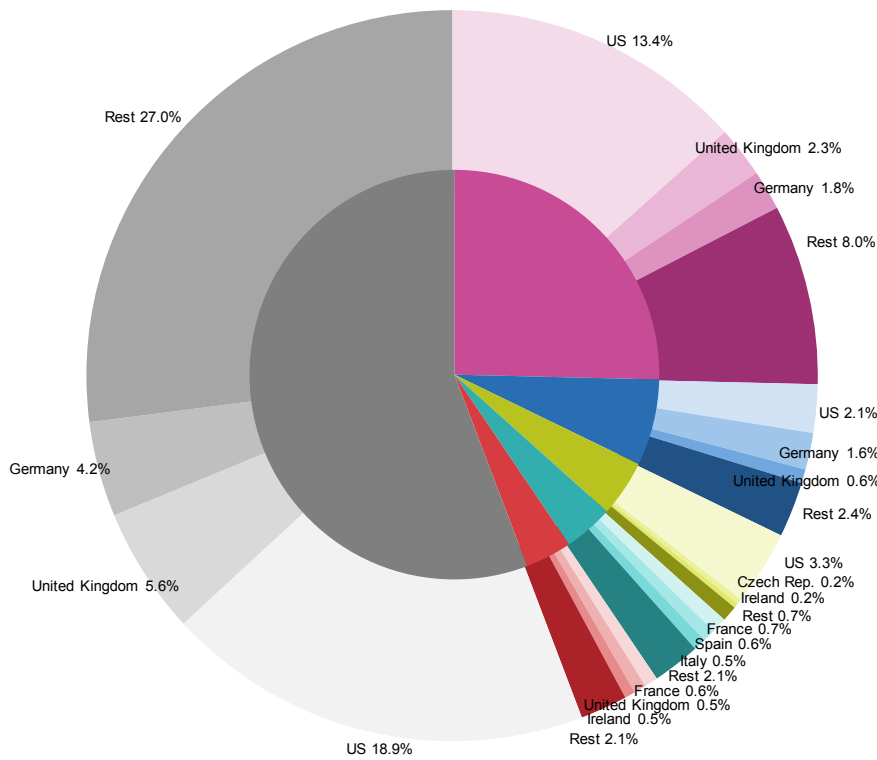
Country-wise and analogously to the analysis of the row discrepancies, Belgium and the Netherlands stand out again as countries for which further work is recommended.

**Figure 13.10: Analysis of the total column discrepancies; net and absolute sums of discrepancies by CPA product and by countries (relates to A6 Figure 13.4)**

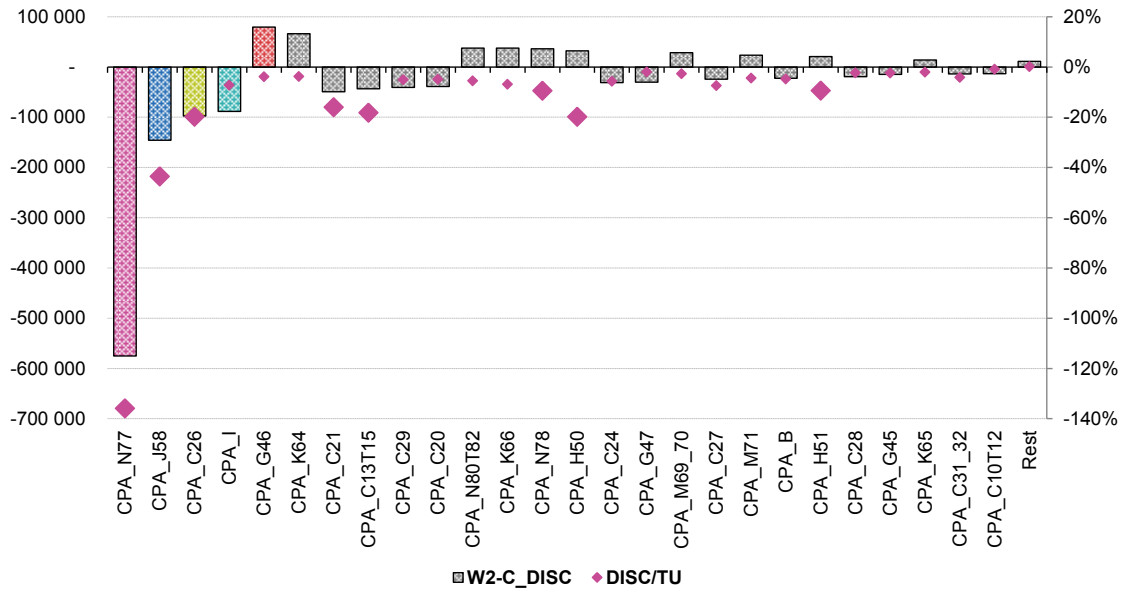
1. Positives, negatives, net and absolute sums of discrepancies; Top 5 CPA product



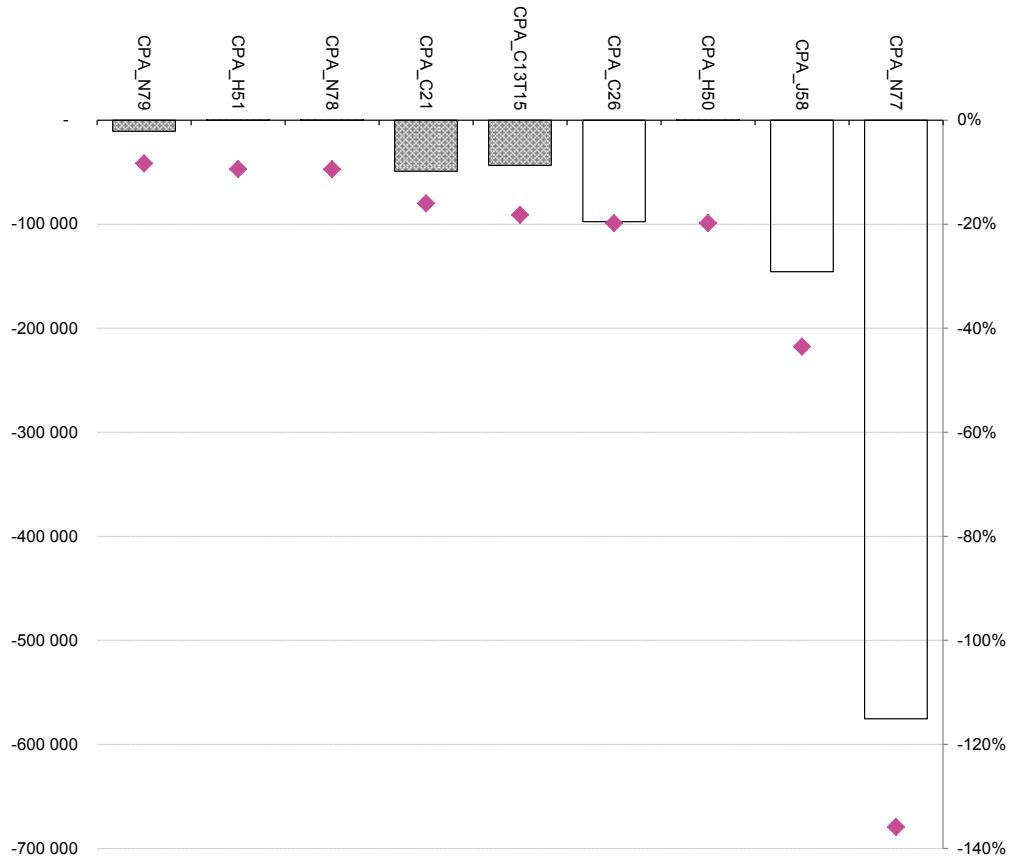
2. Distribution of the absolute discrepancies by CPA product and by countries



3. Total column net sum of discrepancies and shares by many CPA product with respect to the total use in the inter-country statistical use table, sorted by size



4. Top 9 shares over output by CPA product; Net sum of discrepancies and shares



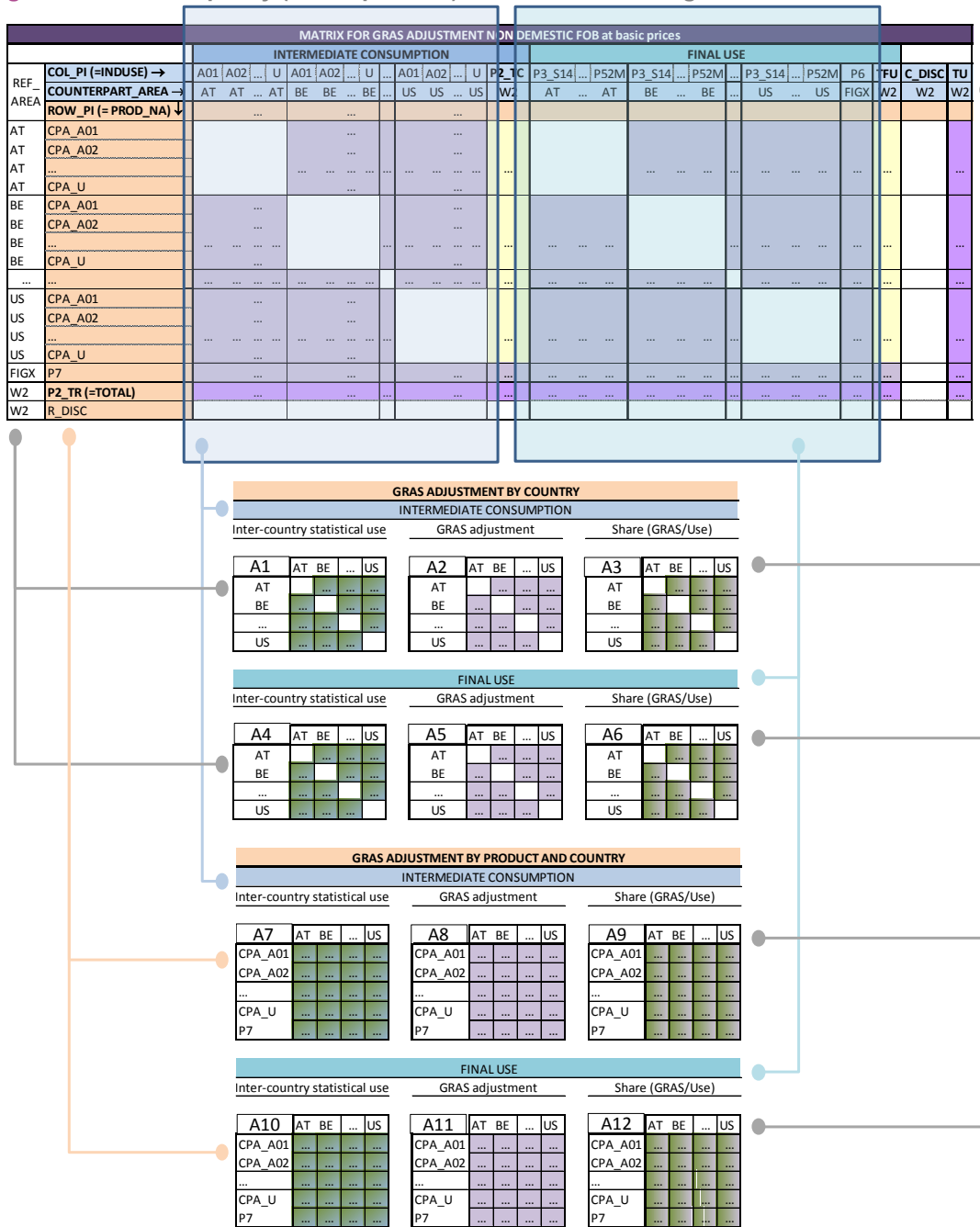
Source: Author.

### 13.2.3 GRAS analysis

The inter-country statistical use table is an intermediate step to build up the inter-country use table. In doing so, all discrepancies are transferred inside the intermediate and final use matrices, excluding the domestic parts. This section analyses the changes occurred in the preliminary inter-country statistical use table once discrepancies have been removed with the GRAS method (see Chapter 11.4). We illustrate the results with four different aggregations coming out from the intermediate and the final use matrices. These are shown in Figure 13.11.

- Intermediate consumption: use values from the inter-country statistical use tables, GRAS adjustment over them and share of adjustment over the former values, on a country by country basis (A1, A2 and A3 tables in Figure 13.11).
- Final uses: final use values from the inter-country statistical use tables, GRAS adjustment over them and share of adjustment over the former values, on a country by country basis (A4, A5 and A6 tables in Figure 13.11).
- Intermediate consumption: use values from the inter-country statistical use tables, GRAS adjustment over them and share of adjustment over the former values, on a CPA product by country basis (A7, A8 and A9 tables in Figure 13.11).
- Final uses: final use values from the inter-country statistical use tables, GRAS adjustment over them and share of adjustment over the former values, on a CPA product by country basis (A10, A11 and A12 tables in Figure 13.11).

**Figure 13.11: Discrepancy (GRAS process) matrix in the interregional use framework**



Source: Author.

Figure 13.12 focuses on the 28 biggest adjustments made in the intermediate consumption to balance the inter-country statistical use table, on a country by country basis. The first seven country pairs (starting from the left axis) represent 64.2 % of the total net sum of discrepancies. The first two, US and Dutch imports from non-EU countries (FIGX-US and FIGX-NL) have net sums of discrepancies above EUR -80 000 million<sup>(10)</sup>. They are followed by German and British exports to US (DE-US and GB-US) for around EUR -47 000 million each one, and US exports to the United Kingdom (US-GB), US exports to Spain (US-ES) as well as French exports to US were adjusted for

<sup>(10)</sup> FIGX includes non-EU countries, except the US.

values ranging between EUR -31 000 million and EUR -40 000 million. The rest of the bilateral country pairs were adjusted with values below EUR 27 000 million (either positive or negative).

Figure 13.12 also shows the shares of the GRAS adjustments over the values of the inter-country statistical use table (see red diamonds in the right axis) on a country by country basis. Besides the magnitude of the adjustments, the average share of the top-28 country pairs with the highest shares is -43.2 %. In particular, the highest shares come from the Spanish and the Danish exports to US (ES-US and DK-US), which both recorded -80 %. It is also remarkable that for the case with the highest adjustment value (FIGX-US), the share is just -14.6 %. However, the second highest adjustment (FIGX-NL), which has a similar adjustment value as FIGX-US, recorded a bigger share of -49.9 %.

**Figure 13.12: GRAS adjustments and shares in the inter-country statistical use table, by reference area and counterpart area (relates to A2 and A3 in Figure 13.11).**

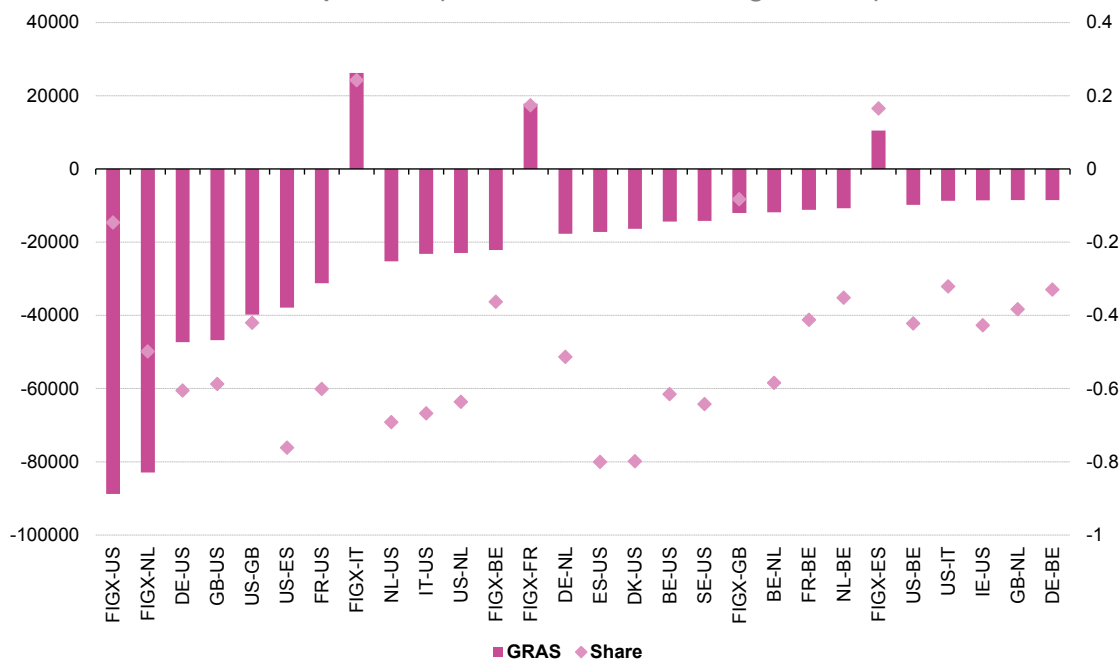
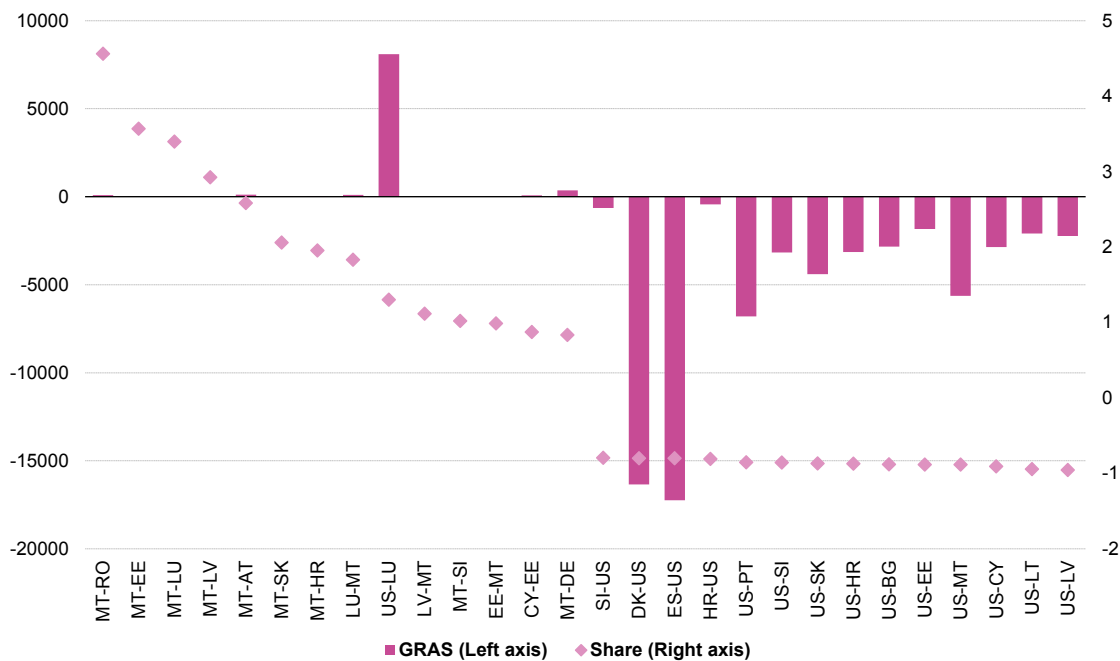


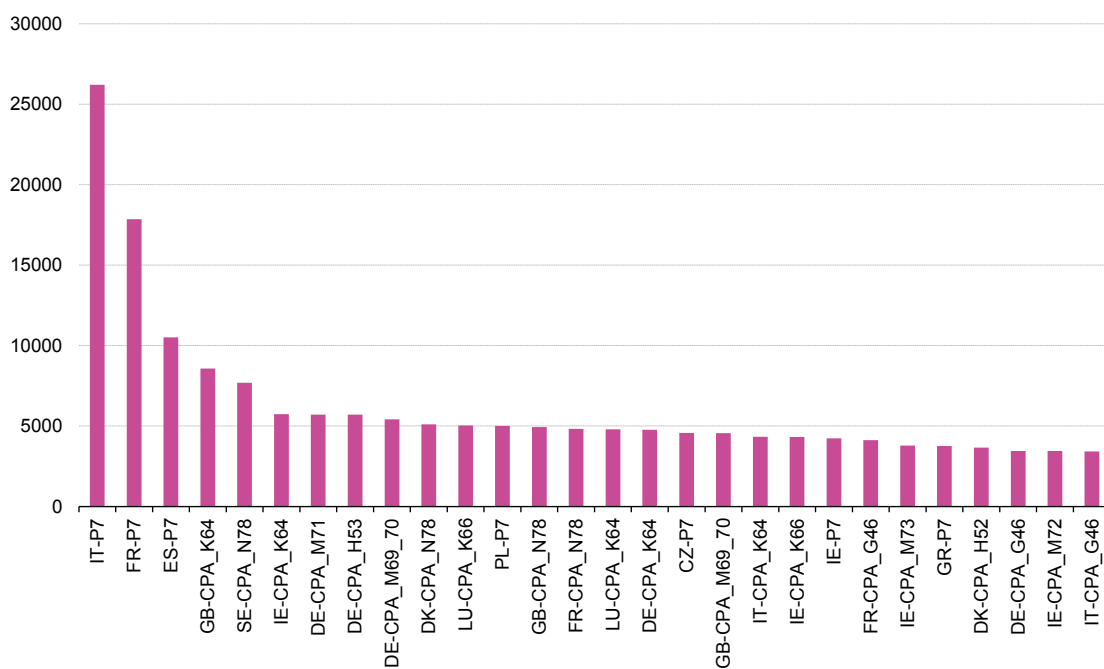
Figure 13.13 is equivalent to Figure 13.12 but sorted by the size of the shares. In this sense, the top-28 country pairs with the highest shares amounted to a total adjustment close to EUR -17 500 million. As a whole, the shares range from 79 % to 456 % in absolute values but, as it can be seen, the top-12 country pairs with the highest shares were very slightly adjusted (very small blue bar).

**Figure 13.13:** GRAS adjustments and shares in the inter-country statistical use table, by reference area and counterpart area – sorted by shares (relates to A2 and A3 in Figure 13.4).



As shown in Figure 13.14, Italian, French and Spanish imports from the rest of the world (excluding US) were the ones that suffered the biggest changes after the GRAS balancing process (IT-P7, FR-P7 and ES-P7), followed by UK imports of financial services (GB\_CPA\_K64) and Swedish imports of employment services (SE\_CPA\_N78). In terms of shares, we found huge values for some cases where the inter-country statistical use table had negligible values that eventually were transformed into substantial amounts. Evidently, this points out to some countries and products where to put more efforts in future work.

**Figure 13.14:** GRAS adjustments at CPA product level (relates to A8 in Figure 13.11.). (million euro)





And last but not least, we provide two tree maps summarising the absolute values of the changes made by the GRAS adjustment by country (Figure 13.15) and CPA product (Figure 13.16). The total area represents 100 % of the total adjustment. Colours represent the reference area and each of them is divided into smaller boxes representing the counterpart area. Below the counterpart name is the share of the adjustment represented by such country compared with the overall total adjustment. Figure 13.15 considers 12 countries and a group of the remaining countries (Rest) for the reference counterpart areas. In addition, Figure 13.16 considers 28 CPA products and a group of the remaining products (Rest).

By countries, Figure 13.15 shows that the rest of the world (FIGX or non-EU countries, except for US) accounts for 28.5 % of the total adjustment in absolute terms, of which US and the Netherlands take around 8.5 % each. Next, US follows with 19 % of the total adjustment, of which UK, Spain and non-EU countries account for around 4 % each as counterpart areas. Germany, UK and France follow with shares between 6.4 % and 9.2 % of the total adjustment. In these three cases, US are the main counterpart area with shares between 3.1 % and 4.7 %.

Figure 13.16 identifies the following products as being the ones with the largest adjustments made during the last stage of the compilation of the inter-country use tables:

- 'Rental and leasing services' (CPA\_N77)
- 'Imports of EU countries and US from the rest of the world' (P7)
- 'Accommodation and food services' (CPA\_I)
- 'Publishing services' (CPA\_J58)
- 'Chemical and chemical products' (CPA\_C20).



Figure 13.16: GRAS share adjustments with respect to the overall total adjustments (relates to A8 in Figure 13.11)

