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THE OECD-WTO BALANCED TRADE IN SERVICES DATABASE

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This paper provides an update and progress report on OECD-WTO efforts, building on the work of WPTGS informal reflection groups, to create a balanced database of bilateral trade in services by EBOPS category. Delegates are asked to comment and provide feedback on the methodology used and to consider if additional data collected in their institution, but not publicly available, could be used as input to the database.

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1. Introduction

1. High quality data on international trade in services that provide insights into the types of services that are traded, and with which partner countries, are vital for economic analyses and policy making. However, for many OECD and non-OECD countries, the currently available trade in services statistics lack the necessary level of detail. In addition, for those countries where data *are* available, internal inconsistencies between totals and subcategories, and with partner countries, hamper the analytical and policy use of services trade statistics.

2. These challenges are particularly relevant for constructing Trade in Value Added (TiVA) estimates. TiVA combines national Supply and Use (SUT) and Input-Output (IO) tables with international trade in goods *and services* statistics in order to provide new insights into how the value added in each country's industry, within a value chain, is embodied in international trade flows. Internationally coherent and detailed bilateral trade in services statistics, are therefore an essential component of the OECD's Inter-Country Input-Output Table that underpins TiVA and many other initiatives producing TiVA estimates.

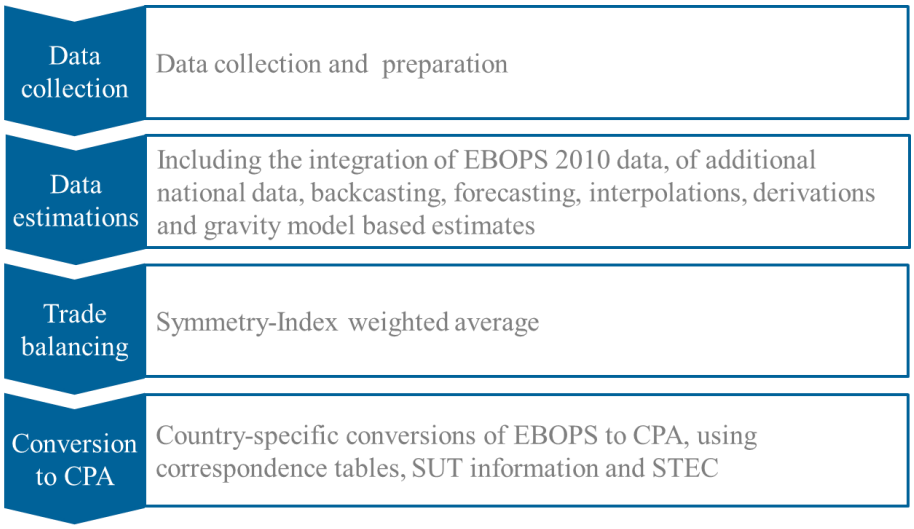
3. There are many reasons why the availability and quality of trade in services data are unsatisfactory, certainly when compared to merchandise trade statistics. Unlike goods which can be seen and physically measured as they cross borders, services transactions can be delivered via a variety of modes, including electronically, and typically only the financial flows are observable. In practice, countries use a variety of different data sources and estimation techniques to develop trade in services statistics, and these vary by country. Data confidentiality can also add another layer of complexity.

4. To mitigate these problems, OECD and WTO have been working in recent years on the development of a transparent process and methodology to estimate coherent bilateral trade in services statistics that leverages all available official trade in services data. The ultimate goal of this work is to develop a dataset that forms the *international benchmark* for trade in services statistics that is constantly improved as new data become available. Importantly, such a common view on services will also facilitate the integration of regional TiVA initiatives (*e.g.* Eurostat's Figaro project, APEC-TiVA, and NAFTA), within TiVA, while at the same time serving as a single and unique reference point for all analytical purposes.

5. The first edition of the Balanced Trade in Services (BaTIS) dataset covers the 1995-2012 period, 191 countries and partners, and all main EBOPS2002 categories. The dataset is being made available for comment and review by WPTGS members and other interested parties and stakeholders prior to public release.

6. This paper describes the compilation methodology used in constructing the dataset in detail, while also providing background to its broader context and future plans. The structure of the paper largely follows the information flow used in constructing the dataset, summarised in Figure 1.

Figure 1. Schematic overview of the steps involved in creating balanced services trade statistics



Delegates are asked to comment on the overall approach and the estimation methodologies developed, and to contribute any additional insights or data that can help improve future versions of the trade in services matrices.

2. Step 1: Data collection and assessment of data availability

2.1 Data collection and preparation

7. The first step in establishing the BaTIS dataset involves the collection of all available official statistics on international trade in services. The main data sources include the OECD Trade in Services by Partner Country statistics; Eurostat's International Trade in Services statistics; UN Services Trade, and the IMF (for partner World only). In addition, for a number of countries, additional data were incorporated from complementary national sources[1]. In all cases, the integration of these additional data required further estimations (described in more detail below), and are consequently flagged as OECD-WTO estimates and not as national data)

8. The data preparation phase also involved deleting certain observations, when in-depth analysis pointed to methodological and statistical problems. This was the case for Norway (all geographical breakdowns prior to 2010) and for Hungary (all bilateral data prior to 2004). In both cases, severe breaks in series occurred (*e.g.* for Norway, exports to the US declined by more than 80% between 2009 and 2010), reflecting a move away from an ITRS-based system to a survey-based system. In addition, partner data for Croatian imports in 2006 were incomplete with significant and unexplainable volatility compared to data for 2005 and 2007; hence data for 2006 were suppressed from the official statistics input dataset. Finally, for three countries (Israel, Latvia and Russia), transactions with zeros reported were removed when these could not be reliably distinguished from missing values.

9. A final issue in the collected national data was the occurrence of negative values. Negative values occur principally in Insurance Services (S253), when (bilateral) insurance claims are larger than premiums received in a given time period, and in Other Business Services (S268), particularly in the presence of large merchanting transactions (negative exports). Further investigations will necessarily be conducted to fully understand the underlying nature of these transactions and their coherence with accounting conventions but in the interim they have been suppressed and re-estimated. Where negative trade values with partner World, were reported adjustments were made manually (for a total of 111 out of 94500 observations), by creating estimates based on the EBOPS structure of adjacent years without negatives, and distributing the discrepancy proportionally across one or more of the other services categories. For bilateral negative values, the data were in effect treated as missing and estimated following the methods described in sections 3.3 and 3.5.

10. The data thus collected and cleaned were subsequently organised into two separate (but related) datasets, the first containing all data with partner *World* for *Total Services* and the eleven main services categories, including *services not elsewhere specified* (S982) and Other *services* (S981), as shown below (Table 1), and the second containing all *bilateral* data by services categories, for all (53) countries that report bilateral data.

[1] For example, for Luxembourg and Belgium, the National Banks provided data for years prior to 2001 that were not included in Eurostat data. Similarly, partner details for Brazil were obtained via the Brazilian Ministry of Development, Industry and Commerce. Finally, as a result of the efforts of countries involved in the WPTGS Informal Reflection Group 3 (investigating more detailed services trade), additional data were made available by Germany (travel), Italy (for 1997 and 1998) and Sweden (1998-2003).

Table 1. EBOPS 2002 categories classification: code names and hierarchy

Code	EBOPS Category Name
S200	Total services
S205	Transportation
S236	Travel
S981	Other services
S245	Communications services
S249	Construction
S253	Insurance services
S260	Financial services
S262	Computer and information services
S266	Royalties and licence fees
S268	Other business services
S287	Personal, cultural and recreational services
S291	Government services n.i.e
S982	*Services not specified elsewhere*

Trade in services with partner world

11. The dataset on Trade in Services with partner world initially included data for 201 countries, aggregated to the World Total. However, Turkmenistan, Faroe Islands, Timor Leste, Federated States of Micronesia, Tuvalu, New Caledonia, French Polynesia, Eritrea, Somalia and North Korea were dropped from the database due to very limited data availability, leaving a total of 191 countries in the dataset.

12. The data were subsequently prepared for further analysis by ensuring consistency between Total services reported and the sum of the 11 main EBOPS categories reported by each country, starting initially through consistency checks with the broader EBOPS categories: S205 (transportation), S236 (travel) and S981 (other services). For only 2000 out of the 6682 reporter-year combinations for imports and exports, where data was available, did the three main EBOPS categories add up exactly to total services. However, in the majority of cases where differences *did* occur (98.1%) differences could be explained by rounding issues. In these cases, rounding differences were distributed proportionally across the three main EBOPS categories.

13. In around 500 cases, data were recorded in category S982 (services trade not specified). Most of these (80%) amounted to less than 1% of total services trade, and so the differences were distributed proportionally across the main EBOPS categories S205, S236 and S981, and to underlying subcomponents (S245, S249, S253, S260, S262, S266, S268, S287 and S291).

Bilateral trade in services data

14. For the bilateral dataset, there were around 100,000 reporter-partner-year combinations for imports and exports where values were available for at least S200, S205, S236 and S981. The components summed exactly to the total in over half of the cases. Of the remaining (43,551) cases, the majority (97.0%) again reflected rounding, which were adjusted and constrained as described above. S982 was reported in 1,375 instances but again in 95% of the cases the values were very small and adjusted proportionally. For those observations where large differences remain (around 1,400), further investigations are necessary.

2.2 Assessment of initial data availability

Total services trade broken down by main EBOPS categories, with partner world

15. Annex 1 gives an overview of the data availability for total services trade (S200), in the original BPM5 classification. It shows that for 109 out of 191 countries, total services export data are available for the full target period of 1995 until 2012 (108 for imports).

16. Annex 2 displays the availability of total services trade, with partner world, broken down by the eleven main EBOPS 2002 categories. A fully dark circle in the table indicates that all of the 12 categories, including total services, are available for the year under consideration; the larger the proportion of white in the circle, the greater the number of service categories missing. The changeover to BPM6 means that for many countries, data from 2009 onwards are not available in EBOPS 2002 standards[2] but as shown below these data can be readily converted to BPM5 equivalents using IMF conversion guidelines.

Bilateral trade in services data for all main EBOPS categories

17. Whereas the dataset of services trade with partner World covers nearly all countries worldwide, significantly fewer countries report trade in services data broken down by partner country. The total OECD-WTO dataset with reporters specifying their trade with bilateral partners includes 53 individual country reporters, of which 47 are countries currently included in TiVA. The bilateral dataset includes (a maximum of) 244 partner countries and 31 regional groupings. Annex 3 gives an overview of the data availability, indicating the average number of partner countries per reporter, per year.

18. Annex 4 presents an overview of how much of total world services trade by EBOPS category can be bilaterally specified in official national statistics. For exports of each main EBOPS category, the table reveals the number of flows from, to, and within the following groupings: TiVA countries, Rest of the World (ROW) and 'unspecified'. They show that between 90%-95% of total world services exports is accounted for by TiVA countries. The tables also show that in recent years around two-thirds of total world services trade (S200) can be attributed to a bilateral country pair, a significant improvement on earlier years; although for some of the more detailed service categories, the percentage is significantly lower, as shown below in Table 2 (which summarises Annex 4).

[2] Future databases will be converted to BPM6 standards.

Table 2. Percentage of World services exports that are bilaterally specified in official statistics, by year and EBOPS category

	S200	S205	S236	S245	S249	S253	S260	S262	S266	S268	S287	S291	S981
1995	27	27	29	8	12	24	24	18	54	11	11	21	25
1996	32	35	31	13	24	34	29	21	58	21	13	22	33
1997	33	35	32	15	27	35	27	20	59	23	12	21	34
1998	34	36	33	14	34	29	28	20	57	24	11	21	35
1999	50	45	44	20	37	37	29	23	64	29	21	26	43
2000	54	53	47	24	44	36	34	26	68	32	30	27	48
2001	59	56	51	25	40	31	33	25	68	35	37	28	53
2002	64	63	58	21	34	50	25	21	67	33	32	27	65
2003	66	62	61	20	34	32	16	21	65	27	27	30	66
2004	68	64	63	39	54	47	31	48	72	44	47	36	67
2005	69	67	63	43	51	49	31	47	72	48	47	29	67
2006	68	67	63	43	49	49	49	52	78	46	46	28	65
2007	68	65	63	40	42	48	47	53	78	45	45	27	65
2008	70	66	62	39	39	49	47	52	79	46	40	25	64
2009	64	60	55	33	35	43	45	51	73	44	41	26	60
2010	63	60	55	36	35	42	44	46	72	42	41	28	60
2011	64	60	54	36	36	41	45	43	77	42	39	23	61
2012	61	55	52	36	34	40	45	47	69	38	39	24	60

3. Step 2: Estimating missing trade in services statistics

19. It is clear that to develop a complete dataset of bilateral trade in services statistics by main EBOPS categories, estimations have to be produced for a very significant number of cells. The OECD-WTO BaTIS dataset uses a 'top-down' approach that starts with the highest levels of aggregation (total services, with partner world) before developing coherent estimates of the subcomponents. This approach thereby fully leverages the greater amount and better quality of data that is available at higher levels of aggregation, and ensures full consistency of the lower level estimates. More specifically, the work is organised in five distinct sub-steps:

- Step 2.1 Develop a complete dataset of trade in services (S200) data with partner World;
- Step 2.2 Develop a complete dataset of all main EBOPS categories with partner World;
- Step 2.3 Develop a complete dataset of total trade in services by partner country;
- Step 2.4 Develop a complete dataset of all main EBOPS categories by partner country;
- Step 2.5 Develop a consistent dataset of partner country data

3.1 Step 2.1: Completing the S200 series with partner World for all countries

20. Most countries in the database publish total trade in services data (S200) for the entire period of interest (1995 – 2012) (see Annex 1). For the remaining countries, there are a variety of reasons that explain the lack of data. One important reason reflects the fact that many countries have already moved to BPM6, meaning that data have to be transformed back to BPM5 for developing the dataset presented here. Another reason is that several countries supply the underlying EBOPS components but not a value for total trade in services; although, by and large, these can be assumed to align with the underlying total, and indeed is the approach used to estimate totals when they are not available, as shown below.

Derivations

21. Total trade in services was derived as the sum of all EBOPS components when all main EBOPS categories were available but total trade was not reported. These calculations of S200 were assigned an estimation code "E1", applicable to 132 individual observations in total (covering 16 different reporters).

Incorporating BPM6 information

22. For data on S200 for 44 countries, BPM6 data were converted to BPM5 (mainly for the 1999-2012 period) following the IMF guidelines, and were assigned an estimation code "E2" in the dataset. This applied to 381 observations in the S200 dataset.

Integrating more recent national data

23. An important part of the data is collected from other international organisations, such as Eurostat and the IMF. However, frequently more recent data are available from national sources. These data were incorporated by constraining to the growth rates implicit in the more recent data, benchmarked to the data available from international organisations. This method is only used for the three latest years of information (t-1, t-2, and t-3). The current dataset assigns an EST code of "E3" to these cases, and contains 12 observations for S200 with this code.

Correcting obvious errors in the data

24. Obvious transmission errors, such as typos or values reported in thousands rather than millions, were corrected. This occurred for only 11 observations in the dataset for S200 values, which were assigned a code of "E6".

Use of regional information for most recent years

25. In a few cases (4), data for the most recent period (2012) were not available, and the growth rate of S200 as reported by countries in the geographical region was used to estimate this value. These observations are coded as "E4".

Interpolation and backcasting

26. The net result of the adjustments above is that only a handful of missing observations remain. These are generally for very small countries and insignificant services traders, and do not include any of the 61 TiVA countries. However good quality estimates are nevertheless required for the Rest of the World component of TiVA.

27. Simple linear interpolations were used for those observations where there was a gap in the series, and back-casting techniques for those series that started after 1995 (using the 3-year average growth rate, calculated from the first three years of available data). In three cases, each with special circumstances, (namely Iraq, Bermuda and Zimbabwe), the obtained estimates were not considered satisfactory, and were therefore replaced by estimates based on the growth rates of total trade of these countries (*i.e.* including goods). Table 3 below gives the data including interpolated and back-casted values (in grey). In total, 150 estimated values thus obtained. These interpolated and backcasted data were coded "E8".

Table 3. Total trade in services (s200): interpolated and backcasted values in the dataset (in grey)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	note
IMPORTS																			
Afghanistan	6	8	12	17	24	34	49	70	100	142	202	288	410	583	831	1248	1288	2239	
Bermuda	474	501	529	558	589	622	657	694	732	773	816	862	1105	1042	982	1010	962	981	
Bosnia & Herz.	270	270	270	270	285	263	269	305	384	432	436	467	579	692	657	533	540	470	
Brunei Dar.	479	556	832	847	818	768	1054	876	1034	1076	1110	1214	1317	1403	1434	1612	1825	1739	
Comoros	50	49	44	41	38	35	32	23	36	41	46	55	63	79	84	94	107	105	
FYR Macedonia	335	309	273	209	234	268	264	275	390	509	555	579	778	1003	835	853	974	993	
Georgia	200	224	250	345	224	295	310	365	397	485	631	727	933	1239	974	1085	1261	1443	
Guinea-Bissau	30	29	26	27	28	29	30	27	36	44	42	40	68	85	87	103	100	71	
Iraq	2062	2298	2562	2855	3181	3545	3951	4403	4907	5469	6095	5490	4866	7572	8563	9864	11124	13291	
Lebanese Rep.	339	470	653	905	1256	1743	2418	3354	6488	8230	7895	8734	9988	13464	14051	13137	12913	12266	
Liberia, Rep. of	164	195	232	276	328	390	464	552	656	780	855	1275	1249	1411	1145	1079	1243	941	
Qatar	1396	1447	1501	1556	1613	1640	1714	1796	2341	2906	4144	6957	7459	7222	5918	8780	16867	23906	
Serbia & Mon.	281	277	362	421	243	293	323	537	795	1192	1478	-	-	-	-	-	-	-	
Uganda	563	675	669	728	419	459	479	503	496	490	609	770	977	1257	1393	1803	2404	2451	
UNMIK/Kosovo	216	227	238	249	261	273	286	300	314	329	340	364	378	396	400	510	512	374	
Zambia	251	266	282	282	306	335	367	375	403	447	471	588	915	906	661	878	1104	1250	
Zimbabwe	848	955	928	737	736	842	723	604	563	621	636	541	560	550	614	864	1153	968	*1*
EXPORTS																			
Afghanistan	124	151	183	223	271	329	399	485	589	716	870	1057	1283	1559	1894	3140	3476	3056	
Bermuda	876	925	977	1031	1089	1149	1213	1281	1353	1428	1508	1592	1651	1580	1327	1400	1428	1402	*2*
Bosnia & Herz.	424	436	448	460	464	450	497	524	721	864	989	1140	1458	1672	1334	1201	1208	1135	
Brunei Dar.	722	602	477	282	316	198	482	427	436	544	616	745	813	867	915	1054	1209	1113	
Comoros	35	36	42	49	49	48	36	23	30	36	43	47	55	64	59	65	74	68	
FYR Macedonia	121	154	128	149	273	317	245	253	379	452	519	601	817	1017	858	902	1108	1052	
Georgia	106	145	198	365	217	360	370	408	459	555	715	885	1094	1260	1314	1599	2008	2544	
Guinea-Bissau	6	7	8	7	6	5	4	6	6	8	5	3	33	44	33	44	45	21	
Iraq	120	134	149	166	185	207	230	257	286	319	355	357	868	1496	2193	2834	2822	2833	*2*
Lebanese Rep.	368	525	749	1068	1525	2175	3104	4429	9462	9704	10858	11581	12755	17574	16889	15902	19601	22139	
Liberia, Rep. of	40	48	58	70	84	101	122	147	176	212	213	336	346	510	274	158	604	374	
Qatar	50	74	109	161	238	363	685	707	1138	1679	3221	4193	3592	3425	2002	3011	7394	9922	
Serbia & Mon.	647	688	818	914	471	624	740	829	1130	1678	1909	-	-	-	-	-	-	-	
Uganda	104	145	165	176	196	213	217	225	262	373	525	526	593	799	1027	1303	1774	2094	
UNMIK/Kosovo	90	104	119	136	156	178	204	234	268	306	330	400	459	515	668	700	886	815	
Zambia	109	111	112	102	107	115	144	115	165	232	273	229	273	300	241	311	375	467	
Zimbabwe	430	484	470	374	373	427	330	282	269	401	362	320	274	231	286	333	390	387	*1*

Notes:
1: used total trade (G+S) growth rate
2: used import growth rate

3.2 Step 2.2: Completing the dataset of main EBOPS categories with partner world

Derivations, BPM6 data, national sources and corrections

28. The second step in the completion of the matrices involves the estimation of services exports and imports by main EBOPS category, with partner world, for all 191 reporters in the database. Many of the reasons why data are missing for S200 also apply for these series, notably the move to BPM6 data. As such the same approaches as described above were used. Simple derivations however often resulted in zeros, and these were given a special code ("E7"). Table 4 describes the number of observations with respective E1, E2, E3, E6 and E7 codes.

Table 4. Number of estimates, by estimation code

Estimation code	E1	E2	E3	E6	E7
# of estimations	398	3986	123	119	426

Estimations using structural information over time: Transport (S205), Travel (S236) and Other services (S981)

29. In spite of the various basic estimations described above, a substantial number of empty cells remained. For many countries, complete information by EBOPS category *is* available for at least one or more (recent) years, but not for the entire period. These missing cells were estimated using back-casting, now-casting and interpolation techniques, starting, top-down, with the three main categories of S200 - *transport*, *travel*, and *other services*.

30. The backcasting and nowcasting procedures use a 3-year moving average percentage share of each of the main EBOPS categories in total trade. An example is provided in Table 5 below for illustration, which shows data for each of the three EBOPS categories from 1999 onwards, but missing in the earlier years. By calculating (in the right-hand side of the table) the 3-year backward moving average share of each of these categories in total trade, (rescaling to ensure the sum for each year is 100%), missing values can be estimated (in grey in the left-hand side of the table). Table 6 shows a similar example for interpolated and nowcast estimates.

31. For the three main EBOPS categories Transport, Travel, and Other business services, a total of 1195 values were estimated in this way, of which 752 were backcast values, 382 nowcast values, and 61 interpolated values. All these observations were coded E8. These estimations completed the data for these three services categories for all years and all countries in the dataset, with the exception of three countries (Cuba, Uzbekistan and former Serbia and Montenegro) for which no EBOPS information was available at any point in time.

Table 5. An example of backcasting S205, S236 and S981: estimated values in grey

	Original values, with estimates in grey				Three-year backward moving average share in S200 (to be re-scaled to 100%)		
	S200	S205	S236	S981	S205	S236	S981
1995	6,054	3,192	2,165	697	52.6%	36.1%	11.4%
1996	7,130	3,754	2,552	824	52.5%	36.2%	11.3%
1997	7,846	4,131	2,804	911	52.6%	36.0%	11.4%
1998	7,872	4,168	2,783	922	52.6%	36.0%	11.5%
1999	8,003	4,180	2,943	879	52.2%	36.8%	11.0%
2000	8,574	4,557	3,017	1,000	53.2%	35.2%	11.7%
2001	9,235	4,828	3,319	1,088	52.3%	35.9%	11.8%
2002	10,311	5,429	3,651	1,230	52.7%	35.4%	11.9%
2003	11,843	6,442	3,956	1,444	54.4%	33.4%	12.2%
2004	15,082	8,743	4,472	1,867	58.0%	29.7%	12.4%
2005	19,367	11,012	6,186	2,170	56.9%	31.9%	11.2%
2006	24,880	13,494	8,827	2,559	54.2%	35.5%	10.3%
2007	34,026	19,097	11,273	3,656	56.1%	33.1%	10.7%
2008	43,427	25,479	13,288	4,660	58.7%	30.6%	10.7%
2009	37,433	23,002	10,347	4,083	61.5%	27.6%	10.9%
2010	42,100	25,780	11,818	4,502	61.2%	28.1%	10.7%
2011	56,518	36,747	13,206	6,565	65.0%	23.4%	11.6%
2012	63,148	40,726	15,072	7,350	64.5%	23.9%	11.6%
2013	70,992	45,155	17,699	8,138	63.6%	24.9%	11.5%

Table 6. An example of nowcasting and interpolation S205, S236 and S981: estimated values in grey

	Original values, with estimates in grey				Three year forward moving average share in S200 (to be re-scaled to 100%)		
	S200	S205	S236	S981	S205	S236	S981
1995	49.85	23.61	6.58	19.65	47.4%	13.2%	39.4%
1996	49.06	22.52	5.03	21.50	45.9%	10.3%	43.8%
1997	44.34	19.67	4.63	20.04	44.4%	10.4%	45.2%
1998	41.19	16.85	5.25	19.08	40.9%	12.7%	46.3%
1999	38.08	15.97	4.61	17.50	41.9%	12.1%	45.9%
2000	34.97	15.03	4.01	15.93	43.0%	11.5%	45.6%
2001	31.68	16.17	2.91	12.60	51.0%	9.2%	39.8%
2002	23.47	17.96	3.68	1.83	76.5%	15.7%	7.8%
2003	36.33	22.11	7.89	6.33	60.8%	21.7%	17.4%
2004	41.34	25.09	9.39	6.85	60.7%	22.7%	16.6%
2005	45.81	28.00	9.58	8.23	61.1%	20.9%	18.0%
2006	54.92	34.14	11.01	9.77	62.2%	20.1%	17.8%
2007	63.46	38.96	15.15	9.35	61.4%	23.9%	14.7%
2008	79.43	49.39	15.26	14.78	62.2%	19.2%	18.6%
2009	84.03	52.18	17.13	14.72	62.1%	20.4%	17.5%
2010	93.98	57.46	19.10	17.42	61.1%	20.3%	18.5%
2011	106.68	67.19	20.22	19.27	63.0%	19.0%	18.1%
2012	105.01	65.18	20.88	18.94	62.1%	19.9%	18.0%

Estimations using structural information over time: Other services categories

32. After creating a full dataset for the three main services categories, the same process was repeated for the nine remaining EBOPS categories – S245, S249, S253, S260, S262, S266, S268, S287 and S291 – the subcomponents of category *S981 Other Services*. Data availability for these services categories is significantly lower than the main categories. Many countries aggregate several services categories into 'other services' or in 'other business services' (without always clearly specifying which categories are included). As a result backcasting, nowcasting and interpolation techniques described in the previous subsection were used only in those cases when all nine services categories were reported in at least one year, resulting in 4293 additional estimated data points (again coded E8).

Estimations using structural information over time: breaking down of Other Services' (S981)

33. As mentioned above, many countries, especially in earlier years, aggregate at least some of their services categories into 'other business services' or even just only report 'other business services'. Table 7 provides an example for India, showing how before 2000, the category 'other business services' (S268) is more than twice as high as compared to the later data which contains estimates across all detailed services categories. In these cases 'other business services' are split and distributed proportionally (using shares from the closest year where splits were available) across the missing categories (including 'Other business services'), to complete the data. This added an additional 5293 observations to the dataset, coded 'E11'.

Table 7. Example of aggregated reporting of 'other business services' (excerpt of imports of India)

	S200	S205	S236	S245	S249	S253	S260	S262	S266	S268	S287	S291	S981
Original data, with aggregated reporting of 'other business services' in 1995-1999													
1995	6,775	1,890	2,582			170			1	2,120		11	2,303
1996	7,238	1,989	2,831			210			7	2,142		59	2,419
1997	9,111	1,942	2,890			229			12	3,852		185	4,279
1998	11,691	1,773	2,949			230			19	6,096		624	6,970
1999	14,509	1,844	3,010			238			23	8,892		503	9,656
2000	16,68	1,979	3,460	599	502	257	276	4,048	83	4,811	18	654	11,247
2001	17,33	2,05	3,198	110	65	282	306	5,941	37	3,790	19	538	12,089
2002	19,47	2,473	3,102	779	231	332	598	6,582	20	4,984	23	353	13,903
2003	23,902	3,022	4,463	969	276	408	367	8,562	24	5,516	27	269	16,417
2004	38,281	4,373	6,170	1,,094	516	842	341	12,133	53	12,364	46	350	27,738
…	…	…	…	…	…	…	…	…	…	…	…	…	…
Estimated data, where other business services are redistributed across the missing services categories													
1995	6,775	1,890	2,582	124	104	170	57	837	1	995	4	11	2,303
1996	7,238	1,989	2,831	125	105	210	58	846	7	1,005	4	59	2,419
1997	9,111	1,942	2,890	225	189	229	104	1,521	12	1,807	7	185	4,279
1998	11,691	1,773	2,949	356	298	230	164	2,407	19	2,860	11	624	6,970
1999	14,509	1,844	3,010	519	435	238	239	3,510	23	4,172	16	503	9,656
2000	16,68	1,979	3,460	599	502	257	276	4,048	83	4,811	18	654	11,247
2001	17,33	2,05	3,198	110	65	282	306	5,941	37	3,790	19	538	12,089
2002	19,47	2,473	3,102	779	231	332	598	6,582	20	4,984	23	353	13,903
2003	23,902	3,022	4,463	969	276	408	367	8,562	24	5,516	27	269	16,417
2004	38,281	4,373	6,170	1,,094	516	842	341	12,133	53	12,364	46	350	27,738
…	…	…	…	…	…	…	…	…	…	…	…	…	…

Use of mirror data

34. When data for multiple EBOPS categories across all time periods are missing, none of the estimation techniques identified above can be used to generate estimates. In these instances, the EBOPS structure of mirror partner data is used. The mirror data by EBOPS category of between 10 to 20 large trading partners are added up (selecting only those trading partners that provide (near) complete EBOPS breakdowns for trade with a particular country), and the shares of the different EBOPS categories are calculated. For the largest services trading countries for which this technique is applied (including *e.g.* Switzerland, to break out S249 and S262 from S268, as well as Australia), these calculations were made annually, after which the estimates were smoothed using a 3-year moving average. For smaller countries, where year-on-year variations in the mirror data can be substantial, the EBOPS structure was determined by pooling the partner information over time. These estimates have been made for a total of 11232 observations, coded as E5. Table 8 identifies the services categories and trade flows involved, highlighting that the use of mirror data was more important for estimations of exports than for imports, and especially for *Construction* (S249), *Other business services* (S268) and *Personal, cultural and recreational services* (S287). The estimates based on mirror data affected 75 out of 191 reporters for at least 2 EBOPS

categories. Examples of countries for which these estimates are most prominent include Uzbekistan, Cuba, Haiti, Chad, Equatorial Guinea, and United Arab Emirates.

Table 8. Use of mirror data for detailed EBOPS estimates, by service category and trade flow

	S205	S236	S245	S249	S253	S260	S262	S266	S268	S287	S291	S981	Total
Imports	47	47	211	645	160	552	557	515	965	714	137	47	4597
Exports	74	38	359	1010	390	732	825	881	1025	911	334	56	6635
Total	**121**	**85**	**570**	**1655**	**550**	**1284**	**1382**	**1396**	**1990**	**1625**	**471**	**103**	**11232**

3.3 Steps 2.3 and 2.4: Estimating partner country breakdowns if **some** *partner data are reported*

35. Steps 2.3 and 2.4 involve the estimation of partner country breakdowns of total trade in services (S200, step 2.3) and all other EBOPS services categories (step 2.4). Both steps follow a very similar process, which is why they are described together. Importantly, the estimation procedures for both steps differ between those countries where *at least a limited amount of partner country data* is available (53), and those countries where no partner information is available at all (the remaining 138).

36. For those countries where at least some bilateral data are available, estimates are made following the methods and techniques used for trade statistics with partner World. In addition, for several countries, additional national data have been incorporated that have either been published by non-official sources (*e.g*. a Ministry of Economy), or using unpublished information made available by national authorities to the OECD and WTO. These data were integrated before generating any additional estimates.

Integrating additional national data sources

37. As mentioned above several countries have provided additional data to the OECD and WTO for the specific purpose of this study. While overall, these data tied in well with the reported totals, adjustments were required to ensure full consistency. These estimations were flagged as "E10". The following procedures were performed:

- Brazil: Preliminary partner information was made available by the ministry of Development, Industry and Commerce. This information was used to build partner shares, which were then applied to the reported IMF (*i.e*., Central Bank of Brazil) totals.

- Germany: Additional information has been provided to help derive estimates for the partners missing from S236 (travel services) and S200 (total services) in the Eurostat dataset. The data were smoothed using five-year moving averages. The percentage shares of the missing partner countries in the total geographically unspecified trade for Travel were used to complete these series. Total trade was subsequently derived by adding the Travel estimates to the other reported EBOPS categories.

- Italy: Additional bilateral information for all trade in services categories was made available for the years 1997 and 1998, which were missing from the Eurostat data. These data were used to build partner shares, which were then applied to the reported Eurostat totals.

- Sweden: Additional data for S200, covering the period 1998 to 2003, were provided by Statistics Sweden and the Swedish central bank. The data were used to build shares that were then applied to the reported totals.

BPM6 information and simple derivations

38. Similarly as for the world dataset, data reported in EBOPS 2010 were converted back to EBOPS 2002 according to the IMF guidelines and coded "E2". Simple derivations were included as coded "E1" (values) or "E7" (zeros).

Backcasting, nowcasting and interpolation

39. All observations without a complete time series, for which at least the first two available years of data are valued "0", were backcasted to also be '0' in previous periods (coded "M1_2"). Similarly, zero values were also estimated using interpolations for all those observations for which the value preceding and following the missing data points are less than 0.5 (coded "M1_1").

40. Backcasting, nowcasting and interpolating non-zero values is however more complex, especially for the total trade in services (S200) by partner. The methods described above for back-casting the structure of EBOPS categories cannot be simply applied to the geographical breakdowns, because even in those years where most country detail is available, many partners are often missing. To address this issue, for the years in which the largest number of partners was available, an auxiliary "unallocated" partner was created, before using the techniques described above, to calculate partner shares of those partners were data was reported in at least one year, and for the "unallocated" partner. These shares were then backcast (and nowcast and interpolated) using a 3-year moving average, rescaled to ensure that they summed to 100%, and finally applied to the reported total trade in services values.

41. The same approach was then applied to the bilateral breakdowns of individual EBOPS categories, following the procedures outlined in section 3.2. These data were subsequently rescaled to preserve the sum of total trade in services.

Other estimates

42. The OECD-WTO estimations generally follow a top-down approach to estimating the data, meaning that estimates for S200 are normally completed prior to the detailed EBOPS categories. However, some countries have reported bilateral data for certain EBOPS categories, but not for S200 (whether due to unavailability or confidentiality). In such cases, if the values concerned were substantial, the partner data were summed across the available categories and scaled-up to produce estimates for the breakdown of S200 (again always scaling to the reported total values). The countries concerned are Chile, Finland, Greece, Mexico and Turkey. These estimates are coded E10 (*i.e.*, as OECD-WTO estimates based on official data).

3.4 Steps 2.3 and 2.4: Estimating partner country breakdowns if no official data are available

43. The majority of countries worldwide do not, at present, publish any partner details for their trade in services statistics, which means that the approaches described in section 3.3 cannot be applied in these cases. In addition, even the 53 countries that *do* provide bilateral breakdowns do not do so for all 191 partners in the OECD-WTO BaTIS dataset. In all these cases, estimates are derived from an econometric gravity model. Gravity models have been used in applied international trade studies for decades, and in general perform well in explaining bilateral trade flows. Generally, they work on the principle that a number of factors determine the size of trade between two partners, including the importer's total demand (*e.g.* related to its economic size (GDP)); the exporter's total supply (again, GDP); and factors that represent the "ease" (or difficulty) with which the exporter can access the importer's market (*e.g.* distance, sharing a common language).

44. Less frequent in the empirical literature is the use of gravity models with the aim of *predicting* bilateral trade flows. Since this is the ultimate objective of our models, several gravity specifications were tested in order to identify the best model. Three elements in particular were taken into account in the model selection: (i) the plausibility of the estimated coefficients; (ii) the predictive power of the model, measured by the correlation coefficient between the reported data and the predictions generated by a model estimated on a training dataset, and calculated on a test dataset; (iii) a discretional, qualitative assessment of the plausibility of the results obtained.

Total Services (S200)

45. All regression models that were tested followed the same generic specification (for exports (X) and for imports (M) :

$$X_{ijt} = \exp(\beta_0 + \beta_1 GDP_{it} + \beta_2 GDP_{jt} + \beta_3\ distance\ variables_{ij} + \beta_4\ other\ regressors_{ijt} + \varepsilon_{ijt})$$

$$M_{ijt} = \exp(\beta_0 + \beta_1 GDP_{it} + \beta_2 GDP_{jt} + \beta_3\ distance\ variables_{ij} + \beta_4\ other\ regressors_{ijt} + \varepsilon_{ijt})$$

46. where X_{ijt} (M_{ijt}) reflects the exports (imports) of total services by country *i* to (from) country *j* in year *t*, and GDP_{it} and GDP_{jt} reflect the nominal GDP of the reporting country *i* and partner country *j* (sourced from the World Bank World Development Indicators or from national sources). The distance variables include the geographical distance and dummies for contiguity, common language and the presence of a colonial relationship, all sourced from the CEPII GeoDist dataset[3].

47. Two other independent variables ($Other\ regressors_{ijt}$) were included, with the objective of improving the predictive power of the model. First, bilateral merchandise exports (imports) were added (sourced from UN Comtrade); given that bilateral relationships for trade in goods and services are generally highly correlated (especially for certain services such as transport). The second variable is the number of total tourist arrivals (and departures) in a country (sourced from UNWTO), which given the importance of travel in total trade services (~25% at world level) is also expected to be a good predictor.

48. The models were fitted on the dataset that resulted from the estimations in steps 2.3 and 2.4[4] above, using the Poisson Pseudo-Maximum Likelihood estimator (PPML). PPML is generally considered superior to a log-linearised Ordinary Least Squares model (OLS), as it avoids biases in the parameter estimates in the presence of heteroscedasticity, does not require a Poisson distribution, and allows for the presence of zero trade flows (see *e.g.* Santos Silva and Tenreyro, 2006).

49. Table 9 summarises the results for the bilateral exports of total services (S200). Model 1 includes the basic specification and includes year, reporter and partner fixed effects to capture any omitted variable correlated with the characteristics of the time period, reporter and partner. However, since the model will be used for out-of-sample predictions (for reporters, partners and years not currently covered), it is important to find an alternative that performs well *without* such fixed effects.

[3] Complemented with manual imputations for a handful of countries not covered by CEPII

[4] The equations were also estimated on a dataset containing reported data only; there was no substantial difference in the results.

Table 9. Results of PPML regressions (exports of total services) used for model selection

	(1)	(2)	(3)	(4)	(5)
Constant	-4.070***	-4.330***	-3.759***	-6.597***	-0.146
	(0.255)	(0.228)	(0.196)	(0.189))	(0.202)
GDP of reporter	0.276***	0.295***	0.335***	0.227***	0.023***
	(0.014)	(0.012)	(0.004)	(0.004))	(0.005))
GDP of partner	0.224***	0.241***	0.301***	0.222***	-0.023
	(0.012)	(0.012)	(0.015)	(0.014))	(0.016))
Distance	-0.251***	-0.254***	-0.275***	-0.217***	-0.029***
	(0.005)	(0.005)	(0.005)	(0.005))	(0.005))
Contiguity	0.099***	0.101***	-0.076***	-0.055***	0.162***
	(0.009)	(0.009)	(0.010)	(0.010))	(0.010))
Common language	0.192***	0.193***	0.456***	0.348***	0.014
	(0.008)	(0.008)	(0.008)	(0.008))	(0.009))
Colony	0.184***	0.185***	0.327***	0.312***	0.093***
	(0.008)	(0.008)	(0.009)	(0.008))	(0.009))
Merchandise trade	0.525***	0.522***	0.452***	0.483***	0.140***
	(0.004)	(0.004)	(0.004)	(0.004))	(0.005))
Arrivals	0.150***	0.142***	0.039***	0.130***	0.008**
	(0.012)	(0.012)	(0.003)	(0.003))	(0.004))
GDP/Capita of reporter				0.348***	0.069***
				(0.004)	(0.005)
T		0.014***	0.011***	0.004***	0.016***
		(0.001)	(0.001)	(0.001)	(0.001)
Mirror data (S200)					0.724***
					(0.005)
Year FE	Y	N	N	N	N
Reporter FE	Y	Y	N	N	N
Partner FE	Y	Y	Y	Y	Y
Observations	96,501	96,501	96,501	96,501	24,584
Pseudo R2	0.949	0.948	0.915	0.923	0.956

50. In Model 2, the year fixed effects were replaced with a linear time trend, with virtually no effect on the parameter estimates for the remaining regressors. In Model 3 the reporter fixed effects were removed, which only marginally reduced the explanatory power of the model (as seen in the small decline in pseudo r-square), but did change some of the estimated coefficients, suggesting a possible missing variable bias. For instance, the language and colony betas are much higher than those in Model 1.

51. Model 4 therefore introduced the reporter's GDP per capita as a proxy for (some) of the unobservable characteristics of the reporter. As expected, the parameter for this variable is statistically significant. The results on the remaining parameters are also encouraging: the betas for the GDPs, distance, merchandise exports and tourist arrivals are very similar those s estimated in Model 2, although some changes remain in the coefficients for contiguity (which even changes signs) and common language.

52. As a final test, the last model in Table 9 contains information on mirror flows (*i.e.*, the total services imports of *j* from *i*). The coefficient associated with this variable is – as expected - very large and highly significant, reducing some of the explanatory power of the other variables. However, given the limited availability of mirror data, this model would again have only limited predictive use (as already indicated by the substantially lower number of usable observations), meaning that for the purposes of constructing the BaTIS dataset, Model 4 is superior.

Out of sample predictions

53. To further examine the predictive power of the various models, all models were estimated on a subsample of the original dataset, after which the predicted values for the remaining observations were calculated and compared with the real observed values. The training dataset consisted of 60% of the observations (randomly selected) and the test dataset consisted of the remaining 40%. Table 10 shows the correlations between the predictions and the real data for all five models[5], illustrating that the predictive power of model 4 is very high and equal to that of model 1, further confirming its suitability for prediction.

Table 10. S200 model selection: correlations between model predictions and observed values, exports (out of sample)

Model	Characteristics	Correlation
Model 1	Reporter FE, partner FE, year FE	0.841
Model 2	Reporter FE, partner FE, time trend	0.841
Model 3	Partner FE, time trend	0.824
Model 4	Reporter GDP/Capita, partner FE, time trend	0.850
Model 5	Reporter GDP/Capita, partner FE, time trend, mirror exports	0.899

Qualitative assessment

54. In addition a qualitative assessment of the predicted values indicated that overall, the estimations appear reasonable from an economic point of view: economies trade more with their neighbours, and big players like the US and the United Kingdom appear as top partners for virtually all estimated reporters. To illustrate, Table 11 shows the estimated top 15 partners for a selection of reporters where bilateral trade data are currently missing (Switzerland, Peru, Egypt, Philippines).

Table 11. Top 15 export partners estimated by Model 4 (percentage share), for selected reporters, 2010-2012

Switzerland				Peru				Egypt				Philippines			
	2010	2011	2012		2010	2011	2012		2010	2011	2012		2010	2011	2012
Germany	18	18	16	US	25	22	23	US	12	12	13	US	24	24	24
UK	8	8	11	Switzerland	8	9	8	UK	12	12	12	Japan	12	13	13
US	10	10	9	China	7	7	7	Japan	2	3	5	Hong Kong	8	8	8
France	8	8	8	Japan	6	6	7	Italy	5	5	5	Singapore	9	7	7
Italy	6	6	5	Germany	6	6	5	Saudi Arabia	4	4	4	China	6	7	7
Japan	4	4	4	Spain	4	4	4	Germany	4	5	4	Germany	5	4	4
Hong Kong	2	3	3	Canada	5	5	4	India	3	4	4	UK	3	3	4
India	1	1	3	UK	3	3	4	France	4	4	4	Korea	3	3	4
China	3	3	3	Brazil	3	3	3	Switzerland	3	3	3	Chinese Taipei	3	3	3
Netherlands	3	3	3	Netherlands	3	3	2	China	2	3	3	Netherlands	3	3	2
Belgium	3	3	2	Italy	3	3	2	Netherlands	3	3	2	Australia	2	2	2
Austria	2	2	2	Venezuela	2	2	2	UAE	2	2	2	Switzerland	1	2	2
Singapore	1	2	2	Chile	2	2	2	Turkey	2	2	2	Thailand	2	2	2
Canada	2	2	2	Korea	2	2	2	Spain	3	2	2	Canada	1	1	2
Spain	2	2	2	Mexico	2	2	2	Belgium	1	2	1	France	1	1	1

[5] The coefficients of the models derived from the training dataset were very similar to those in table 9 and are available from the authors on request.

Final predicted values

55. Using model 4 for the predictions was feasible for virtually all trade flows. However, as data for some of the independent variables (bilateral merchandise exports or tourist arrivals) were not always available for some small countries, reduced forms of model 4 (*i.e*., excluding one or more of the missing independent variables) were used to predict these remaining missing data points. In order to maintain consistency over time of the predicted series, only one model was used to predict a specific reporter-partner series. Table 12 summarises the characteristics of the models used to predict the missing S200 flows, together with the percentage of observations and trade value predicted by each. Any final remaining gaps were filled using the same backcasting and interpolation techniques as described in section 3.1.

Table 12. Summary of the model specifications* for the prediction of total services (S200) flows

			Exports		Imports	
	Merchandise exports/imports included?	Tourist arrivals/ departures included?	% of total estimated obs.	% of total estimated value	% of total estimated obs.	% of total estimated value
Full model	YES	YES	52.55	20.72	6.82	7.00
Reduced model (a)	YES	NO	2.52	0.19	48.81	18.11
Reduced model (b)	NO	YES	22.51	0.20	1.29	0.04
Reduced model (c)	NO	NO	2.66	0.04	23.89	0.28
Reduced model (d)	NO	NO	0.18	0.02	0.19	0.02
S200 trade estimated by gravity models			80.42	21.17	80.99	25.46

* The full model and reduced models a-c include gravity variables, reporter GDP per capita and partner fixed effects; reduced model d is the same as c but excludes the partner fixed effects, to allow the estimation of those partner economies for which partners for which none of the reporters indicated a trade flow.

Models for individual EBOPS items

56. To estimate the bilateral trade flows for the detailed EBOPS categories, the same approach as for Total services was used. Slightly different specifications were developed however for Transport (S205), Travel (S236) and all other services categories (S245-S291), in order to include service category-specific independent variables that optimised the models' predictive power.

57. First, for *Transport services (S205)*, in addition to the standard gravity variables, the World Bank Logistic Performance Index (LPI, aimed at measuring the quality of logistics services) of the reporter, and bilateral merchandise trade flows were included. A total of five models were developed[6], the characteristics of which are summarised in Table 13. The table includes the correlation coefficients between the predicted and the real values that were derived from a training dataset consisting of 75% of the total observations (randomly selected) and a test set (containing the remaining 25%).

6 Detailed tables with regression equations are available from the authors on request.

Table 13. S205 model selection: correlations between model predictions and observed values, exports

Model	Characteristics	Correlation
Model 1	LPI, Merchandise exports, gravity variables, Reporter GDP/Cap, partner FE, time trend	0.769
Model 2	Merchandise exports, Transport exports to world, gravity variables, Reporter GDP/Capita, partner FE, time trend	0.922
Model 3	Transport exports to world, gravity variables, Reporter GDP/Capita, partner FE, time trend	0.849
Model 4	Gravity variables, Reporter GDP/Cap, partner FE, time trend	0.577
Model 5	Transport exports to world, gravity variables, Reporter GDP/Capita, time trend	0.855

58. Table 13 shows that while the predictive power of the LPI is not very strong (partly due to a high correlation with the GDP per capita of the reporter), the inclusion of total exports of Transport to the world strongly increases the predictive power of the model (for example, model 5 performs significantly better than model 4 even without partner fixed effects).

59. Based on these results, Model 2 was deemed the most appropriate choice for the prediction of transport flows. Similarly as for Total Services, additional reduced form models were necessary to complete the predictions for those country pairs where information from the independent variables incomplete[7].

60. Subsequently, for *Travel services (S236)*, in addition to the standard gravity variables, three service category-specific variables were considered in different combinations, including total tourist arrivals, bilateral merchandise trade, and Travel exports to the world. Table 14 summarises the different specifications, together with the correlation coefficient between the predictions and the real values, again calculated on a test set covering 25% of the total observations.

Table 14. S236 model selection: correlations between model predictions and observed values, exports

Model	Characteristics	Correlation
Model 1	Tourist arrivals, merchandise exports, Travel exports to world, gravity variables, Reporter GDP/Capita, partner FE, time trend	0.797
Model 2	Tourist arrivals, merchandise exports, gravity variables, Reporter GDP/Capita, partner FE, time trend	0.731
Model 3	Merchandise exports, Travel exports to world, gravity variables, Reporter GDP/Capita, partner FE, time trend	0.804
Model 4	Travel exports to world, gravity variables, Reporter GDP/Capita, partner FE, time trend	0.766
Model 5	Travel exports to world, gravity variables, Reporter GDP/Capita, time trend	0.751

61. Somewhat surprisingly, the predictive power of models 1 and 3 is virtually identical; once Travel exports to World and the bilateral merchandise flows are included, the inclusion of tourist arrivals does not improve the accuracy of the predictions. Given their superior predictive power, both Model 1 and Model 3 (depending on the data availability for tourism arrivals) were used in the final estimations, as well as reduced models to cover observations with missing data for independent variables.

62. Finally, for each of the *Other Services items (S245-S291)*, separate sets of four models were also estimated considering the heterogeneity across service sectors, as follows:

[7] Estimations available from the authors on request.

- Model 1: Merchandise exports, gravity variables, reporter GDP/capita, partner FE, time trend
- Model 2: Merchandise exports, exports of relevant service item to the world, gravity variables, reporter GDP/Capita, partner FE, time trend
- Model 3: Exports of relevant service item to the world, gravity variables, reporter GDP/Capita, partner FE, time trend
- Model 4: Exports of relevant service item to the world, gravity variables, reporter GDP/Capita, time trend

63. Similarly to Transport and Travel, the addition of *exports of the relevant service item to the world* (model 2) significantly improved the predictions for all sectors, and in particular for computer, financial and government services. Merchandise exports also emerged as an important determining factor, particularly for construction, other business services and government services. Overall, the models perform relatively well in the prediction of bilateral exports, as shown in table 14, although some sectors appeared particularly difficult to predict (insurance and financial services). Models 2, 3 and 4 were selected for all items except S262, for which the inclusion of merchandise exports (*i.e.* Model 3 in comparison with Model 2) did not improve the accuracy of the predictions and only Model 2 (preferred) and Model 4 (without partner fixed effects, *i.e.* for partners for which none of the reporters indicated a trade flow).

Table 15. Other Services model selection: correlations between model predictions and observed values, exports

	Service item								
	S245	S249	S253	S260	S262	S266	S268	S287	S291
Model 1	0.892	0.727	0.391	0.589	0.372	0.756	0.820	0.545	0.465
Model 2	0.938	0.791	0.733	0.730	0.834	0.811	0.891	0.753	0.545
Model 3	0.914	0.689	0.722	0.704	0.834	0.720	0.855	0.756	0.498
Model 4	0.844	0.704	0.598	0.759	0.820	0.813	0.800	0.723	0.879

64. In order to maintain the coherence of the series only one model was used to estimate any given reporter-partner; the first choice model was used on the condition that it predicted at least five data points for that reporter-partner combination, otherwise the next best model was used (on the same condition). Again, as for S200, S205 and S236, in a few cases this procedure left gaps in the series, when data for a particular independent variable was missing in certain years. These gaps were subsequently filled using the same methodology for backcasting, nowcasting and interpolation as described in section 3.1.

3.5 Step 2.5: Ensuring the consistency of the datasets

Rescaling of regression estimates to officially reported totals

65. The final step to complete the datasets of services exports and services imports by EBOPS and partner country is the rescaling of the model-based estimates to each country's reported values. For those countries that did not publish any geographical detail, or only identified bilateral trade flows for a very limited set of partner countries, this process involved a relatively straightforward proportional scaling of the model based estimates to the total value of geographically unspecified services traded (by EBOPS category) However, several countries provided geographical breakdowns for a very large number of trading partners while at the same time reporting a significant proportion of geographically unspecified trade (10-20%, for example). It is improbable that this portion of trade could be accounted for by only the

handful of very small partner countries included in the model but not in the reported data. Instead, it appeared that for those countries, trade with all partners was underestimated. Based on these considerations, three groups of reporters were identified for which different rescaling strategies were applied:

- ***Group 1. Countries that do not report any geographical detail and for which all bilateral flows are derived from model estimates***
  For each reporter, 1% of trade was allocated to the rest of the world (ROW), *i.e*. countries outside the 191 in the matrix[8]. The bilateral estimates for the 191 were rescaled to the world total less 1%.

- ***Group 2. Countries that report many geographical partners* and *a substantial part of non-geographically specified trade* or *unspecified trade is negative*[9]**
  Any reported partners outside the 191 in the dataset were allocated to ROW. The reported data, ROW estimate, and 'raw' model based estimates were combined and subsequently rescaled to reported totals (this essentially proportionally distributes all non-geographically specified trade across partners). If no ROW countries are reported, 1% of trade is allocated to ROW and the remaining reported and estimated data are rescaled to the world total less 1%.

- ***Group 3. Countries where data consist of a mixture of reported partners (generally between 40-80 partners) and model-based estimates, and the amount of unspecified trade is similar to the total amount of trade estimated by the model for the missing partners.***
  Where ROW countries were included in the reported data, model estimates were rescaled to the value of unspecified trade (and aggregate ROW). Where no ROW countries were reported, 1% of trade was allocated to ROW, and all other partners were scaled to the value of unspecified trade less ROW.

66. The attribution of countries to these groups was done manually for S200, and automatically for the individual EBOPS categories (using the ratio between the amount of unspecified trade and the sum of the unscaled model estimates to determine between Groups 2 and 3 above).

Final bi-proportional scaling

67. While the previous step ensures a fully consistent bilateral breakdown of total trade in services and for each individual EBOPS category, it is also necessary to ensure that for each partner, the sum of EBOPS categories adds up to total services trade (S200) with that partner. Since these differences were not substantial – for example, the trade weighted average difference between the reported S200 values by partner and the sum of the estimated EBOPS values by partner is 9.1% –a bi-proportional adjustment procedure (RAS) was applied to ensure the final simultaneous consistency between the bilateral data and the EBOPS and partner totals.

8 This ROW category was added to account for the fact that 191 countries do not cover the entire globe. Indeed, several countries – mostly from the EU – report bilateral data for up to 240 partner countries. In those cases, these ROW countries account for on average for ~1% of total trade.

9 Unspecified trade is negative if the sum of reported partners (by EBOPS) is larger than the world total. This is caused by the adjustments for negative values (by EBOPS) described in section 2.1.

3.6 Results of the estimates made for bilateral exports and imports by EBOPS and partner

68. The process described in sections 2 and 3 resulted in a fully consistent dataset of export and import of trade in services by EBOPS category for 191 countries and partners, from 1995 to 2012. Table 11 provides a summary overview of all the different types of estimates that were used, showing that approximately one third of the trade in services value (but 80% of the data points) in the final database are estimated.

Table 16. Summary of estimates in the dataset at partner level, for imports and exports, for all years and all main EBOPS categories

	All		S200		Other EBOPS	
	# of cells	Value (mln USD)	# of cells	Value (mln USD)	# of cells	Value (mln USD)
Reported EBOPS 2002 data (no estimations)	584,641	92,681,400	112,819	51,081,335	471,822	41,600,065
Derivations, corrections, conversions to BPM5	1,394,890	12,133,856	17,115	7,166,211	1,377,775	4,967,645
Interpolations, backcasting, nowcasting	551,712	20,049,992	111,741	8,781,786	439,971	11,268,207
Gravity estimations	11,643,303	30,653,402	177,845	1,138,460	11,465,458	29,514,942
Total estimates	13,589,905	62,837,251	306,701	17,086,457	13,283,204	45,750,794
Grand Total	14,174,546	155,518,651	419,520	68,167,792	13,755,026	87,350,859

4. Step 3. Balancing bilateral imports and exports of trade in services

69. Having completed the datasets for bilateral exports and bilateral imports by EBOPS category, the final step is to produce the balanced matrix in which trade asymmetries are reconciled. At the moment, this reconciliation is still done entirely mechanically. However, future versions of the dataset will deal with the largest asymmetries (manually), incorporating information from, for example, bilateral or multi-lateral discussions among countries (such as those facilitated by the OECD and other International Organisations, such as Eurostat).

70. The balancing process takes place in two stages: first, the asymmetries for Total Services (S200) exports and imports are reconciled, to arrive at a balanced matrix of total bilateral trade in services flows. The more detailed services categories are subsequently included, by first balancing their percentage shares in the (unbalanced) S200 reported and mirror data, and rescaling these to 100%. This top-down approach also recognises that the bilateral data at the higher level of aggregation (totals) are often of higher quality than those at the level of individual EBOPS items.

71. The methodology for the balancing process is essentially the same as that used by the OECD to balance international merchandise trade[10]. It involves the calculation of a weighted average of the reported trade flow and its mirror (*i.e.* as reported by the partner), whereby the weights are based on a symmetry index. This reporter and EBOPS-category specific symmetry index (SI) is defined as the share of bilateral trade for which the absolute difference with the mirror trade data is less or equal than 10% of the sum of these two values flows. More formally, for each reporter *i*, partner *j*, services category *k*, and year *t*, the symmetry index is defined as:

$$SI^{x}_{ikt} = \sum_{j} \frac{X^{r}_{ijkt}}{X_{ijkt}} \qquad and \qquad SI^{m}_{ikt} = \sum_{j} \frac{M^{r}_{ijkt}}{M_{ijkt}}$$

where X^r and M^r reflect retained exports and retained imports, *i.e.* those bilateral flows that meet the mentioned 10% criterion.

72. However, in addition to weighing the bilateral flows by the symmetry index of each reporter, the procedure also takes into account the varying levels of confidence surrounding the different estimation methodologies. To this end three additional weights were introduced, including a weight of 1 for reported data or very high quality estimates (EBOPS 2010 conversions, simple derivations), a weight of 0.75 for estimates based on data from other years or other data sources (*e.g.* backcasting, nowcasting and interpolation), and finally a weight of 0.5 for gravity model estimates.

73. The balancing procedure implies that the final figure included in the OECD-WTO BaTIS database for a particular bilateral trade flow differs from data reported by both relevant countries. The size of these differences is a direct function of the asymmetry between, and overall symmetry weights applied to, both countries. If a country therefore significantly and systematically under-reports or over-reports its trade flows with partners, significant differences between the sum of the balanced trade figures and the original reported totals by the individual countries may occur[11].

74. Tables 17 and 18 provide an overview of the average differences between the sum of balanced bilateral trade and reported total trade for all countries and for the top 5 countries with the largest and smallest differences between balanced and reported totals. Overall, with a few exceptions, the differences are relatively small: excluding the top 5 countries where differences are large, the average absolute difference is around 10% (for exports and imports) with a relatively small standard deviation.

Table 17. Differences between sum of balanced bilateral trade and reported total trade

	All countries		***Excluding top 5 countries with largest differences***	
	Imports	Exports	Imports	Exports
Difference – mean	-2.5%	3.7%	1.8%	4.8%
Difference – St.dev.	41.7%	16.2%	12.5%	12.4%
Absolute difference – mean	16.7%	12.6%	9.6%	10.4%
Absolute difference – St.dev.	38.3%	10.8%	8.1%	8.1%

[10] See also Fortanier and Sarrazin (2016)

[11] Although, in the process of constructing, global Supply and Use and Input-Output tables, these differences may be removed or reduced (depending on the consistency between national TIS data and equivalent measures in SUTS), geographical biases may still occur.

Table 18. Top 5 countries with largest and with smallest differences between sum of balanced bilateral trade and reported total trade

Top 5 countries with largest differences				*Top 5 countries with smallest differences*			
Imports		***Exports***		***Imports***		***Exports***	
1.Switzerland	-293.2%	1.Malta	-41.2%	1.Taiwan	-0.5%	1.France	1.0%
2.Cyprus	-76.0%	2.Costa Rica	39.0%	2.Estonia	-0.9%	2.Netherlands	1.2%
3.Saudi Arabia	43.4%	3.Cyprus	-36.2%	3.Tunisia	1.3%	3.Greece	-1.4%
4.Thailand	37.8%	4.Switzerland	-36.0%	4.Germany	1.4%	4.Bulgaria	2.2%
5.Malaysia	33.5%	5.India	33.8%	5.Greece	1.4%	5.Austria	2.3%

5. Conclusions and next steps

75. Building a global matrix of international services trade by EBOPS category from existing official data sources, in a transparent manner, is a substantial and ongoing project. While the first version of the OECD-WTO BaTIS dataset has been completed, as noted above, a number of areas of further investigation are in the pipeline to continue to improve the database. One important planned improvement is the development of non-mathematical solutions for large trade asymmetries, which are able to take into account and correct for identifiable causes of asymmetry such as differences in compilation methodologies or indeed the outcome of bilateral discussions between countries. OECD and WTO are currently working with other international organisations, such as Eurostat, as well as other regional TiVA initiatives to ensure a consistent and shared recording of such improvements.

76. The second area where additional work is currently ongoing involves the conversion of the EBOPS categories to CPA equivalents, providing the important link to national Supply and Use Tables and TiVA. Given the many-to-many nature of this conversion, this is a relatively complex problem. However, at a national level, such conversions are commonly made in the context of constructing the National Accounts and several countries have already made available their internal conversion tables. OECD and WTO, again in collaboration with other international organisations and regional TiVA initiatives, are currently developing a generic conversion table based on these inputs, that can subsequently be tailored for individual countries based on additional data (ideally national conversion tables, but, in the absence of these, STEC data by industry will also be a very useful source).

77. The development of this dataset, its methodology, and the current ongoing work, is ultimately driven by need to develop high quality and transparently developed detailed trade in services statistics for the purposes of constructing global Supply and Use and Input-Output tables. As such it is difficult to overstress the importance of international collaboration in order to achieve a common view of internationally coherent trade in services statistics – in other words a public good and an international benchmark. In addition however to its use for TiVA, the dataset serves as a standalone product, serving the development of new insights on trends in international trade in services and supporting the development of trade in services policies. Finally, it is also hoped that the dataset will in itself create a virtuous circle that helps countries in compiling trade in services data, for example though the identification of important trade in services partners, which in turn will help to improve the quality of the global dataset. The work of the WPTGS bilateral asymmetry meetings and the WPTGS Informal Reflection Group on more detailed services trade will certainly form an important component of this coordinated effort and in the coming years.

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ANNEX 1. AVAILABLE YEARS FOR TOTAL TRADE IN SERVICE (EXPORT AND IMPORTS, S200)

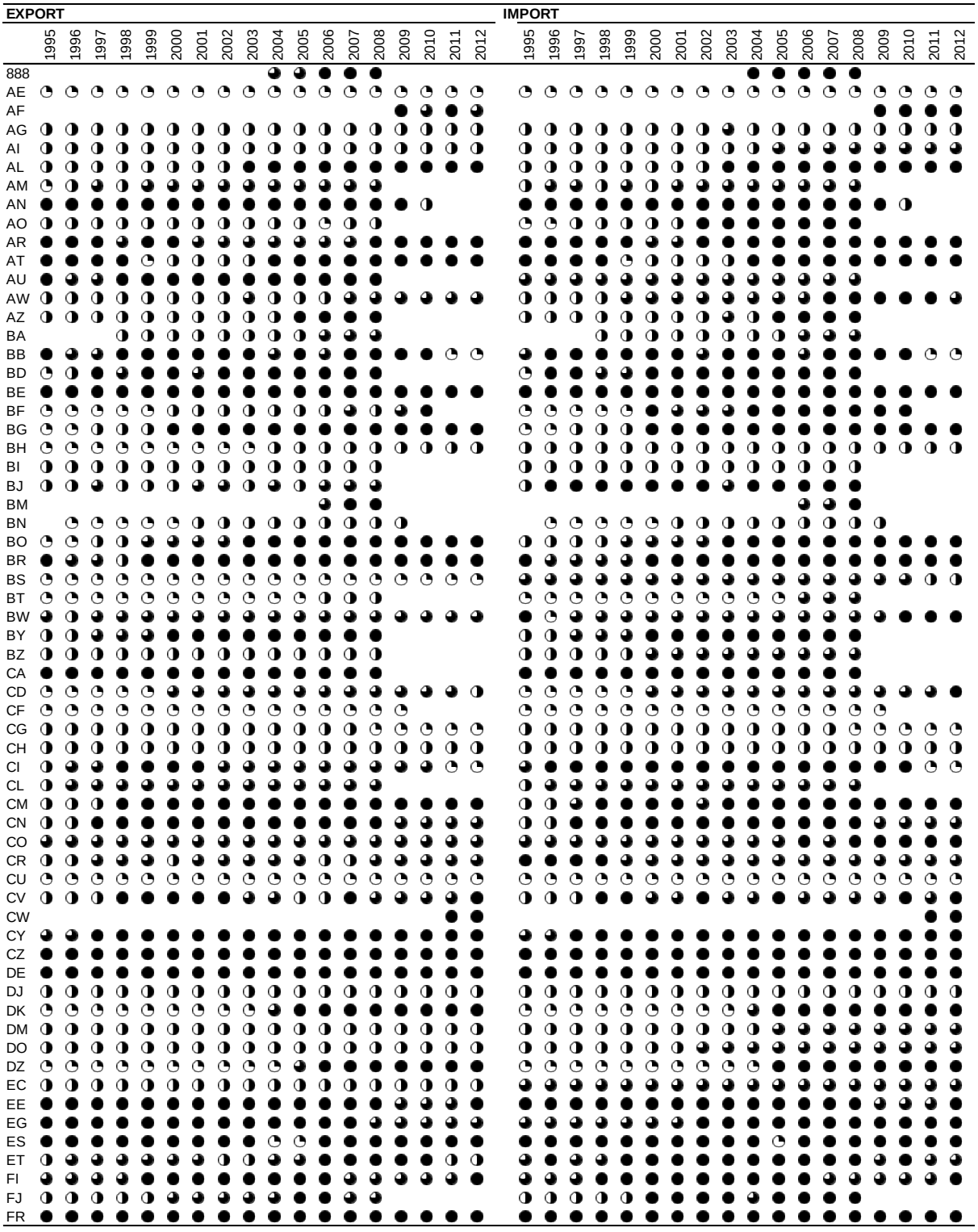
Imports		Exports	
1995-2012	AE, AG, AI, AL, AR, AW, BE, BG, BH, BO, BR, BS, BW, CD, CG, CH, CM, CO, CR, CU, CV, CY, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, ET, FI, FR, GA, GB, GD, GH, GM, GN, GQ, GR, GY, HN, HT, HU, ID, IE, IL, IR, IS, IT, JO, JP, KE, KG, KH, KN, LC, LS, LT, LU, LV, LY, MA, MD, MN, MR, MS, MT, MU, MV, MX, MZ, NG, NL, NP, OM, PA, PAL, PE, PG, PL, PT, PY, RO, RW, SD, SE, SI, SK, SL, SR, ST, SZ, TN, TO, TR, TW, TZ, US, UY, VC, VE, VN and ZA, AT*, HR*, LA*, NO*,KM*	1995-2012	AE, AG, AI, AL, AR, AW, BE, BG, BH, BO, BR, BS, BW, CD, CG, CH, CM, CO, CR, CU, CV, CY, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, ET, FI, FR, GA, GB, GD, GH, GM, GN, GQ, GR, GY, HN, HR, HT, HU, ID, IE, IL, IR, IS, IT, JO, JP, KE, KH, KN, LA, LC, LS, LT, LU, LV, LY, MA, MD, MN, MR, MS, MU, MV, MX, MZ, NG, NL, NO, NP, OM, PA, PAL, PE, PG, PL, PT, PY, RO, RW, SD, SE, SI, SK, SL, SR, ST, SZ, TN, TO, TR, TW, TZ, US, UY, VC, VE, VN and ZA, AT*, MT*,KM*
1995-1997	NZ	1995-1997	NZ
1995-2002	ER	1995-2002	ER
1995-2008	AM, AO, AU, AZ, BD, BI, BJ, BT, BY, BZ, CA, CL, CN, FJ, GT, HK, IN, JM, KW, LK,ML, MO, MW, MY, NI, PH, PK SA, SB, SC, SG, SN, SV, TH, UG*, VU, WS	1995-2008	AM, AO*, AU, AZ, BD, BI, BJ, BT, BY, BZ, CA, CL, CN, FJ, GT,HK,IN, JM, KW, LK,ML, MO,MW, MY,NI, PH, PK, SA,SB, SC,SG, SN,SV, TH,UG, VU, WS
1995-2009	CF, KI, TD	1995-2009	CF,KI, TD
1995-2010	AN**, BB, CI, GW*, NE, SY, TG, TT	1995-2010	AN**, BB, CI, GW*, NE, SY, TG, TT
1995-2011	KR, MG, MM, NA, UZ, YE	1995-2011	KR, MG, MM, NA, UZ, YE*
1996-2005	YU**	1996-2005	YU**
1996-2009	BN	1996-2009	BN
1996-2012	MK	1996-2012	MK
1997-2008	GE	1997-2008	GE
1997-2012	ZM	1997-2012	KG,ZM
1998-2008	BA	1998-2008	BA
1999-2012	QA	1999-2012	QA
2000-2008	KZ, UA	2000-2008	KZ
2000-2010	BF	2000-2010	BF
2000-2012	ZW	2000-2012	ZW
2001-2008	RU*	2001-2008	RU,UA
2002-2012	LB,TJ	2002-2012	LB,TJ
2004-2008	888	2004-2008	888
2004-2011	LR	2004-2011	LR
2005-2007	IQ	2005-2007	IQ
2006-2008	BM	2006-2008	BM
2006-2012	ME**, RS**	2006-2012	ME**,RS**
2009-2012	AF	2009-2012	AF
2011-2012	CW**, SX**	2011-2012	CW**,SX**

** with a gap in series*

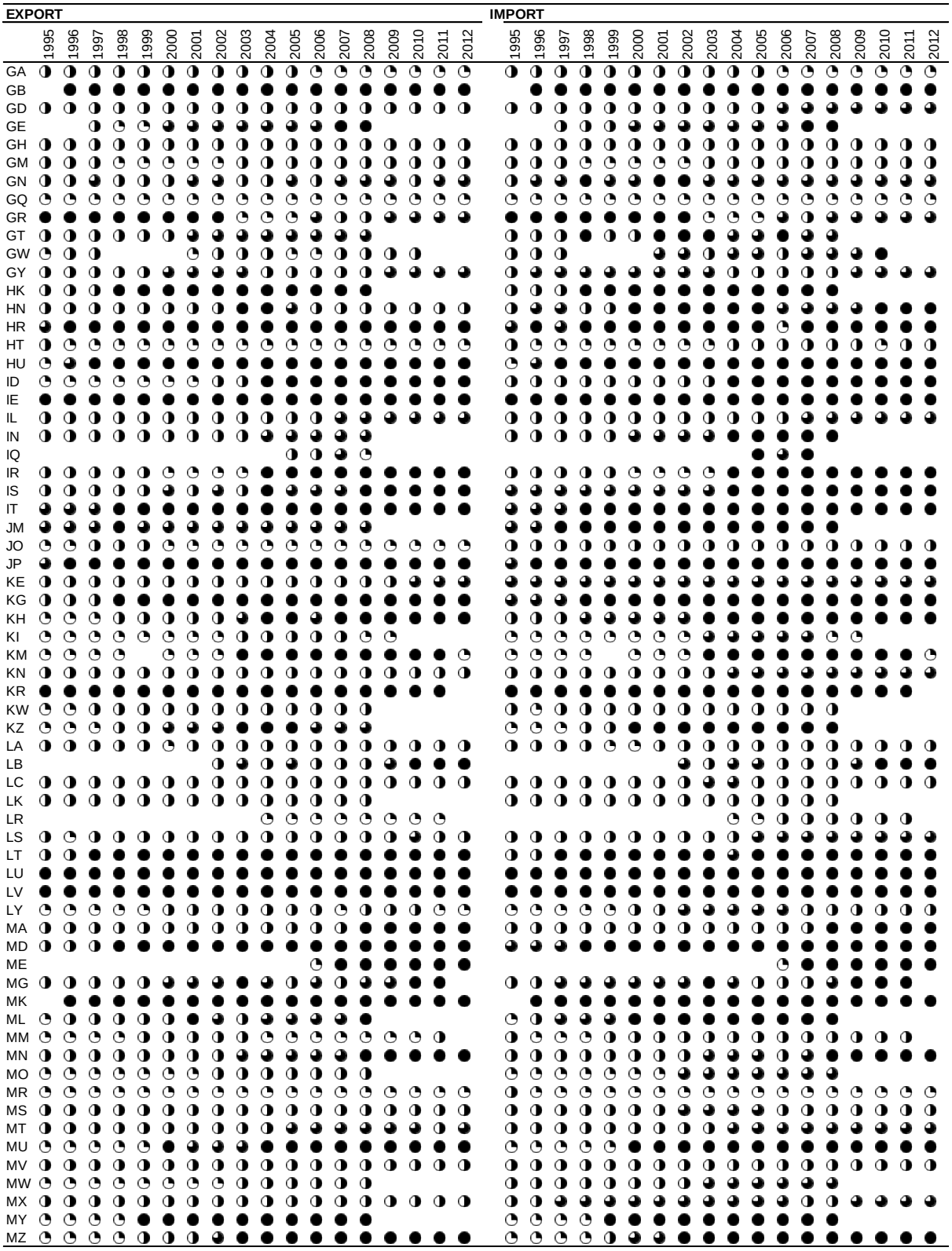
*** t is correct that these countries are only included for part of the period of interest, due to the breakup of YU into ME and RS, and of AN into CW and SX.*

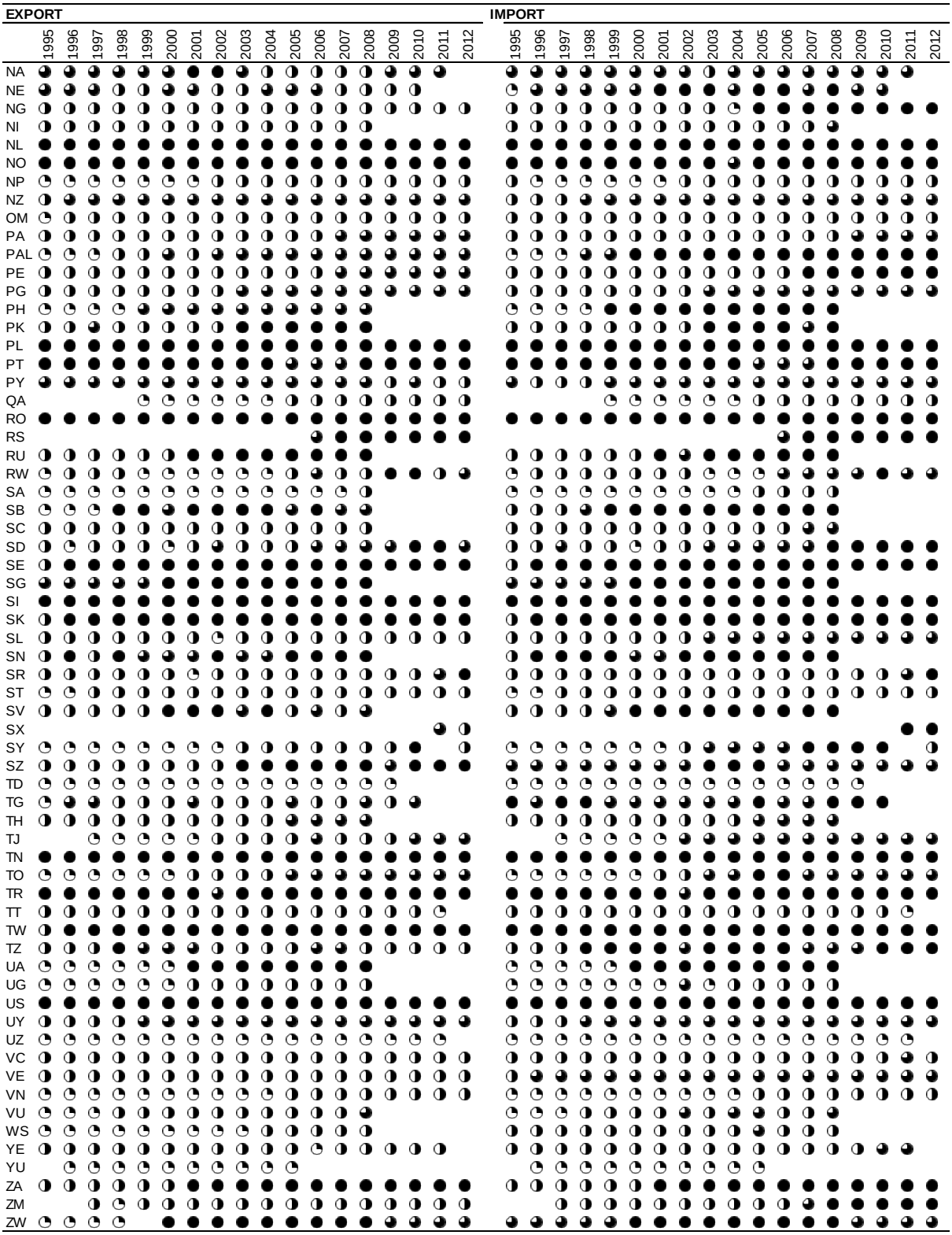
ANNEX 2. INITIAL AVAILABLE OFFICIAL STATISTICS REPORTED IN EBOPS 2002

Number of available EBOPS categories, per year



● All 11 categories available; ◕ 10-11 categories available;
◑ 6-9 categories available; ◔ 1-5 categories available. No circle = no data available.


EXPORT
IMPORT
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
GA GB GD GE GH GM GN GQ GR GT GW GY HK HN HR HT HU ID IE IL IN IQ IR IS IT JM JO JP KE KG KH KI KM KN KR KW KZ LA LB LC LK LR LS LT LU LV LY MA MD ME MG MK ML MM MN MO MR MS MT MU MV MW MX MY MZ


EXPORT
IMPORT
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
NA NE NG NI NL NO NP NZ OM PA PAL PE PG PH PK PL PT PY QA RO RS RU RW SA SB SC SD SE SG SI SK SL SN SR ST SV SX SY SZ TD TG TH TJ TN TO TR TT TW TZ UA UG US UY UZ VC VE VN VU WS YE YU ZA ZM ZW

ANNEX 3. INITIAL AVAILABILITY OF BILATERAL EXPORT DATA IN COLLECTED OFFICIAL STATISTICS, BY EBOPS 2002

	Average number of TiVA partner countries per year													Average number of non-TiVA partner countries per year										
	S200	S205	S236	S245	S249	S253	S260	S262	S266	S268	S287	S291	S981	S200	S205	S236	S245	S249	S253	S260	S262	S266	S268	S287	S291	S981
by reporter																										
AT	55	51	51	42	42	42	45	42	42	45	42	42	51	110	8	8	7	7	7	9	7	7	9	7	7	8
AU	30	24	30	17	23	28	30	22	22	24	21	30	24	3	2	3	1	2	3	3	3	2	3	1	3	2
AZ	19	13	11	9	8									14	11	12	6	4								
BE	50	52	53	39	35	46	48	40	33	45	35	44	45	100	54	47	37	23	36	69	29	23	58	17	26	6
BG	61	54	54	54	54	54	54	54	54	54	54	54	54	171	8	8	8	8	8	8	8	8	8	8	8	8
BY	26	20	20									11	26	15	15	15									13	15
CA	43	22	41	1	1	1	1	1	1	1	1	22	22	16	15	16									15	15
CL		23	9												7	2										
CN	8	9	9										9	1	1	1										1
CY	60	45	53	35	40	39	48	39	46	46	37	43	48	158	4	6	5	5	5	5	5	6	5	4	6	5
CZ	55	49	49	44	44	44	44	44	44	44	44	44	49	145	8	8	8	8	8	8	8	8	8	8	8	8
DE	40	44	19	44	44	44	44	44	44	44	44	44	44	92	6	1	6	6	6	6	6	6	6	6	6	6
DK	54	50	50	48	48	49	49	49	49	42	48	49	49	102	8	8	8	9	9	9	8	8	8	8	8	9
EE	32	29	26	22	24	21	22	22	22	26	22	15	26	129	3	6	2	6	5	5	5	6	4	6	5	4
ES	30	17	18										39	9	2	2	1	1	1	1	1	1	1	1	1	7
FI	40	30	43	22	26	36	29	26	27	30	25	34	38	65	4	6	4	5	6	4	5	4	5	5	6	5
FR	43	39	39	37	37	37	37	37	37	37	37	37	39	102	6	6	6	6	6	6	6	6	6	6	6	6
GB	50	40	40	3	3	20	20	3	3	20	20	38	40	95	8	9			9	9			9	9	9	8
GR	34	35	27	38	34	31	32	36	35	32	35	26	22	73	5	3	6	5	5	4	6	5	5	5	4	3
HK	39	38	23	16		29	36	17	17	10	15		23	10	10	1	1		9	9	2	1	1	2		1
HR	49	51	43	52	40	50	51	50	47	51	49	28	34	108	6	4	5	4	8	6	5	4	6	5	7	8
HU	53	45	44	42	42	42	42	42	42	42	42	42	45	118	8	8	8	8	8	8	8	8	8	8	8	8
IE	40	40	40	32	37	30	30	20	25	31	30	26	39	121	8	7	6	8	5	4	3	7	4	6	5	7
IL				52	51		48	51	51	54	51						68	50		31	54	54	84	54		
IS	60	53	53							53			53	171	6	6							6			6
IT	44	40	40	36	36	36	36	36	36	36	36	36	40	105	6	6	6	6	6	6	6	6	6	6	6	6
JP	30	30	30	30	30	30	30	30	30	30	29	30	30	3	3	3	3	3	3	3	3	3	3	3	3	3
KR	20	20	20	20		20			20	20		20	20	4	4	4	4		4			4	4		4	4
LT	38	33	34	31	31	31	31	31	31	32	31	31	34	155	7	8	7	7	7	7	7	8	7	7	7	8
LU	39	50	50				32			48			50	171	8	8				8			8			8
LV	60	54	54	46	46	46	46	46	46	46	46	46	54	146	7	7	7	7	7	7	7	7	7	7	7	7
MD	3	3	3	3	3	2	3	3	3	3	1	3	3	2	2	2	2	1	1	1	1	1	2	1	2	2
MT	46	23	20	14	45	46	24	22	38	31		38	36	85	6	1	4	10	10	7	4	10	5		7	8
MX			2																							
NL	44	39	42	31	32	32	29	32	31	36	34	36	39	93	5	6	4	5	5	5	5	4	6	5	6	6
NO	30	27	24	25	27	24	27	25	25	24	25	25	27	24	2	2	2	2	2	2	2	2	2	2	2	2
NZ	17	14	17	5	2	9	8	14	13	17	8	17	2	1	1	1			1		1	1	1		1	
PK		40	44	47	18	32	43	46	29	56	21	41			29	35	29	8	17	30	41	6	72	6	35	
PL	55	49	49	49	49	49	49	49	49	49	49	49	49	172	9	9	9	9	9	9	9	9	9	9	9	9
PT	38	9	37	7	7	7	7	7	7	7	7	7	41	8	1	4	1	1	1	1	1	1	1	1	1	5
RO	61	54	54	54	54	54	54	54	54	54	54	54	54	172	8	8	8	8	8	8	8	8	8	8	8	8
RU	56	55	54	54	52	56	55	54	53	57	54	51	51	85	71	77	67	91	106	115	49	87	110	88	85	19
SE	51	47	47	43	43	44	42	44	43	44	43	42	47	113	8	8	8	8	8	8	8	8	8	8	8	8
SG	20	7			4	7	7	7	7		2			3												
SI	50	46	46	43	43	43	43	43	43	43	43	43	46	114	9	9	9	9	9	9	9	9	9	9	9	9
SK	49	46	46	45	45	45	45	45	45	45	45	45	46	88	11	11	11	11	11	11	11	11	11	11	11	11
SZ	1	1	1	1	1	1	1	1	1	1	1	1	1													
TN	24	23	24									20	31	18	16	16									11	19
TR			26			23				26						8			2				3			
US	18	31	31			31	32	31	31			20	17	1	2	2			2	2	2	2			1	1

ANNEX 4. AVAILABILITY OF BREAKDOWNS IN SERVICES EXPORT DATA, 1995-2012

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
S200	**Total Exports to WL**	**1,222,225**	**1,317,313**	**1,372,613**	**1,389,978**	**1,435,548**	**1,521,978**	**1,525,108**	**1,634,065**	**1,896,585**	**2,302,354**	**2,573,223**	**2,908,697**	**3,490,237**	**3,916,201**	**3,555,576**	**3,896,263**	**4,372,893**	**4,473,813**
	TiVA 61 countries -> World	**1,147,364**	**1,233,734**	**1,286,687**	**1,300,576**	**1,320,301**	**1,425,650**	**1,435,183**	**1,528,512**	**1,769,286**	**2,148,528**	**2,396,571**	**2,699,659**	**3,242,415**	**3,632,910**	**2,664,758**	**2,836,352**	**3,166,959**	**3,078,320**
	TiVA -> TiVA	320,020	417,854	447,106	464,924	702,806	809,156	886,423	1,027,600	1,216,268	1,503,908	1,677,153	1,886,759	2,241,459	2,572,780	2,142,102	2,302,806	2,632,194	2,555,598
	TiVA -> RoW	4,771	5,541	5,928	7,513	8,737	11,604	12,587	24,828	37,720	67,888	84,833	101,351	132,264	166,020	146,274	143,969	154,088	154,666
	TiVA -> unspecified	*822,573*	*810,339*	*833,653*	*828,139*	*608,758*	*604,889*	*536,172*	*476,083*	*515,298*	*576,732*	*634,586*	*711,549*	*868,692*	*894,110*	*376,381*	*389,577*	*380,676*	*368,055*
	RoW -> World	**58,542**	**64,147**	**67,048**	**69,150**	**71,786**	**76,871**	**83,919**	**96,576**	**116,162**	**138,936**	**160,444**	**187,510**	**224,385**	**264,120**	**170,742**	**189,205**	**195,949**	**205,354**
	RoW -> TiVA	0	0	0	0	0	771	106	194	260	290	2,418	2,238	2,692	3,273	1,878	2,393	270	263
	RoW -> RoW	0	0	0	0	0	115	14	18	17	17	420	429	540	593	194	217	42	43
	RoW -> unspecified	*58,542*	*64,147*	*67,048*	*69,150*	*71,786*	*75,986*	*83,799*	*96,364*	*115,884*	*138,629*	*157,606*	*184,844*	*221,152*	*260,254*	*168,670*	*186,595*	*195,637*	*205,048*
	Unspecified	**16,319**	**19,433**	**18,878**	**20,251**	**43,461**	**19,457**	**6,006**	**8,978**	**11,137**	**14,890**	**16,209**	**21,529**	**23,437**	**19,171**	**720,076**	**870,707**	**1,009,985**	**1,190,139**
S205	**Total Exports to WL**	**310,117**	**315,949**	**326,107**	**317,589**	**324,699**	**346,372**	**339,185**	**354,709**	**400,813**	**502,015**	**569,276**	**635,739**	**766,134**	**890,667**	**692,825**	**807,466**	**880,142**	**888,450**
	TiVA 61 countries -> World	**284,273**	**288,301**	**297,215**	**289,105**	**302,599**	**323,563**	**315,639**	**328,476**	**370,065**	**465,154**	**527,252**	**585,116**	**705,902**	**821,901**	**525,099**	**602,692**	**648,533**	**608,717**
	TiVA -> TiVA	82,576	107,788	113,422	113,172	145,704	179,478	186,733	221,746	244,354	314,363	376,554	418,077	487,677	565,477	406,504	475,260	513,466	476,973
	TiVA -> RoW	968	1,221	1,384	1,535	1,786	2,601	2,617	2,873	3,617	5,147	6,403	7,526	9,648	15,032	7,733	8,089	8,684	7,732
	TiVA -> unspecified	*200,730*	*179,291*	*182,410*	*174,399*	*155,108*	*141,483*	*126,289*	*103,857*	*122,094*	*145,644*	*144,295*	*159,512*	*208,577*	*241,392*	*110,862*	*119,343*	*126,383*	*124,013*
	RoW -> World	**16,403**	**18,241**	**18,856**	**18,076**	**19,247**	**20,078**	**20,817**	**22,619**	**26,477**	**31,802**	**38,724**	**47,107**	**53,677**	**63,260**	**35,461**	**41,360**	**47,220**	**50,688**
	RoW -> TiVA	0	0	0	0	0	387	54	62	72	81	948	2,068	2,377	2,925	2,015	2,518	1,389	1,110
	RoW -> RoW	0	0	0	0	0	15	7	11	10	9	83	432	492	537	314	364	354	320
	RoW -> unspecified	*16,403*	*18,241*	*18,856*	*18,076*	*19,247*	*19,676*	*20,755*	*22,546*	*26,395*	*31,712*	*37,692*	*44,607*	*50,807*	*59,798*	*33,132*	*38,477*	*45,477*	*49,259*
	Unspecified	**9,441**	**9,407**	**10,036**	**10,408**	**2,853**	**2,731**	**2,729**	**3,614**	**4,271**	**5,058**	**3,300**	**3,516**	**6,555**	**5,506**	**132,266**	**163,415**	**184,389**	**229,045**
S236	**Total Exports to WL**	**397,871**	**433,453**	**437,696**	**441,777**	**459,393**	**476,816**	**467,305**	**487,178**	**544,625**	**649,990**	**703,006**	**761,493**	**875,961**	**963,200**	**876,572**	**951,505**	**1,064,512**	**1,104,233**
	TiVA 61 countries -> World	**367,207**	**399,455**	**401,736**	**404,037**	**418,750**	**434,575**	**423,259**	**437,627**	**487,345**	**581,469**	**629,762**	**676,864**	**774,345**	**845,287**	**633,085**	**659,997**	**731,752**	**729,536**
	TiVA -> TiVA	114,590	132,287	136,062	144,247	199,618	220,155	234,940	278,803	327,156	403,599	438,560	469,729	542,073	581,240	476,104	507,891	565,952	564,378
	TiVA -> RoW	1,851	2,179	2,279	2,576	2,731	3,405	3,509	3,091	3,735	4,700	7,508	8,125	10,320	11,942	9,830	12,379	12,786	14,426
	TiVA -> unspecified	*250,765*	*264,989*	*263,395*	*257,214*	*216,400*	*211,015*	*184,809*	*155,732*	*156,453*	*173,170*	*183,695*	*199,010*	*221,952*	*252,105*	*147,151*	*139,727*	*153,014*	*150,732*
	RoW -> World	**25,452**	**28,128**	**29,572**	**31,057**	**34,521**	**36,336**	**38,095**	**45,240**	**52,318**	**63,010**	**71,554**	**83,308**	**100,108**	**113,650**	**79,160**	**88,961**	**82,340**	**84,966**
	RoW -> TiVA	0	0	0	0	0	91	20	41	62	57	242	534	582	558	460	544	331	330
	RoW -> RoW	0	0	0	0	0	3	3	4	3	4	36	111	165	183	98	98	13	7
	RoW -> unspecified	*25,452*	*28,128*	*29,572*	*31,057*	*34,521*	*36,242*	*38,072*	*45,196*	*52,253*	*62,948*	*71,277*	*82,662*	*99,361*	*112,909*	*78,601*	*88,319*	*81,995*	*84,629*
	Unspecified	**5,212**	**5,870**	**6,388**	**6,683**	**6,122**	**5,905**	**5,951**	**4,312**	**4,963**	**5,511**	**1,690**	**1,321**	**1,508**	**4,263**	**164,328**	**202,547**	**250,421**	**289,731**
S245	**Total Exports to WL**	**25,321**	**26,935**	**28,808**	**32,718**	**32,105**	**34,302**	**36,349**	**37,419**	**45,030**	**53,821**	**59,400**	**71,310**	**83,014**	**97,703**	**93,448**	**97,160**	**106,336**	**111,157**
	TiVA 61 countries -> World	**20,922**	**22,112**	**23,481**	**27,418**	**26,959**	**28,707**	**30,696**	**30,892**	**37,187**	**43,743**	**49,773**	**60,541**	**70,050**	**80,616**	**65,750**	**71,019**	**78,909**	**81,924**
	TiVA -> TiVA	2,089	3,405	4,165	4,593	6,311	8,017	8,976	7,712	8,766	21,073	25,041	29,770	32,926	37,269	29,908	34,102	37,259	39,159
	TiVA -> RoW	63	128	84	81	62	79	93	89	165	163	255	384	470	843	584	599	623	594
	TiVA -> unspecified	*18,770*	*18,579*	*19,232*	*22,744*	*20,586*	*20,611*	*21,627*	*23,092*	*28,256*	*22,508*	*24,478*	*30,387*	*36,654*	*42,504*	*35,258*	*36,318*	*41,028*	*42,172*
	RoW -> World	**2,227**	**2,427**	**2,847**	**2,782**	**3,051**	**2,617**	**2,612**	**2,954**	**3,255**	**5,619**	**6,856**	**9,939**	**12,277**	**15,725**	**6,803**	**7,238**	**6,942**	**7,301**
	RoW -> TiVA	0	0	0	0	0	7	8	7	9	20	69	213	217	183	349	303	259	338
	RoW -> RoW	0	0	0	0	0	3	2	2	2	2	7	13	6	14	13	29	24	42
	RoW -> unspecified	*2,227*	*2,427*	*2,847*	*2,782*	*3,051*	*2,608*	*2,602*	*2,945*	*3,245*	*5,597*	*6,780*	*9,713*	*12,054*	*15,529*	*6,441*	*6,906*	*6,659*	*6,920*
	Unspecified	**2,172**	**2,397**	**2,481**	**2,518**	**2,095**	**2,978**	**3,041**	**3,573**	**4,589**	**4,459**	**2,771**	**830**	**687**	**1,361**	**20,894**	**18,902**	**20,485**	**21,932**
S249	**Total Exports to WL**	**42,569**	**40,277**	**44,052**	**41,233**	**35,555**	**30,199**	**31,617**	**35,301**	**39,607**	**46,377**	**56,052**	**68,968**	**86,542**	**112,153**	**109,318**	**99,409**	**106,575**	**107,007**
	TiVA 61 countries -> World	**38,959**	**36,658**	**39,887**	**38,311**	**32,739**	**28,317**	**29,355**	**32,519**	**35,363**	**42,064**	**50,624**	**62,188**	**78,501**	**101,013**	**90,225**	**83,540**	**88,079**	**69,052**
	TiVA -> TiVA	5,024	9,425	11,566	13,410	12,780	12,558	11,823	10,945	12,045	22,916	25,427	29,051	31,520	35,844	33,806	32,457	35,368	33,644
	TiVA -> RoW	91	107	171	408	470	832	803	948	1,452	2,094	3,200	4,488	4,598	7,483	4,537	2,572	3,409	2,984
	TiVA -> unspecified	*33,845*	*27,126*	*28,150*	*24,493*	*19,489*	*14,926*	*16,729*	*20,626*	*21,866*	*17,054*	*21,997*	*28,649*	*42,384*	*57,685*	*51,882*	*48,511*	*49,303*	*32,424*
	RoW -> World	**126**	**205**	**408**	**432**	**449**	**458**	**556**	**625**	**934**	**2,375**	**2,988**	**2,902**	**3,977**	**4,971**	**3,978**	**5,069**	**4,714**	**4,107**
	RoW -> TiVA	0	0	0	0	0	0	0	0	0	2	6	31	49	68	27	66	6	14
	RoW -> RoW	0	0	0	0	0	0	0	0	0	0	4	41	60	64	9	12	13	20
	RoW -> unspecified	*126*	*205*	*408*	*432*	*449*	*457*	*556*	*624*	*933*	*2,374*	*2,978*	*2,831*	*3,869*	*4,839*	*3,941*	*4,991*	*4,695*	*4,073*
	Unspecified	**3,484**	**3,414**	**3,756**	**2,490**	**2,367**	**1,425**	**1,705**	**2,157**	**3,310**	**1,938**	**2,440**	**3,878**	**4,064**	**6,169**	**15,116**	**10,800**	**13,782**	**33,848**

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
S253	**Total Exports to WL**	**24,199**	**25,081**	**24,304**	**25,153**	**28,269**	**27,706**	**29,845**	**44,379**	**54,254**	**56,548**	**49,396**	**62,203**	**76,725**	**83,488**	**96,099**	**96,719**	**105,295**	**104,156**
	TiVA 61 countries -> World	**23,101**	**23,949**	**23,141**	**23,047**	**26,892**	**25,407**	**27,446**	**41,794**	**50,949**	**52,597**	**44,478**	**58,330**	**71,656**	**79,494**	**84,408**	**82,828**	**90,796**	**88,041**
	TiVA -> TiVA	5,835	8,311	8,257	6,904	10,093	9,519	8,797	21,613	16,849	25,661	23,182	29,415	35,629	38,675	37,842	38,214	40,483	38,489
	TiVA -> RoW	59	168	212	335	428	355	443	635	596	775	869	1,181	1,397	2,512	2,962	2,724	2,865	3,014
	TiVA -> unspecified	*17,208*	*15,470*	*14,672*	*15,808*	*16,371*	*15,533*	*18,206*	*19,546*	*33,504*	*26,162*	*20,427*	*27,734*	*34,630*	*38,308*	*43,604*	*41,891*	*47,449*	*46,538*
	RoW -> World	**559**	**758**	**786**	**1,090**	**1,100**	**986**	**1,392**	**1,084**	**1,334**	**1,873**	**2,822**	**2,476**	**3,267**	**3,570**	**2,770**	**2,892**	**2,584**	**2,862**
	RoW -> TiVA	0	0	0	0	0	0	0	0	0	4	1	22	37	75	47	47	79	44
	RoW -> RoW	0	0	0	0	0	0	0	0	0	0	1	6	14	10	6	7	4	
	RoW -> unspecified	*559*	*758*	*786*	*1,090*	*1,100*	*985*	*1,392*	*1,084*	*1,334*	*1,869*	*2,820*	*2,453*	*3,224*	*3,481*	*2,713*	*2,838*	*2,498*	*2,814*
	Unspecified	**539**	**374**	**378**	**1,016**	**277**	**1,313**	**1,007**	**1,501**	**1,971**	**2,078**	**2,096**	**1,397**	**1,803**	**424**	**8,921**	**10,999**	**11,916**	**13,253**
S260	**Total Exports to WL**	**49,807**	**62,022**	**71,462**	**71,430**	**85,762**	**97,584**	**93,518**	**99,905**	**120,201**	**153,400**	**180,551**	**225,274**	**297,285**	**298,616**	**262,932**	**282,109**	**316,871**	**308,469**
	TiVA 61 countries -> World	**47,567**	**60,583**	**70,967**	**71,596**	**83,390**	**94,519**	**90,775**	**95,167**	**114,432**	**145,262**	**171,766**	**217,464**	**291,862**	**292,043**	**227,519**	**236,336**	**268,364**	**256,664**
	TiVA -> TiVA	11,783	18,061	19,240	20,038	24,876	32,787	30,957	24,645	18,698	46,918	55,406	106,366	136,487	137,166	116,203	122,375	139,943	136,967
	TiVA -> RoW	66	140	156	235	212	345	272	268	270	369	444	3,237	3,453	3,061	2,300	2,855	2,919	2,859
	TiVA -> unspecified	*35,718*	*42,382*	*51,571*	*51,322*	*58,302*	*61,387*	*59,545*	*70,255*	*95,465*	*97,975*	*115,917*	*107,861*	*151,921*	*151,815*	*109,016*	*111,105*	*125,503*	*116,838*
	RoW -> World	**422**	**463**	**469**	**571**	**582**	**569**	**617**	**760**	**990**	**1,060**	**1,336**	**1,754**	**2,487**	**3,415**	**1,846**	**4,365**	**3,565**	**3,200**
	RoW -> TiVA	0	0	0	0	0	0	1	1	93	100	147	88	88	53	97	69	55	39
	RoW -> RoW	0	0	0	0	0	0	0	0	0	0	6	2	4	8	3	13	2	
	RoW -> unspecified	*422*	*463*	*469*	*571*	*582*	*569*	*616*	*759*	*896*	*959*	*1,190*	*1,660*	*2,398*	*3,359*	*1,741*	*4,293*	*3,496*	*3,159*
	Unspecified	**1,818**	**976**	**26**	**-737**	**1,790**	**2,497**	**2,126**	**3,978**	**4,778**	**7,079**	**7,449**	**6,055**	**2,936**	**3,158**	**33,567**	**41,409**	**44,942**	**48,605**
S262	**Total Exports to WL**	**13,787**	**16,499**	**22,420**	**26,825**	**37,069**	**45,649**	**53,149**	**59,083**	**74,968**	**93,411**	**103,820**	**125,506**	**156,117**	**195,190**	**189,951**	**213,808**	**249,526**	**261,373**
	TiVA 61 countries -> World	**11,923**	**14,591**	**20,385**	**24,804**	**35,061**	**39,890**	**45,460**	**50,139**	**63,408**	**75,971**	**81,800**	**101,224**	**125,218**	**153,537**	**138,251**	**151,367**	**176,114**	**183,987**
	TiVA -> TiVA	2,465	3,473	4,539	5,372	8,437	11,927	13,402	12,555	15,422	44,581	48,608	65,219	82,211	99,516	95,537	96,458	107,215	122,409
	TiVA -> RoW	4	7	8	24	28	71	70	59	99	105	157	375	660	1,044	801	653	690	922
	TiVA -> unspecified	*9,454*	*11,111*	*15,838*	*19,408*	*26,597*	*27,893*	*31,988*	*37,524*	*47,886*	*31,285*	*33,035*	*35,630*	*42,347*	*52,976*	*41,913*	*54,255*	*68,209*	*60,656*
	RoW -> World	**80**	**85**	**130**	**99**	**124**	**167**	**237**	**262**	**356**	**521**	**679**	**966**	**1,419**	**2,194**	**1,053**	**1,281**	**1,477**	**1,686**
	RoW -> TiVA	0	0	0	0	0	0	2	1	1	0	0	77	112	166	161	163	208	230
	RoW -> RoW	0	0	0	0	0	0	0	0	0	0	0	5	10	16	20	25	31	40
	RoW -> unspecified	*80*	*85*	*130*	*99*	*124*	*167*	*7,452*	*8,682*	*11,204*	*520*	*679*	*884*	*1,296*	*2,012*	*871*	*1,093*	*1,238*	*1,416*
	Unspecified	**1,784**	**1,823**	**1,905**	**1,922**	**1,884**	**5,591**	**7,452**	**8,682**	**11,204**	**16,919**	**21,341**	**23,316**	**29,480**	**39,460**	**50,648**	**61,161**	**71,935**	**75,700**
S266	**Total Exports to WL**	**59,334**	**65,792**	**68,295**	**71,275**	**84,821**	**91,930**	**90,468**	**98,606**	**115,780**	**141,494**	**159,691**	**173,786**	**204,086**	**228,744**	**236,258**	**255,470**	**290,269**	**293,466**
	TiVA 61 countries -> World	**55,580**	**61,530**	**64,005**	**67,899**	**82,404**	**90,274**	**88,946**	**96,714**	**113,568**	**140,014**	**158,123**	**172,911**	**203,509**	**227,800**	**228,577**	**248,529**	**281,679**	**280,103**
	TiVA -> TiVA	31,748	38,160	39,753	40,439	53,829	61,700	61,172	65,183	74,547	100,968	113,953	134,230	155,934	177,015	169,629	179,087	219,104	197,779
	TiVA -> RoW	240	313	365	252	460	393	398	603	824	1,264	1,261	2,033	2,844	3,243	3,739	4,405	4,082	3,877
	TiVA -> unspecified	*23,592*	*23,057*	*23,888*	*27,207*	*28,115*	*28,182*	*27,377*	*30,928*	*38,196*	*37,782*	*42,909*	*36,648*	*44,730*	*47,543*	*55,208*	*65,037*	*58,492*	*78,447*
	RoW -> World	**231**	**302**	**367**	**346**	**329**	**376**	**332**	**349**	**478**	**724**	**578**	**623**	**683**	**773**	**292**	**312**	**339**	**228**
	RoW -> TiVA	0	0	0	0	0	0	0	1	1	1	1	27	30	70	6	5	7	6
	RoW -> RoW	0	0	0	0	0	0	0	0	0	0	0	23	7	2	0	1	1	0
	RoW -> unspecified	*230*	*302*	*367*	*346*	*329*	*375*	*332*	*349*	*477*	*723*	*577*	*572*	*645*	*702*	*285*	*307*	*331*	*222*
	Unspecified	**3,524**	**3,960**	**3,923**	**3,030**	**2,088**	**1,280**	**1,190**	**1,542**	**1,734**	**756**	**990**	**252**	**-105**	**172**	**7,389**	**6,628**	**8,252**	**13,134**
S268	**Total Exports to WL**	**232,938**	**269,237**	**286,814**	**295,079**	**305,488**	**325,886**	**338,177**	**364,681**	**437,452**	**528,344**	**609,373**	**695,194**	**844,932**	**944,854**	**899,548**	**983,672**	**1,128,775**	**1,172,738**
	TiVA 61 countries -> World	**229,650**	**265,201**	**283,396**	**290,869**	**300,265**	**313,720**	**327,214**	**351,173**	**420,930**	**484,621**	**555,863**	**651,327**	**781,632**	**875,208**	**728,652**	**787,723**	**898,905**	**887,524**
	TiVA -> TiVA	26,363	55,904	65,803	69,477	86,352	102,237	116,586	119,160	115,521	231,951	286,385	312,237	374,328	428,988	385,036	407,289	472,253	437,853
	TiVA -> RoW	311	367	438	814	778	765	1,915	1,338	1,881	2,579	3,751	4,922	4,669	4,805	6,731	5,533	5,102	5,873
	TiVA -> unspecified	*202,976*	*208,931*	*217,154*	*220,578*	*213,136*	*210,718*	*208,712*	*230,674*	*303,529*	*250,091*	*265,726*	*334,168*	*402,635*	*441,416*	*336,885*	*374,901*	*421,550*	*443,798*
	RoW -> World	**9,042**	**10,311**	**10,250**	**10,065**	**9,452**	**10,711**	**9,885**	**11,216**	**14,408**	**17,016**	**16,083**	**20,846**	**25,578**	**32,386**	**23,064**	**19,046**	**30,357**	**29,606**
	RoW -> TiVA	0	0	0	0	0	3	19	79	18	20	29	527	518	483	433	481	575	575
	RoW -> RoW	0	0	0	0	0	1	1	1	1	1	1	54	33	77	94	142	176	149
	RoW -> unspecified	*9,042*	*10,311*	*10,250*	*10,064*	*9,452*	*10,708*	*9,865*	*11,137*	*14,389*	*16,994*	*16,053*	*20,266*	*25,027*	*31,826*	*22,538*	*18,424*	*29,606*	*28,882*
	Unspecified	**-5,754**	**-6,275**	**-6,832**	**-5,855**	**-4,229**	**1,454**	**1,079**	**2,292**	**2,113**	**26,708**	**37,427**	**23,020**	**37,722**	**37,260**	**147,831**	**176,903**	**199,513**	**255,608**

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
S287	**Total Exports to WL**	**15,893**	**13,540**	**16,687**	**20,183**	**12,428**	**14,648**	**12,917**	**15,976**	**18,353**	**22,842**	**23,280**	**23,755**	**26,783**	**29,300**	**27,798**	**33,011**	**38,621**	**39,475**
	TiVA 61 countries -> World	**14,766**	**12,711**	**15,844**	**19,266**	**11,573**	**14,011**	**12,358**	**15,182**	**17,060**	**20,364**	**21,425**	**22,325**	**24,822**	**26,260**	**19,876**	**24,279**	**28,776**	**27,994**
	TiVA -> TiVA	1,672	1,815	2,054	2,225	2,562	4,388	4,755	5,046	4,958	10,643	10,719	10,738	11,930	11,599	11,244	13,349	14,833	15,167
	TiVA -> RoW	13	13	13	18	18	22	22	30	52	66	108	109	138	145	207	215	246	211
	TiVA -> unspecified	*13,081*	*10,883*	*13,777*	*17,023*	*8,993*	*9,601*	*7,582*	*10,105*	*12,049*	*9,655*	*10,598*	*11,478*	*12,754*	*14,516*	*8,425*	*10,715*	*13,697*	*12,616*
	RoW -> World	**71**	**76**	**79**	**102**	**149**	**120**	**105**	**155**	**202**	**332**	**409**	**653**	**799**	**997**	**733**	**1,066**	**1,152**	**1,445**
	RoW -> TiVA	0	0	0	0	0	0	0	0	0	0	0	1	2	2	8	4	2	3
	RoW -> RoW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2
	RoW -> unspecified	*71*	*76*	*79*	*102*	*149*	*120*	*105*	*155*	*202*	*332*	*409*	*652*	*797*	*995*	*725*	*1,060*	*1,147*	*1,441*
	Unspecified	**1,056**	**753**	**764**	**815**	**706**	**516**	**453**	**639**	**1,091**	**2,147**	**1,446**	**776**	**1,162**	**2,043**	**7,189**	**7,665**	**8,693**	**10,035**
S291	**Total Exports to WL**	**42,789**	**44,231**	**42,837**	**43,122**	**29,696**	**30,658**	**32,383**	**36,493**	**45,218**	**51,934**	**57,036**	**63,278**	**68,886**	**69,136**	**66,894**	**68,584**	**77,476**	**76,815**
	TiVA 61 countries -> World	**37,296**	**38,620**	**37,528**	**37,390**	**23,707**	**24,946**	**26,159**	**28,774**	**34,664**	**41,693**	**44,750**	**51,158**	**55,478**	**53,630**	**49,423**	**47,412**	**53,055**	**51,711**
	TiVA -> TiVA	8,900	9,405	8,639	8,898	7,583	8,117	8,970	9,830	13,328	17,974	15,944	16,819	17,310	16,032	15,672	15,467	16,176	15,298
	TiVA -> RoW	122	155	161	129	129	148	133	182	400	513	544	585	643	686	527	540	506	520
	TiVA -> unspecified	*28,274*	*29,060*	*28,728*	*28,363*	*15,995*	*16,681*	*17,056*	*18,762*	*20,935*	*23,206*	*28,262*	*33,754*	*37,524*	*36,911*	*33,225*	*31,405*	*36,374*	*35,894*
	RoW -> World	**4,438**	**4,471**	**4,226**	**4,601**	**4,805**	**4,627**	**5,457**	**6,565**	**9,135**	**8,466**	**10,103**	**11,049**	**12,094**	**13,881**	**6,871**	**6,963**	**9,824**	**7,872**
	RoW -> TiVA	0	0	0	0	0	8	2	2	3	4	14	584	377	579	1,013	2,903	867	2,360
	RoW -> RoW	0	0	0	0	0	0	1	1	1	1	1	12	16	26	19	29	38	126
	RoW -> unspecified	*4,438*	*4,471*	*4,226*	*4,601*	*4,805*	*4,619*	*5,454*	*6,562*	*9,131*	*8,461*	*10,089*	*10,453*	*11,702*	*13,276*	*5,839*	*4,031*	*8,918*	*5,386*
	Unspecified	**1,056**	**1,140**	**1,083**	**1,131**	**1,185**	**1,085**	**767**	**1,154**	**1,419**	**1,776**	**2,182**	**1,071**	**1,314**	**1,626**	**10,599**	**14,209**	**14,597**	**17,231**
S981	**Total Exports to WL**	**506,640**	**563,613**	**605,681**	**627,013**	**651,197**	**698,563**	**718,428**	**791,842**	**950,863**	**1,148,159**	**1,298,600**	**1,509,272**	**1,844,371**	**2,059,185**	**1,982,245**	**2,129,944**	**2,419,747**	**2,474,658**
	TiVA 61 countries -> World	**478,179**	**535,424**	**577,441**	**598,174**	**611,124**	**665,356**	**686,780**	**752,844**	**899,217**	**1,091,936**	**1,230,362**	**1,425,532**	**1,746,350**	**1,955,599**	**1,563,716**	**1,648,302**	**1,866,544**	**1,820,238**
	TiVA -> TiVA	125,438	186,465	205,702	215,498	277,687	329,373	379,372	512,154	617,487	763,307	854,249	970,864	1,171,498	1,286,400	1,170,456	1,252,735	1,464,510	1,458,548
	TiVA -> RoW	1,104	1,333	1,516	2,514	2,760	3,143	3,901	4,507	6,745	10,886	12,439	16,550	19,631	22,916	19,941	16,818	14,702	15,479
	TiVA -> unspecified	*351,636*	*347,626*	*370,223*	*380,162*	*330,677*	*332,839*	*303,507*	*236,184*	*274,986*	*317,743*	*363,673*	*438,118*	*555,222*	*646,283*	*373,319*	*378,750*	*387,332*	*346,211*
	RoW -> World	**16,778**	**18,716**	**19,095**	**19,808**	**19,478**	**20,564**	**21,799**	**25,001**	**32,925**	**36,486**	**40,622**	**49,463**	**62,585**	**77,912**	**47,412**	**48,788**	**55,889**	**58,309**
	RoW -> TiVA	0	0	0	0	0	14	32	92	127	152	225	215	475	544	490	622	126	104
	RoW -> RoW	0	0	0	0	0	4	4	3	4	3	5	6	19	34	26	28	12	13
	RoW -> unspecified	*16,778*	*18,716*	*19,095*	*19,808*	*19,478*	*20,546*	*21,764*	*24,906*	*32,794*	*36,331*	*40,392*	*49,241*	*62,091*	*77,335*	*46,896*	*48,139*	*55,751*	*58,192*
	Unspecified	**11,683**	**9,473**	**9,145**	**9,032**	**20,595**	**12,644**	**9,849**	**13,997**	**18,721**	**19,737**	**27,617**	**34,278**	**35,436**	**25,673**	**371,117**	**432,854**	**497,314**	**596,110**

ANNEX 5. SOURCE CODES IN BILATERAL DATASET

Methodology for estimated values (as described in the text)	
Code	**Description**
blank	No calculation/estimation/adjustment/correction/addition
E1	Simple derivation
E1_2	Deriving EBOPS item when total services is available and only one main category is missing.
E2	Conversion of BPM6 data to BPM5 presentation
E3	Calculation through national BOP growth rate. In these cases, the growth rate of the national BOP is applied item by item to the relevant primary source (IMF, EURO, OECD, UNSD). This method is only used for the 3 latest years (*i.e.* t-1, t-2 and t-3). The rationale behind is that normally the national source releases the figures earlier that than Eurostat, OECD, IMF of UNSD. This is why estimates E3 are in principle provisional and are substituted with the relevant primary source when it becomes available. Only applies to partner world.
E4	Derived from regional growth rates. In these cases, a regional growth rate applied to S205, S236, S291, S981 (totals derived). Only used if there is absolutely nothing else is available. Regions are defined as North America, Central and South America, Europe, CIS, Asia. It is only used for the last 3 years, and with partner world. Sub-items (*e.g.* S245) are filled in based on the item's share in the last year available and have source code E8.
E5	Estimate based on breakdown of EBOPS categories observed in mirror data
E6	Correction of mistakes in source data, such as implausible negative values, definition not in line with international recommendations
E7	Derived to be negligible/zero
E7_3	Derived as zero, as partner World is Zero
E7_4	Derived as zero, as S200 is zero
E8	Estimated using past or future structure (interpolation, backcasting, nowcasting).
E10	Estimate based on (national) non-official sources.
E11	Estimated breakdown of 'other business services' across EBOPS categories, using structure from other years
E13	Reported zeros replaced based on values of S200
M1*	Estimated as zero, of which:
M1_1	Estimated as zero using interpolation
M1_2	Estimated as zero using backcasting
M2_1	Estimated value using interpolation
M3*	Estimated value by gravity model – Total services, of which:
M3_1	Total services model: merchandise trade, tourist arrivals/departures, basic gravity variables, partner FE
M3_2	Total services model: merchandise trade, basic gravity variables, partner FE
M3_3	Total services model: tourist arrivals/departures, basic gravity variables, partner FE
M3_4	Total services model: basic gravity variables, partner FE
M3_5	Total services model: basic gravity variables
M4*	Estimated value by gravity model - Sectors, of which:
M4_1	Sectoral model: merchandise trade, trade of relevant item with world, basic gravity variables, partner FE
M4_2	Sectoral model: trade of relevant item with world, basic gravity variables, partner FE
M4_3	Sectoral model: trade of relevant item with world, basic gravity variables
M4_4	Sectoral model: merchandise trade, tourist arrivals, trade of relevant item with world, basic gravity variables, partner FE (exports of travel only)
M5*	Model estimates filled using time series information, of which:
M5_1	Interpolated model estimates
M5_2	Back/now cast model estimates
M3_1	Total services model: merchandise trade, tourist arrivals/departures, basic gravity variables, partner FE