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Author(s)	:	Nico van Leeuwen, Arjan Lejour
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Bilateral Services Trade Data and the GTAP database

This paper has two aims. The first is a description of CPB's method to modify the GTAP data base, version 6 with bilateral services trade data. The source for constructing bilateral flows in this paper is a recent comprehensive database from the OECD which was established in cooperation with Eurostat, based on the concepts and framework of trade in services set out by the IMF in their balance of payments statistics. We manage to cover flows between 24 OECD countries and four sectors, which equals approximately 75% of the total flows of services world trade in 2001. On the other hand however, it doesn't cover all GTAP services sectors. The second is our proposal to contribute (updated) bilateral services trade data to the GTAP database, version 7, base year 2004. These data will include 24 reporting OECD countries with 24 to 55 partner countries for 10 services sectors.

1 Introduction[1]

This paper has two aims. The first is a description of CPB's method to modify the GTAP data base, version 6 with bilateral services trade data. The second is our proposal to contribute (updated) bilateral services trade data to the GTAP database, version 7. The current services trade data in GTAP are basically composed of data of total imports and exports of services sectors according to International Monetary Fund balance of payments statistics data. The bilateral trade matrix and rebalancing is constructed using amongst others a RAS procedure and bilateral trade flows in goods.[2] The current bilateral data are thus constructed and it would be desirable to obtain a statistical base for constructing the bilateral flows.

Good statistical measurement of services trade becomes more and more important now trade in services gets the attention of policymakers. In 1995 many countries decided to liberalise services trade according to the General Agreement for Trade in Services (GATS). Also in the Doha round the WTO members aim to open their markets in services further.[3] It is noted that trade in services is hampered by many barriers. Most of these barriers are consequences from regulating national services markets. Some of these barriers are unintended consequences of regulation, but others are outright discriminatory for foreigner providers.[4]

Even within the European Union in which the free movement of services is one of the core principles, services trade is hampered by many barriers (EC, 2002). Recently, the European Commission launched new policy proposals for the intra-EU service market (EC, 2004). To analyse the welfare impact of these (and other) policy proposals, it is necessary to use good bilateral data on services trade. With the new interest in services trade, efforts increase to raise the quality of services data and on trade. The OECD has cooperated with Eurostat, to create comprehensive database on bilateral trade in services. This database is based on the concepts and framework of trade in services set out by the IMF in their balance of payments statistics.

In first instance the database only covered the years 1999 and 2000 for a selection of the OECD countries for total services. The size of the database has increased over time and covers now 28 OECD countries and four sectors, which equals approximately 75% of the total flows of

[1] A preliminary version of this paper was presented at the GTAP advisory board meeting and the GTAP conference, both in Lübeck, June 2005. We thank our CPB colleagues Ali Aouragh, Arie ten Cate and Henk Kox for their assistance with the data. We acknowledge useful comments from William Cave and Nora Dihel (OECD) and Tom Hertel, and Rob McDougall (GTAP Center, Purdue University).

[2] Chapter 15 of the GTAP documentation (Dimaranan and McDougall, 2005) provides more information.

[3] However, all observers agree that the offers of most countries to liberalise services trade further are meagre.

[4] See Hoekman and Braga (1995) for a classification of the various types of barriers, and also Kox and Lejour (2005) for a description of the discriminatory nature of regulation for foreign service providers.

services world trade (OECD, 2005). Recently the database has also been used to study the bilateral patterns of services trade using gravity equations.[5]

We have used this bilateral data set to modify bilateral trade in for aggregated GTAP sectors: other commercial services, transport and other government services for 23 countries countries. Because the OECD database (2004) only covers the sectors transport services, other commercial services, and government services, we only provide data for these aggregated GTAP sectors.[6] The construction of a reliable data set for bilateral trade in services was not an aim in itself. We needed it for analysing the proposals of the European Commission for liberalising commercial services trade within Europe, see De Bruijn *et al*. (2006), and Lejour *et al*. (2006) and for analysing the Lisbon agenda, see Gelauff and Lejour (2006).

Section 2 of this paper describes the database and our procedure to deliver a consistent data set for bilateral services trade. This procedure is as follows. In many cases we observe two observations for the same flow with different values because the exporting and importing country report. We use the observation of the most reliable partner. Our method to determine the most reliable partner is also presented in Section 2. If we have only one observation for a certain flow, we use this observation, and in case there is not flow at all, we have to construct a value based on total import and exports. We do this for the sectors transport services, other commercial services, travel and government services. Section 3 compares our results with the original data in the GTAP 6 database for the year 2001. After having discussed our method at the GTAP advisory board meeting in 2005 and 2006, we have decided that CPB will deliver an a updated, consistent data set for bilateral trade in services to the GTAP database, version 7, base year 2004. Section 4 discusses the dimensions of this data set, and the division of tasks between CPB and the GTAP Center.

[5] Nicoletti *et al.* (2003), Grünfeld and Moxnes (2003), Lejour and de Paivra Verheijden (2007), and Kimura and Lee (2006).
[6] The fourth sector is travel, which is not a sector in the GTAP data base.

2 The Bilateral Services Trade Data

2.1 General

This section describes the data on bilateral trade in services from the OECD. Data on services trade are hard to come by. It is difficult to measure the trade flows because services are often not observable if they cross the border. The information is collected by means of complex systems combining enterprises' direct declarations, surveys, the census of bank transactions and estimates. According to Eurostat (1996) this leads to several types of problems which are not discussed here.[7] For the analysis, however, it is essential to solve the problem of consistency of the data. A large part of this section is devoted to that issue.

The bilateral services trade data for most OECD countries originates from the OECD (2004). The data set covers 28 OECD-countries[8] and 55 partner countries for 1999 until 2002. Moreover four individual sectors are covered, of which three sectors correspond to (aggregated) GTAP sectors: Other commercial services, Transport services, and Government services. The trade values of the fourth sector, travel, have to be booked within the present standard GTAP commodities, see Dimaranan and McDougall (2005).

From this source we have managed to compile bilateral data for 24 GTAP countries and regions, which all belong to the OECD area[9]. For Korea, Mexico, New Zealand and Turkey data has not been collected, since it appeared that there were too many blank spots. We have collected the data for 2001, the benchmark year of the GTAP-6 database. We thus capture around 75% of all services trade using this database. This amounts to 1100 billion US dollar. Table 2.1 provide more details on the size and distribution for the flows. For a full list of available GTAP countries and sectors we refer to Appendix A.

2.2 Preparing the initial data sets

The first step is to collect the original data from the OECD sources. As mentioned before the data are collected for one year, 2001. This enabled us to organise two types of matrices per sector.

[7] These problems are divided into three categories: difficulties related to recording and valuation, the analysis of values instead of volumes and consistency and symmetry.

[8] From the 30 OECD countries, we do not cover two countries. First, the trade data for Belgium and Luxembourg are combined in the OECD database until 2001. Second, we do not include Iceland, because we miss data.

[9] Flows from and to Norway equal the flows of the Rest of EFTA (XEF) region. That means that we assume that the flows for Liechtenstein and Iceland are set to zero.

Table 2.1 Total trade in services availability of partner country statistics, 2001

	Services exports			Services imports	
Country	Value (billion USD)	% of word total	Country	Value (billion USD)	% of word total
World	1493.8	100.0	World	1517.5	100.0
Total OECD	1165.1	78.0	Total OECD	1118.5	73.7
Of which			Of which		
United States	279.3	18.7	United States	210.4	13.9
United Kingdom	111.9	7.5	Germany	145.8	9.6
Germany	91.4	6.1	Japan	108.2	7.1
France	80.2	5.4	United Kingdom	95.6	6.3
Japan	64.5	4.3	France	62.3	4.1
Spain	58.3	3.9	Italy	57.2	3.8
Italy	57.5	3.9	Netherlands	54.9	3.6
Netherlands	52.9	3.5	Belgium-Luxembourg	43.3	2.9
Belgium-Luxembourg	50.3	3.4	Canada	42.0	2.8
Canada	36.6	2.4	Ireland	36.8	2.4
Austria	32.8	2.2	Spain	34.0	2.2
Korea	29.1	1.9	Korea	32.9	2.2
Switzerland	27.7	1.9	Austria	31.6	2.1
Denmark	26.9	1.8	Denmark	23.5	1.6
Sweden	22.0	1.5	Sweden	22.9	1.5
Ireland	21.3	1.4	Mexico*	17.2	1.1
Greece	19.4	1.3	Australia	16.7	1.1
Norway	17.9	1.2	Norway	15.1	1.0
Australia	16.3	1.1	Switzerland	13.4	0.9
Turkey*	15.2	1.0	Greece	11.6	0.8
Mexico*	12.7	0.9	Poland	9.0	0.6
Poland	9.8	0.7	Finland	8.1	0.5
Portugal	8.8	0.6	Portugal	6.2	0.4
Hungary	7.7	0.5	Turkey*	6.1	0.4
Czech Republic	7.1	0.5	Hungary	5.5	0.4
Finland	5.8	0.4	Czech Republic	5.5	0.4
New Zealand**	4.3	0.3	New Zealand**	4.2	0.3
Slovak Republic	2.8	0.2	Slovak Republic	2.3	0.2
Iceland	1.1	0.1	Iceland	1.1	0.1
EU15 total***	633.2	42.4	EU15 total***	628.9	41.4
Extra-EU trade	287.4	19.2	Extra-EU trade	277.3	18.3
Intra-EU trade	345.8	23.1	Intra-EU trade	351.6	23.2
Hong Kong, China	41.8	2.8	Hong Kong, China	24.7	1.6

Source: OECD-Eurostat (2003)

* A partner country breakdown is available for travel only (for Turkey, only exports).

** A partner country breakdown is only available for other commercial services excluding insurance services.

*** EU total cannot be derived by summing member countries data as national data is in some cases based on national sources rather than Eurostat source (see country tables).

First of all we have created an export matrix in which the OECD countries are taken as reporters of the exports of this sector to one of the 55 partner countries. The second table is also

a matrix in which exports can be read from a partner country to a reporting OECD importing country. This results in two matrices for each of the four sectors.

The two export matrices ideally are identical, but in practice there are some notable differences per sector:

- In many cases we observe two observations for the same flow with different values reported by the exporting and importing country.
- Sometimes there is only one reported observation for a certain flow.
- In some cases there is no flow at all.
- In an exceptional case a flow is negative.

In all these cases we have to make a choice in order to finally obtain one matrix per sector for the countries we have included in this study. This will be dealt with in the following sections.

2.3 The choice if there are two observations per flow

In general, the importing and exporting country do not report the same value for a bilateral trade flow. This is also the case for goods, but in services the differences in reporting seem to be larger. One of the extreme examples is that Finland reports exports of 125 million US$ to France, while France reports imports of 220 million US$ from Finland in 2001. This incompatibility of reported values leads to the question whether certain countries do systematically under- or over report imports or exports. This question is not unique constructing a consistent set of services trade data. It figures also prominently in merchandise trade data and FDI data.

We use two methods to identify the most reliable reporter. The first is a regression analysis, see also Tsigas *et al*. (1992), and Lejour and de Paiva Verheijden (2007). The second is a method that constructs indexes for reliability for the exporter and importer by classifying a reported trade value as reliable if the difference between the reported importer and exporter is less than 20%. Gehlhar (1996) uses this method to reconcile merchandise trade data for the GTAP database.

We take the differences between reporting partners are given. Tsigas *et al*. (1992) list various intended and unintended reasons for misreporting merchandise trade. Some very common reporting problems are misrepresenting partner countries and commodity categories. However, these reasons are not relevant for solving the problem of data consistency.

Regression analysis

We assess this issue by running a regression with reported imports of country *i* to country *j*, imp_{ij} as the dependent variable and reported exports between these countries, $exp_{ij,}$ and dummies

for reporting exporting countries, D^O , or reporting importing countries, D^D , as independent variables.

$$\ln(imp_{ij}) = \alpha + \beta \ln(\exp_{ij}) + \sum_r \gamma_r D_r^O + \sum_r \delta_r D_r^D + \varepsilon_{ij} \quad (2.1)$$

α is a constant term, and β the coefficient for the log of exports. In the ideal case – if both countries report the same value - this coefficient is 1, and that of the constant term, α, is 0. The $\gamma's$ and $\delta's$ are the coefficients for the dummies of the reporting exporting and importing countries, respectively. If these coefficients are not statistically significant, country *r* does not systematically under or over reports: in the ideal case all these coefficients are thus zero. If it is positive for the exporting countries, the value of reported exports is lower than that for reported imports. The reporting exporting country thus underreports. If the coefficient is statistically negative for the exporting country, that country thus over reports. If the coefficient is positive for the importing country, that country thus over reports. The dummy variable for exports for Belgium-Luxembourg is left out of the regression for statistical reasons.[10] For some other countries available data are too scarce for a meaningful estimate. Note that the concept of over or underreporting is a relative concept. With the estimation method, we identify systematic under or over reporting relative to the statistical mean of the data. It does not say anything about the absolute quality of reporting.

The regression results in Table 2.2, suggest that some countries may reports significantly high or low trade levels. Exports appear to be relatively low for the UK, Germany and the USA compared to the reporting of their partners, while the reverse appears to be the case for Australia, Czech Republic, Norway, Denmark, Portugal, Slovakia, and Sweden. Australia, Denmark, Germany, Spain, France, Italy, Korea, Mexico, Turkey, and the United States appear to report significantly higher levels of services imports compared to the reporting exporting countries. However a more in depth analysis of national methodologies would be needed to verify if this is in fact the case and not just a statistical illusion.

In order to deal with the differences between reported values between the importing and exporting country, we have made a ranking based on the values of the dummy coefficients in Table 2.2. When the importing and exporting country both report the bilateral trade flow, we use the data from the country highest placed in the ranking (that is to say the lowest number).

[10] The combination of the constant term and the dummies forced us to leave out these two dummies in order to guarantee the independency of the explanatory variables. Hereby we implicitly assume that reported exports of Belgium-Luxembourg are not systematically biased, an assumption for which we do not have a firm indication. Theoretically this assumption also affects the results for the other countries. Tsigas *et al*. (1992) note this as a serious problem. However they distinguish only 7 regions, while we have about 25 regions. The influence of this assumption on the final ranking will be modest.

That country reports on average most reliable. For some reporting countries we could not identify a ranking, because there were not sufficient observations, we consider them as non-reliable reporters. We have no statistical indications that these countries are reliable reporters.

Table 2.2 Reporting trade data by importing or exporting country

Country	Export reporter			Import reporter		
	coefficient, γ	standard error	rank	Coefficient, δ	standard error	rank
Australia	-0.634***	0.085430	49	1.157790***	0.256283	43
Austria	-0.139348	0.092071	22	0.088794	0.256080	6
Belgium-Luxembourg				0.378142	0.257943	20
Canada	-0.014545	0.082924	3	0.319410	0.255796	15
Switzerland				0.393972	0.346024	14
Czech Republic	-0.612801***	0.089290	48	0.380363	0.253152	21
Germany	0.371623***	0.083319	42	0.925270***	0.264467	38
Denmark	-0.658214***	0.129007	46	0.550442***	0.266144	31
Spain	-0.209773*	0.129115	26	0.854414***	0.266258	36
Finland	-0.084594	0.091188	11	-0.169350	0.253566	10
France	0.132286	0.081554	25	0.535658***	0.259571	30
UK	0.398360***	0.082858	44	0.364376	0.264348	19
Greece	0.201275**	0.105648	28	0.326949	0.257499	16
Hungary	0.027052	0.094106	4	-0.263822	0.252977	13
Ireland	0.099621	0.284522	5	-0.160998	0.304337	9
Italy	-0.122256	0.080572	23	0.892041***	0.257264	37
Japan	-0.031907	0.087149	7	0.709187***	0.262453	34
Korea	0.015891	0.252900	1	1.046760***	0.295720	39
Mexico		.		0.788967***	0.333028	32
Netherlands	0.036321	0.080104	8	0.433865*	0.258858	27
Norway	-0.366336***	0.083002	41	0.393872*	0.256294	24
New Zealand		.		-0.446041	0.333042	18
Poland		.		0.037383	0.334182	2
Portugal	-0.463555***	0.089209	47	0.250828	0.251719	12
Slovakia	-0.950083***	0.097226	50	0.508278**	0.250674	29
Sweden	-0.321946***	0.112171	35	0.337104	0.262906	17
Turkey				1.611758***	0.333887	45
USA	0.377708***	0.103395	40	0.704740***	0.273735	33
Constant term	0.794398***	0.238731				
Coefficient exports	0.815939***	0.015876				

Dependent variable is the log of bilateral imports. OLS estimates

. ***, **, * denote statistical significant at the 1%, 5%, and 10% level respectively.

Ranking is based on the absolute value of the coefficients. The larger the value, the lower the ranking. This is indicated by a higher ranking number.

Source: OECD (2004).

Indices for reliability (Gehlhar method)

Mark Gehlhar (1996) uses an other method for reconciling the bilateral merchandise trade data for the GTAP data base. He constructs reliability indices for each good. According to this philosophy, transaction data are reliable if the values of the reporting countries deviate less than 20%. An arbitrary reporting exporter trades with dozens of countries in a particular good. Some of the transactions are reliable according to the definition above and some are not. By aggregating the values of the reliable transactions of the reporters and comparing the aggregate to total reported exports for that particular good Gehlhar constructs reliability indices of the exporters. This is done for every reporting exporting and importing country per good item. The higher the index, the larger the share of reliable transactions, and the more reliable the reporter is. If the index for the reporting exporter is higher than for the reporting importer, the reported trade flow from the exporter is considered to be the most reliable.

We use the same method to identify the most reliable reporters in transport services, other commercial services, travel, other (government) services and total services. We also use the criterion of 20% as indication for a reliable reported flow.

Table 2.3 Reliability indices for reporting exporters in services

Reporting exporter	Total	Other commercial	Transport	Other (government)	Travel
AUS	2.07	0.24	1.16	0.17	2.13
JPN	2.38	0.3	2.3	0.26	0.57
CAN	0.13	0.07	2.12	0	2.45
USA	2.42	0.7	1.94	0.79	1.28
AUT	0.12	1.49	0.16	0.24	2.81
BEL	0.25	0	0.16	0	0.36
DNK	1.03	0	0.01	0	0.72
FIN	0.62	0.25	0.23	0.6	0.57
FRA	1.56	0.45	1.26	0	1.53
DEU	2.25	0.42	1.44	0.23	2.84
GBR	1.84	0.47	0.41	0.03	1.17
GRC	0.23	0.04	0.04	0	0.63
IRL	0.1	0	0	0.5	0
ITA	1.59	0.07	1.42	0.27	1.8
LUX	0	0	0.03	0	0.02
NLD	1.67	1.56	0.47	0.2	2.06
PRT	0.92	0.38	0.47	0.17	1.06
ESP	0.19	0	1.54	0	0.18
SWE	0.75	0.37	0.58	0.18	2.82
XEF	1.02	0.72	0.3	0.13	0.7
HUN	0.11	0.42	0.6	0.16	0
POL	0	0	0	0	0
SVK	0.81	0.94	0.96	0.28	0.15
CZE	1.2	0.74	0.27	0.08	1.56

Source: OECD (2004) and own calculations

This number is arbitrary. In first instance, we experimented with a lower number because some biases in reporting that occur in merchandise trade are not (or less) relevant in services trade, such as the classification of trade and transportation costs. However in that case only a few flows were considered to be reliable. For practical reasons we stick to the 20% criterion. We have done this for the years 1999-2002, and aggregated the reliability indices for these four years, implying that an index with a value of 4 is theoretically the highest value.

From Table 2.3 and Table 2.4 we conclude that most reliability indices are smaller than 1. Using the maximum value of 4 as a benchmark at most a quarter of the values of the reported flows are considered to be reliable. In particular in other commercial services and other government services the reliability is low. Only in a few cases the indices exceed the value of 1. In transport services and travel the index sometimes exceed the value of 2 indicating that at least 50% of the recorded trade values are reliable.

Table 2.4 Reliability indices for reporting importers in services

Reporting importer	Total	Other commercial	Transport	Other (government)	Travel
AUS	1.03	0.26	1.28	0.11	1.32
JPN	2.75	0.12	1.63	0.72	1.03
CAN	2.73	1.07	2.17	0	2.44
USA	2.53	0.14	1.74	0	1.35
AUT	0.36	0.13	0.27	0.08	0.71
BEL	0.06	0.01	0.01	0	0
DNK	0.42	0	0.06	0	0.68
FIN	0.68	0.4	0	0.2	0.67
FRA	2.55	1.57	1.21	0.17	1.3
DEU	1.57	0.64	1.14	1.4	2.4
GBR	1.01	0.14	1.07	0.69	0.96
GRC	0.06	0.18	0.11	0.03	0.32
IRL	0	0	0	0.5	0.18
ITA	0.56	0.25	0.75	0.03	1.69
LUX	0	0	0.07	0	0
NLD	1.86	2.36	0.49	0.6	2.16
PRT	1.83	1.27	0.31	0	0.89
ESP	0.09	0	2.11	0	1.97
SWE	1.09	1.35	0.39	0.23	2.02
XEF	0.86	1	0.45	0.14	1.38
HUN	0.61	0.76	1.22	0.14	0
POL	0	0	0	0	0
SVK	0.53	0.4	0.54	0.31	0
CZE	0.61	0.84	0.58	0.17	0.21

Source: OECD (2004) and own calculations

Comparison of both methods

Do both methods lead to comparable outcomes? To answer this question we estimated the correlation between the reliability indices for total, transport, other commercial, other and travel services and the inverse to the t values of the outcomes of the regressions on total and other commercial services trade.

Table 2.5 shows that the results are rather awkward. The correlation between both methods for total services is negative, minus 0.26 and for other commercial services it is hardly positive 0.16. The results for other commercial services and total services are positive correlated for both methods. Given the importance of other commercial services within total services trade, it would be surprising if there was no positive correlation at all. This is also the case for the correlation between total services and transport services and travel using the Gehlhar method.

Table 2.5 Comparison regression and Gehlhar method

Method		Regression	Regression	Gehlhar	Gehlhar	Gehlhar	Gehlhar	Gehlhar
			Other		Other			
	Sector	Total	commercial	total	commercial	Transport	Other	Travel
Regression	Total	1.000	0.276	-0.260	-0.143	-0.030	-0.092	-0.157
	Other							
regression	commercial	0.276	1.000	-0.193	0.158	-0.113	-0.047	0.253
Gehlhar	Total	-0.260	-0.193	1.000	0.418	0.575	0.289	0.480
	Other							
Gehlhar	commercial	-0.143	0.158	0.418	1.000	0.032	0.192	0.419
Gehlhar	transport	-0.030	-0.113	0.575	0.032	1.000	0.161	0.425
Gehlhar	Other	-0.092	-0.047	0.289	0.192	0.161	1.000	0.180
Gehlhar	Travel	-0.157	0.253	0.480	0.419	0.425	0.180	1.000

Source: OECD (2004) and own calculations.

It is difficult to explain the lack of significant positive correlation between both methods for total and other commercial services trade. In both methods the reliability of a reporter is related to the other reporters. Systematic under or over reporting is registered by a significant country dummy of a low reliability index. The methods are, however, also completely different for at least three reasons. First, in the Gehlhar method, the reliability is weighed by the size of the flow, which is not the case for the regression.[11] Second, given the reliability criterion most of the transactions are considered to be not reliable according to the Gehlhar method. In the regression method differences in reporting that exceed the 20%, are still informative. A relative difference of 100% adds more to a significant over or under reporting than a difference of 50%. The Gehlhar method is in this respect cruder, but also puts the finger on the spot: does it makes sense to draw any conclusion on reliability of the reporter if the relative differences exceed the

[11] We guess that the differences between both methods could be reduced by estimating with weighed least squares. This is probably econometrically correct, but our experience is that the differences with OLS are in practice not that large.

20%? Third, countries with report relatively low trade values compared to some partners and relatively high trade values to other partners do not systematically over- or underreport according to the regression method. It is tempting to conclude that this country is a reliable reporter, but their reporting patterns is erratic. According to the Gehlhar method that country is not a reliable reporter (at least if the differences exceed the criterion of 20%).

It is well known by the experts that the quality of statistics on services trade is relatively low. From the regression method we could mistakenly conclude that some countries are reliable reporters while they are not. Because of that reason we choose for the Gehlhar method. This choice is also motivated by the experience with the merchandise trade data in the GTAP project that led to this preferred method.[12] We have no convincing reason to deviate from this method. We acknowledge that this choice is debatable and hope that a fruitful discussion and an in depth analysis of national statistical methodologies could improve the decision to choose for one of both methods.[13]

2.4 The remaining choices

If there is only one flow, this flow is considered to be the correct flow. We don't make a correction for the nature of the flow. It could either be an observed export or import flow. That number in that particular cell is considered to be correct. If a value of a cell is negative we set this value to zero.

In all other remaining cases, there is no observation for the resulted matrix. In this case we have estimated the empty cells.

For all sectors:

- We don't have separate flows from and to Belgium and Luxembourg for 2001, but for 2002. We have used the 2002 numbers to identify the country-specific shares of the combined flows for 2001.
- Imports in Australia, Japan, United States, Denmark, Sweden, Greece, Ireland, Spain and Poland from several countries are calculated using import shares from neighbouring countries in EU15.
- Some minor flows for Poland are set to zero.

For the sector Transportation services:

- Imports from Ireland in Australia is set to zero.

[12] The version of the paper presented at the board meeting and the GTAP conference in June 2005 did only contain the regression method.

[13] An other option would be a choice for the exporting reporter because some countries claim the surveying services exports is easier than survey imports.

- Imports from Spain in Australia is a residual of total imports from EU15 and the sum of imports from other 14 countries.

For Transportation services we are not able to separate them between margin and non-margin services as is done in the present GTAP database. We have not made corrections to separate margin and non-margin transportation services.

For the sector Other commercial services:

- The imports in Denmark from some other EU countries is unknown. First we calculate the total imports in this country from the EU15 as a residual of total services and Transportation services, assuming that Government services is zero. Then we use the ratio per sector of Finland to calculate the remaining imports of flows from EU15 countries in Denmark.
- Imports from Australia, Japan and United States in Denmark are also calculated given the totals for services and Transportation services, assuming that Government services is zero.
- Other remaining import flows in Denmark are set to zero.
- Exports of several empty cells from Denmark are set to zero.
- The above mentioned procedure for imports in Denmark and export from Denmark has also been carried out for Spain. In this case the ratios of Italy have been used.

For the sector Travel

- Imports from Hungary in Australia is set to zero.
- Imports from Spain in Australia is calculated given the total from EU15 countries and the other countries.
- Export from Hungary to several countries equals that of Czech Republic.
- Export from Poland to United States is set to zero.
- Exports in Ireland to several countries is calculated using export shares from United Kingdom.
- Imports in Hungary from remaining countries set to zero.
- Imports in Poland from remaining countries set to zero.

For the sector Government services:

- Exports from Spain to remaining countries equals that of Portugal.
- Export from Denmark to remaining countries equals that of Finland.
- Imports in Canada, Finland and Sweden from several countries are calculated using import shares from neighbouring countries in EU15.
- All the other missing cells are set to zero.

As a final step possibly created bilateral flows within a country have been set to zero.

All this results in a 24 by 24 OECD countries matrix of flows from 4 sectors of bilateral trade services. In order to have an idea of the steps we have taken to convert the original data from the OECD source to a final table for the GTAP database, we have included three tables of the sector other commercial services in Appendix C. Table C1 shows the original data from reporting OECD countries to partner OECD countries, whereas table C2 the original data shows from reporting OECD countries to partner countries. This will enable the reader to note the availability of the data, the differences between the tables and the gaps, which remain. In table C3 the final table after all adjustments and estimations for the investigated OECD countries can be found.

As has been mentioned before, It is difficult to measure the trade flows because services are often not observable if they cross the border. The choices we have made to create a full matrix between GTAP (OECD) countries for four sectors are to some extent arbitrary, but are based on expert knowledge. We are convinced that the procedure mentioned improves at least the quality of the current bilateral services trade data in the GTAP database. In the next section we have a closer look at some of the results compared to the present data in the GTAP-6 database.

3 Results of the new Bilateral Services Trade Data

This section will show some of the results of our efforts to create new bilateral Services Trade Data. At the same time we would like to compare our results with the present (aggregated) data in the GTAP-6 database. This will then lead to recommendations for further research.

3.1 Results for Japan, United States, major EU countries, Remaining OECD and Rest of World

In the following tables results are shown for Japan, United States, a few major EU countries, Remaining OECD, Rest of World and Total World. We start with the sector other commercial services. In Table 3.1 the new adjusted flows are shown, whereas in Table 3.2 the (aggregated) results from the release candidate of GTAP-6 database can be found.

Table 3.1 **Consistent matrix of other commercial services trade from reporting OECD countries to partner OECD countries, 2001, in billion US dollars, adjusted OECD bilateral database**

Reporter / partner	JPN	USA	FRA	DEU	GBR	ITA	NLD	R -OECD	RWD	Total
JPN	0	13.9	0.4	1.7	3.2	0.2	0.3	5.3	8.8	33.8
USA	14.6	0	5.4	9.2	17.5	3.1	4.4	50.3	33.1	137.5
FRA	0.6	8	0	5.1	4.4	1.9	1.9	8.5	10.6	40.9
DEU	1.3	8.1	2.8	0	6.5	1.8	3.3	17.1	13.4	54.4
GBR	3.6	18.6	4.5	11.4	0	2.7	6.1	17.1	14.6	78.6
ITA	0.3	0.8	1.5	2.4	1.4	0	0.6	13.1	8.9	29
NLD	0	3.6	1.6	3.6	4.6	1.3	0	8.3	5.9	28.9
R-OECD	16.8	23.6	7.2	25.7	11.2	15.8	7.8	50.2	46.4	204.7
RWD	15.1	31.8	7.8	18.6	10.2	9.4	7.1	46.8	58.8	205.7
Total	52.4	108.4	31.2	77.7	58.8	36.2	31.5	216.8	200.5	813.5

Source: OECD (2004) and own calculations.

The concordance between the GTAP sectors and the OECD sector other commercial services is not perfect. This OECD sector definition includes Royalties and licenses, which is not covered by the GTAP sectors.[14] On the other hand the GTAP data base includes 175 billion on traveller's expenditures on commercial services.[15] Correcting for these traveller's expenditures and Royalties and licenses, the OECD data produces significantly larger values.

Furthermore we notice a substantial increase in the trade between Japan and United States. The trade between the mentioned EU countries doesn't show too many differences. As can be seen from the table we have not adjusted the flows from and to Rest of World (RWD).

[14] Note that the value of the G-7 exports of Royalties and licenses is about 65 billion US$, and their imports are about 45 billion US$.

[15] Personal communication with Rob McDougall.

Table 3.2 **Matrix of other commercial services trade from reporting OECD countries to partner OECD countries, 2001, in billion US dollars, GTAP-6 database**

Reporter / Partner	JPN	USA	FRA	DEU	GBR	ITA	NLD	R-OECD	RWD	Total
JPN	0.0	2.2	1.3	3.8	1.1	1.7	1.3	6.9	8.8	27.1
USA	9.0	0.0	6.6	15.9	9.9	5.5	5.8	40.8	33.1	126.6
FRA	3.4	6.3	0.0	5.5	2.9	2.2	1.8	12.2	10.6	44.9
DEU	4.5	6.0	2.5	0.0	2.9	3.0	2.4	15.1	13.4	49.8
GBR	4.3	9.3	2.8	7.2	0.0	2.7	2.8	22.0	14.6	65.7
ITA	2.6	4.8	1.7	4.2	2.2	0.0	1.4	9.5	8.9	35.3
NLD	1.9	3.4	1.3	3.1	1.3	1.3	0.0	7.1	5.9	25.2
R-OECD	14.3	27.6	9.4	24.8	13.8	9.5	8.5	57.2	46.4	211.6
RWD	15.1	31.8	7.8	18.6	10.2	9.4	7.1	46.8	58.8	205.7
Total	55.1	91.3	33.4	83.0	44.4	35.4	31.1	217.6	200.5	791.9

Source: Dimaranan and McDougall (2005) and own calculations.

In the next two tables we show the consistent matrix for other government services trade. In table 3.3 we have calculated the flows from and to Rest of World as a residual given the OECD and Total world numbers in the original OECD statistics. The reason for this is that the overall flows of the adjusted OECD database are much lower then in the present GTAP-6 database. Government services in the GTAP database include foreign expenditures on health and education. The OECD classifies these two items in the sector travel. The included traveller's expenditures in the GTAP database amount to 52 billion US$.[16] Even correcting for these values, the GTAP database produces significantly larger values than the OECD data. Some cells are empty because these data are not available in the OECD database.

Table 3.3 **Consistent matrix of other government services trade from reporting OECD countries to partner OECD countries, 2001, in billion US dollars, adjusted OECD bilateral database**

Reporter / partner	JPN	USA	FRA	DEU	GBR	ITA	NLD	R -OECD	RWD	Total
JPN	0	0.4	0	0	0	0	0	0.1	0.4	0.9
USA	0.5	0	0.3	0.3	0.5	0.1	0.5			13.4
FRA	0	0	0	0.1	0.1	0.1	0	0.1	0.1	0.5
DEU	0	2.7	0	0	1.4	0	0.1	0.4	0.0	4.5
GBR	0.1	0.4	0	0	0	0	0.1	0.4	1.2	2.2
ITA	0	0	0.1	0.1	0.1	0	0	0.1	0.2	0.6
NLD	0	0	0	0.1	0	0	0	0.4	0.6	1.1
R-OECD	0.1		0.3	0.5	0.7	0.5	0.2			
RWD	0.5		0.1	0.2	0.0	0.9	0.7			
Total	1.2	17.9	0.9	1.3	2.8	1.7	1.5			

Source: OECD (2004) and own calculations.

[16] Personal communication with Rob McDougall.

Table 3.4 **Matrix of government services trade from reporting OECD countries to partner OECD countries, 2001, in billion US dollars, GTAP-6 database**

Reporter / Partner	JPN	USA	FRA	DEU	GBR	ITA	NLD	R-OECD	RWD	Total
JPN	0.0	0.5	0.0	0.1	0.1	0.0	0.0	0.2	0.7	1.6
USA	2.5	0.0	1.8	4.1	4.3	1.9	1.3	10.1	18.6	44.6
FRA	0.1	0.5	0.0	0.1	0.1	0.1	0.0	0.3	0.5	1.7
DEU	0.2	2.7	0.1	0.0	0.4	0.2	0.1	0.8	2.1	6.6
GBR	0.2	1.6	0.1	0.3	0.0	0.1	0.1	0.7	1.4	4.5
ITA	0.1	0.4	0.0	0.1	0.1	0.0	0.0	0.2	0.4	1.3
NLD	0.1	0.8	0.1	0.1	0.1	0.1	0.0	0.3	0.6	2.1
R-OECD	1.1	7.6	0.8	1.9	1.8	0.8	0.6	4.1	6.6	25.2
RWD	1.1	6.8	0.6	1.3	1.3	0.6	0.4	3.2	5.4	20.8
Total	5.3	21.0	3.6	8.1	8.2	3.7	2.6	20.0	36.2	108.5

Source: Dimaranan and McDougall (2005) and own calculations.

Tables 3.5 and 3.6 show the consistent data set for transport services according to the OECD data and the GTAP data. The transport sector in GTAP is also used as export for the transport margins, which according to the GTAP documentation equals the freight transport services. The documentation of the OECD database, however, also includes these services. We do not have bilateral data to separate transport services in margin and non-margin data. In order to compare the two data sets we have included a column in table 3.6 which shows the exports of margins for the separate countries. A bilateral flow is not available. We see here a striking difference between the totals of world transport services if we include the margins in Table 3.6. however the GTAP data also include travel expenditures.

Table 3.5 **Consistent matrix of transport services trade from reporting OECD countries to partner OECD countries, 2001, in billion US dollars, adjusted OECD bilateral database**

Reporter / partner	JPN	USA	FRA	DEU	GBR	ITA	NLD	R -OECD	RWD	Total
JPN	0	5.7	0.3	1.1	1.5	0.3	1.1	4.4	3.4	17.7
USA	5.7	0	1.6	2.8	4.7	0.8	1.3	16.7	12.2	45.7
FRA	0.7	2.3	0	1.5	2	0.9	0.9	5.3	3.4	16.9
DEU	1.1	4.2	1.4	0	1.7	1.2	1.1	5.9	3	19.5
GBR	1.6	6.3	1.5	2	0	0.8	1.9	7.2	4.1	25.3
ITA	0.5	1.3	0.8	0.9	0.5	0	0.2	2.1	2.7	8.9
NLD	0.8	2	1.1	2.3	0.7	0.4	0	8.1	1.2	16.6
R-OECD	4.3	19.7	6.2	9.5	8.5	3.8	3.7	34.3	20.6	110.6
RWD	6.9	21.3	4.1	7.6	7.5	3.1	1.8	20.3	17.2	89.9
Total	21.6	62.8	16.8	27.7	27	11.3	12	104.3	67.8	351.3

Source: OECD (2004) and own calculations.

Table 3.6 **Matrix of transport services trade from reporting OECD countries to partner OECD countries, 2001, in billion US dollars, GTAP-6 database**

Reporter / Partner	JPN	USA	FRA	DEU	GBR	ITA	NLD	R-OECD	RWD	Total	Margins
JPN	0.0	1.3	0.6	0.8	1.2	0.5	0.1	3.2	3.4	11.0	25.4
USA	4.0	0.0	2.8	5.6	4.0	2.4	3.1	14.0	12.2	48.0	18.7
FRA	1.3	3.8	0.0	1.4	1.6	0.6	0.3	4.2	3.4	16.6	11.1
DEU	1.1	3.7	0.7	0.0	1.4	0.5	0.3	3.3	3.0	14.0	18.1
GBR	1.5	3.7	1.0	1.5	0.0	0.7	0.4	4.9	4.1	17.7	9.3
ITA	0.9	2.4	0.6	1.2	1.2	0.0	0.2	3.2	2.7	12.4	4.3
NLD	0.6	4.4	0.3	0.5	0.6	0.2	0.0	1.3	1.2	8.9	15.9
R-OECD	8.1	21.6	4.9	9.0	9.1	3.8	2.1	22.8	20.6	102.1	76.3
RWD	6.9	21.3	4.1	7.6	7.5	3.1	1.8	20.3	17.2	89.9	55.2
Total	24.3	62.3	14.8	27.6	26.6	11.7	8.4	77.1	67.8	320.6	234.4

Source: Dimaranan and McDougall (2005) and own calculations.

Finally we present our table for travel expenditures based on the OECD data. As with table 3.3 the total world numbers in table 3.7 are based on the OECD database, since GTAP information is not available. For some countries total OECD and total world is not available and therefore the total table can't be completed. Travel is not a separate category in the GTAP database. Therefore we do not make a comparison.

Table 3.7 **Matrix of exports of travel expenditures from reporting OECD countries to partner OECD countries, 2001, in billion US dollars, adjusted OECD bilateral database**

Reporter / partner	JPN	USA	FRA	DEU	GBR	ITA	NLD	R -OECD	RWD	Total
JPN	0	2.7	0.1	0.1	0.2	0.1	0			3.6
USA	9.8	0	3.4	2.7	8.8	1.6	1.5			83.4
FRA	0.8	5.2	0	3.7	4.3	1.8	1.6	8.9	3.9	30.1
DEU	0.5	2.4	1.5	0	1.2	1.1	2.2	8.4	1.1	18.4
GBR	0.5	6.4	1.1	1.2	0	0.7	0.9	5.5	0	16.2
ITA	1.2	3	2.5	6	2.1	0	0.4	7.5	2.9	25.9
NLD	0.1	1	0.4	1.8	1	0.2	0	2.1	0.2	6.7
R-OECD	3.8		5.8	28.4	14.9	5	4.4			
RWD	9.8		3.3	8.3	0	4.3	0.6			
Total	26.5	62.5	17.9	51.9	32.5	14.8	11.6			

Source: OECD (2004) and own calculations.

4 Implementation in GTAP database

A preliminary version of this paper is discussed at the advisory board meeting 2005 of the GTAP consortium. We agreed that CPB will deliver bilateral trade data for total services, (non-margin) transport services, other commercial services, government services, and travel. Our source data is the OECD data base Transaction in international services by partner country, 1999-2002. The data base covers 30 reporters (all OECD countries, plus China/HongKong.) and 55 partner countries. For intra-OECD trade we have two reporters (in principal). We decide on the best reporter, fill in holes, re balance intra-OECD trade. If the OECD database contains data for non-OECD partner countries, we also deliver these data, but we do not have the possibility to fill the gaps. These will be substantial.

The selection of the 'best' reporter is the critical part of our exercise. Before (see Lejour and Van Leeuwen, 2005, GTAP conference) we have used regression method. Now we use the Gehlhar method. Apart from some theoretical reasons, the main reason to use this method is the good experience with the merchandise trade data. Although the correlation between both methods is disappointing for services, it does not lead to large differences in results by comparing table 3.1, 3.3 and 3.5 in the present (Gehlhar) and previous (regression) version of the paper.

At this moment we have delivered the data for 2001 for transport, travel, other commercial services, government services and total services. In February 2006, we received from the OECD *OECD Statistics of International Trade in Services: Detailed Tables by Partner Country (including unpublished data)"* including the year 2003. Interestingly the other commercial services sector is split into communication, construction, insurance, financial services, computer and information services, royalties and licences, and other business services. This improves the concordance to the GTAP sectors considerably. The OECD gave permission to use these data (although we have to refer to unpublished data which is not ideal from the perspective of transparency and reproducibility). CPB is willing to prepare these data for the GTAP 7 data base at this sector level. We will provide a consistent trade dataset for 24 OECD countries, and add data for partner countries if these are available.

Note that the year 2003 deviates from the base year of GTAP 7 (2004). The OECD expects to deliver 2004 data in December 2006 or later. It is unclear whether these data will include a disaggregated commercial services sectors. Probably this is too late to incorporate these data in the GTAP 7 data base.

Table 4.1 Concordance OECD data and GTAP sectors

OECD sectors	GTAP sectors
200: 200: TOTAL SERVICES	
205: 205: TRANSPORTATION	OTP + WTP +AIR transport
236: 236: TRAVEL	
245: 245: COMMUNICATION SERVICES	CMN communication
249: 249: CONSTRUCTION SERVICES	CNS construction
253: 253: INSURANCE SERVICES	ISR insurance
260: 260: FINANCIAL SERVICES	OFI financial services nec
262: 262: COMPUTER AND INFORMATION SERVICES	OBS business services nec
266: 266: ROYALTIES AND LICENSE FEES	
268: 268: OTHER BUSINESS SERVICES	OBS business services nec and TRD Trade services
287: 287: PERSONAL, CULTURAL AND RECREATIONAL SERVICES	ROS recreational and other services
291: 291: GOVERNMENT SERVICES, N.I.E.	OSG public admin. and defence, education, health
984A: 984a: OTHER COMMERCIAL SERVICES	

After having delivered the data the GTAP Center will:

- Disaggregate the OECD transport sector in the GTAP sectors: air, water and other transport, and take care of the split in margin and non-margin services.
- Disaggregate the OECD other business sector in the GTAP sectors: other business and trade. Computer and information services should be added to other business services in GTAP.
- Cover non-OECD countries using IMF data and RAS methods.
- Split out margin (=freight transport) and non-margin transport services.
- Match the 2004 IMF data with the 2003 OECD data.

Appendix A: List of available GTAP countries and sectors

Table A1: List of available GTAP countries

AUS	Australia
JPN	Japan
CAN	Canada
USA	United States
AUT	Austria
BEL	Belgium
DNK	Denmark
FIN	Finland
FRA	France
DEU	Germany
GBR	United Kingdom
GRC	Greece
IRL	Ireland
ITA	Italy
LUX	Luxembourg
NLD	Netherlands
PRT	Portugal
ESP	Spain
SWE	Sweden
XEF	Rest of EFTA
CZE	Czech Republic
HUN	Hungary
SVK	Slovakia
POL	Poland

Table A2: Sectoral concordance between OECD and GTAP

OECD sectors	GTAP sectors
Transport services (TRA)	Water, Air and other Transport
Other commercial services (OCS)	Construction, Trade, Communication, Other financial services nec, Insurance, Business services nec, Recreational and other services
Government services (OSG)	Public administration and defence, education, health

Sources: OECD (2004), and Dimaranan, and McDougall (2005).

Appendix B: OECD definitions of services sectors

These are the definitions and coverage of service categories given of the four sectors breakdown presented in the OECD (2004).

Transportation covers all transportation (sea, air, and other - including land, internal waterway, space, and pipeline) services that are performed by residents of one economy for those of another and that involve the carriage of passengers, the movement of goods (freight), rentals (charters) of carriers with crew, and related supporting and auxiliary services. Some related activities are excluded: freight insurance, which is included in insurance services; goods procured in ports by non-resident carriers and repairs of transportation equipment, which are included in goods; repairs of railway facilities, harbours, and airfield facilities, which are included in construction services; and rentals (charters) of carriers without crew, which are included in other business services.

Travel covers primarily the goods and services acquired from an economy by travellers during visits of less than one year in that economy. The goods and services are purchased by, or on behalf of, the traveller or provided, without a quid pro quo, for the traveller to use or give away. Excluded is the international carriage of travellers, which is covered in passenger services under transportation. All expenditures including those for educational and health-related purposes (such as tuition, room and board paid for or provided by educational institutions, hospital charges, treatments, physicians fees, etc.) made by students and medical patients are recorded under travel.

Other Commercial services cover Communications services, Construction services, Insurance services, Financial services, Computer and information services, Royalties and license fees, Other business services, Personal, cultural and recreational services. For detailed information about definition and coverage of these sectors, please refer to the *OECD Statistics on International Trade in Services Volume 1: detailed tables by Service Category.*

Government services, n.i.e. is a residual item covering government service transactions (including those of international organisations) not contained in previous classifications. Included are all transactions by embassies, consulates, military units, and defence agencies with residents of economies in which the embassies, etc. are located and all transactions with other economies. (Excluded are transactions with residents of the home countries represented by the embassies, consulates, etc.). Transactions in this item comprise those for goods and services (such as office supplies, furnishings, utilities, official vehicles and operation and maintenance, and official entertainment) and personal expenditures incurred by diplomats and consular staff

and their dependants in the economies in which they are located. Also included are transactions, subject to the same considerations as above, by other official entities (such as aid missions and government tourist, information, and promotion offices) located in economies abroad. Included, as well, are transactions that are associated with general administrative expenditures, etc. and not classified elsewhere. In addition, transactions associated with aid services that are provided by non-military agencies, do not give rise to any payments, and have offsets in transfers are included in this item. Last, transactions associated with the provision of joint military arrangements and peacekeeping forces, such as those of the United Nations, are included in government services, n.i.e.

Appendix C: Various tables of sector other commercial services

Table C1: Matrix of flows of other commercial services from reporting OECD countries to partner OECD countries, 2001, in billion US dollars

Original data from OECD, TIS data file

REP\PART	OECD	AUS	JPN	CAN	USA	EU15	AUT	BEL	DNK	FIN	FRA	DEU	GBR	GRC	IRL	ITA	LUX	NLD	PRT	ESP	SWE	XEF	HUN	POL	SVK	CZE	WLD
OECD																											
AUS	2.4		0.2	0.0	1.2	0.7					0.1	0.0	0.5	0.0	0.0	0.0		0.0			0.0	0.0					4.1
JPN	24.9	0.3		1.1	13.9	7.2		0.1			0.5	1.0	3.2			0.2	0.1	1.2			0.1						36.3
CAN	16.7	0.2	0.3		12.4	3.2	0.0		0.0	0.0	0.5	0.5	1.0	0.0	0.5	0.1		0.2	0.0	0.1	0.3	0.0		0.0			19.7
USA		2.8	14.6	13.1		55.8					6.2	9.2	17.5			3.1		4.6		2.1	2.2	0.8					145.8
EU15	264.6	2.5	7.4	2.4	55.4	164.5																3.3	1.2	1.8	0.6	1.3	311.0
AUT	8.1	0.0	0.1	0.0	0.7	5.6		0.3	0.0	0.0	0.3	3.2	0.7	0.0	0.2	0.3	0.1	0.3	0.0	0.1	0.1	0.0	0.2	0.3	0.3	0.2	9.2
BEL	19.5	0.0	0.1	0.1	4.2	14.4	0.2		0.1	0.1	2.4	2.6	2.1	0.1	0.5	0.9		2.8	0.2	0.4	0.3	0.1	0.0	0.0	0.0	0.0	20.6
DNK																											
FIN	2.0	0.0	0.1	0.0	0.4	1.4	0.0		0.1		0.1	0.2	0.2	0.0	0.0	0.1		0.1	0.0	0.0	0.5	0.1	0.0	0.0	0.0	0.0	2.7
FRA	24.8	0.1	0.6	0.6	8.0	12.8	0.3		0.2	0.1		1.3	4.4	0.2	0.5	1.9		1.6	0.4	-1.9	0.4	0.1	0.1	0.2	0.0	0.1	31.5
DEU	41.0	0.8	1.4	-0.2	8.1	24.4	1.0		0.5	0.2	3.7		6.5	0.8	1.3	1.8		2.8	0.4	1.8	0.9	0.2	0.3	0.4	0.2	0.5	47.8
GBR	64.0	1.2	3.6	1.5	18.6	32.8	0.3		1.0	1.0	5.5	6.8		0.5	3.6	2.7		5.2	0.4	1.6	1.7	0.9	0.2	0.2	0.0	0.1	78.9
GRC	1.7	0.0	0.0	0.0	0.4	1.2																0.0	0.0	0.0	0.0	0.0	2.1
IRL			0.3	0.0	1.8	12.7																					20.1
ITA	20.2	0.0	0.2	0.1	3.2	14.7	0.2	0.0	0.1	0.1	3.0	3.5	4.0	0.1	0.4		0.0	1.2	0.1	0.5	0.1	0.1	0.0	0.1	0.0	0.0	22.9
LUX	15.6	0.0	0.4	0.0	1.1	11.3	0.1	1.9	0.1	0.0	1.4	3.2	1.2	0.0	0.1	1.9		0.7	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0	16.4
NLD	23.1	0.1	-0.1	0.1	3.6	17.3	0.2	2.9	0.2	0.2	1.6	3.7	4.6	0.1	0.7	1.4	0.3		0.1	0.7	0.7	0.1	0.1	0.1	0.0	0.1	25.8
PRT	1.4	0.0	0.0	0.0	0.2	1.1	0.0		0.0	0.0	0.2	0.1	0.3	0.0	0.1	0.1		0.1		0.2	0.0	0.0	0.0	0.0	0.0	0.0	1.7
ESP																											
SWE	11.9	0.0	0.3	0.1	2.2	7.3																1.0	0.0	0.1	0.0	0.0	13.7
XEF			0.1	0.0	1.4	3.2	0.0	0.1	0.4	0.1	0.1	0.2	1.4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.6						5.1
HUN	1.8	0.0	0.0	0.0	0.7	0.9	0.1	0.1	0.0	0.1	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0		0.0	0.0	0.0	3.0
POL																											
SVK	0.7	0.0	0.0	0.0	0.1	0.4	0.1		0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.1	0.0		0.1	0.8
CZE	1.3	0.0	0.0	0.0	0.2	0.9	0.1	0.0	0.0	0.0	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1		2.4
WLD																											

Table C2: Matrix of flows of other commercial services from partner OECD countries to reporting OECD countries, 2001, in billion US dollars

Original data from OECD, TIS data file

PART\REP	OECD	AUS	JPN	CAN	USA	EU15	AUT	BEL	DNK	FIN	FRA	DEU	GBR	GRC	IRL	ITA	LUX	NLD	PRT	ESP	SWE	XEF	HUN	POL	SVK	CZE	WLD
OECD		3.4	37.3	19.9		266.8	7.0	16.1		3.1	23.3	59.1	30.1	2.0		26.8	10.2	24.4	1.8		11.7		2.5		1.1	1.7	
AUS			0.6	0.1	1.0	1.2	0.0	0.0		0.0	0.1	0.4	0.4	0.0		0.1	0.0	0.1	0.0		0.1		0.0		0.0	0.0	
JPN		0.3		0.9	8.4	5.8	0.0	0.1		0.1	0.4	1.7	1.7	0.0	0.6	0.2	0.2	0.3	0.0		0.1	0.0	0.0		0.0	0.0	
CAN		0.0	0.4		7.2	2.5	0.0	0.1		0.0	0.5	0.1	0.6	0.0	0.2	0.2	0.0	0.2	0.0		0.3	0.0	0.0		0.0	0.0	
USA		1.8	23.1	15.8		66.0	0.8	3.4		0.9	5.4	15.9	9.7	0.5	11.7	4.8	1.0	4.4	0.3		3.3	1.4	0.9		0.1	0.3	
EU15		1.0	10.7	2.5	33.4	165.3	5.0	11.7		1.9	14.9	33.2	15.4	1.3	15.0	19.3	7.5	17.3	1.3		6.4	3.5	1.3		0.6	1.2	
AUT				0.0				0.1		0.0	0.2	2.9	0.2			0.4	0.1	0.2	0.0			0.0	0.2		0.1	0.1	
BEL			0.5				0.2									0.0	1.3	2.7				0.2	0.1			0.0	
DNK				0.0			0.0	0.1		0.2	0.2	0.5	0.3			0.1	0.0	0.2	0.0			0.6	0.0		0.0	0.0	
FIN				0.0			0.0	0.0			0.1	0.3	0.3			0.1	0.0	0.2	0.0			0.0	0.0		0.0	0.0	
FRA		0.1	1.3	0.4	4.0		0.1	2.0		0.1		5.1	3.1			3.5	1.1	1.9	0.2			0.2	0.1		0.0	0.1	
DEU		0.1	1.7	0.5	5.9		2.6	1.6		0.3	2.8		3.4			3.9	1.7	3.3	0.2			0.2	0.3		0.2	0.6	
GBR		0.6	5.0	1.0	14.0		1.1	2.4		0.5	4.5	11.4				6.0	1.2	6.1	0.3			1.3	0.2		0.1	0.2	
GRC		0.1		0.0			0.0	0.0		0.0	0.1	0.3	0.1			0.1	0.0	0.1	0.0			0.0	0.0		0.0	0.0	
IRL		0.0		0.2			0.1	0.3		0.1	0.4	1.6	1.1			1.0	0.2	0.7	0.0			0.0	0.0		0.0	0.0	
ITA		0.0	0.3	0.1	0.8		0.2	0.6		0.1	1.5	2.4	1.4				1.1	0.6	0.0			0.1	0.0		0.0	0.0	
LUX			0.0				0.1									0.0		0.4				0.0	0.0			0.0	
NLD		0.2	1.2	0.2	3.5		0.4	1.9		0.2	1.6	3.7	2.7			1.4	0.6		0.1			0.2	0.3		0.1	0.2	
PRT				0.0			0.0	0.1		0.1	0.2	0.3	0.2			0.1	0.0	0.1				0.0	0.0		0.0	0.0	
ESP			0.1	0.0	0.5		0.1	0.4		0.0	0.9	1.3	0.9			0.7	0.1	0.4	0.3			0.0	0.0		0.0	0.0	
SWE		0.0	0.2	0.1	0.9		0.0	0.2		0.4	0.5	1.0	0.8			0.2	0.1	0.5	0.0			0.7	0.1		0.0	0.0	
XEF		0.0		0.1	0.3	2.6	0.0	0.1		0.1	0.1	0.3	0.5	0.0		0.1	0.0	0.2	0.0		0.7		0.0		0.0	0.0	
HUN						1.1	0.1	0.0		0.0	0.1	0.3	0.1	0.0		0.1	0.0	0.1	0.0		0.0				0.0	0.0	
POL				0.0		1.5	0.2	0.0		0.0	0.1	0.7	0.1	0.0		0.1	0.0	0.1	0.0		0.1		0.0		0.0	0.0	
SVK						0.3	0.1	0.0		0.0	0.0	0.1	0.0	0.0		0.0	0.0	0.0	0.0		0.0		0.0			0.1	
CZE						1.1	0.1	0.0		0.0	0.1	0.5	0.1	0.0		0.0	0.0	0.1	0.0		0.1		0.0		0.2		
WLD		5.2	48.1	22.0	77.8	298.4	7.6	17.3		3.5	26.3	67.2	35.3	2.2	31.8	29.4	10.7	27.4	2.0		13.0	5.5	3.7		1.1	3.3	

Table C3: Matrix of flows of other commercial services from reporting OECD countries to partner OECD countries, 2001, in billion US dollars

after all the corrections

REP\PART	OECD	AUS	JPN	CAN	USA	EU15	AUT	BEL	DNK	FIN	FRA	DEU	GBR	GRC	IRL	ITA	LUX	NLD	PRT	ESP	SWE	XEF	HUN	POL	SVK	CZE	WLD
OECD	466.1	5.9	37.3	19.9	76.6	265.0	7.0	13.1	3.2	3.8	23.3	59.1	48.6	2.7	23.8	26.8	6.8	24.4	1.8	9.0	11.7	5.3	2.5	2.3	1.1	1.7	607.8
AUS	3.2	0.0	0.2	0.1	1.2	1.3	0.0	0.0	0.0	0.0	0.1	0.4	0.5	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	4.8
JPN	24.9	0.3	0.0	0.9	13.9	6.8	0.0	0.1	0.0	0.1	0.4	1.7	3.2	0.0	0.6	0.2	0.1	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	33.8
CAN	16.7	0.0	0.4	0.0	7.2	2.7	0.0	0.0	0.0	0.0	0.5	0.1	0.6	0.0	0.5	0.2	0.0	0.2	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0	21.2
USA	104.4	2.8	14.6	15.8	0.0	61.5	0.8	1.4	0.0	0.9	5.4	9.2	17.5	0.5	11.7	3.1	0.9	4.4	0.3	2.1	3.3	1.4	0.9	0.4	0.1	0.3	137.5
EU15	264.6	2.5	7.2	2.4	46.8	145.1	2.6	9.7	2.1	2.4	14.9	33.5	22.4	1.9	9.9	10.2	5.5	17.3	1.3	5.8	5.7	3.5	1.2	1.6	0.5	1.3	323.4
AUT	8.1	0.0	0.1	0.0	0.7	5.3	0.0	0.3	0.0	0.0	0.2	3.2	0.7	0.0	0.2	0.3	0.1	0.2	0.0	0.1	0.1	0.0	0.2	0.3	0.3	0.2	13.0
BEL	11.3	0.0	0.5	0.0	0.9	8.2	0.2	0.0	0.0	0.0	1.2	1.2	0.8	0.0	0.8	0.0	1.1	2.7	0.1	0.0	0.1	0.2	0.1	0.1	0.0	0.0	16.3
DNK	4.8	0.0	0.1	0.0	0.5	2.9	0.0	0.1	0.0	0.2	0.2	0.5	0.3	0.0	0.3	0.1	0.1	0.2	0.0	0.1	0.7	0.6	0.0	0.0	0.0	0.0	7.2
FIN	2.3	0.0	0.1	0.0	0.4	1.6	0.0	0.0	0.1	0.0	0.1	0.3	0.2	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	3.0
FRA	30.3	0.1	0.6	0.4	8.0	18.5	0.3	2.1	0.2	0.1	0.0	5.1	4.4	0.2	0.5	1.9	1.3	1.9	0.2	0.0	0.4	0.2	0.1	0.2	0.0	0.1	40.9
DEU	41.0	0.8	1.4	0.5	8.1	23.4	1.0	1.4	0.5	0.2	2.8	0.0	6.5	0.8	1.3	1.8	0.9	3.3	0.2	1.8	0.9	0.2	0.3	0.4	0.2	0.6	54.4
GBR	64.0	1.2	3.6	1.0	18.6	37.1	0.3	1.5	1.0	1.0	4.5	11.4	0.0	0.5	3.6	2.7	1.0	6.1	0.3	1.6	1.7	1.3	0.2	0.2	0.0	0.2	78.6
GRC	1.7	0.1	0.0	0.0	0.4	1.0	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	2.9
IRL	9.8	0.0	0.3	0.2	1.8	6.6	0.1	0.5	0.0	0.1	0.4	1.6	1.1	0.1	0.0	1.0	0.3	0.7	0.0	0.6	0.2	0.0	0.0	0.0	0.0	0.0	13.6
ITA	20.2	0.0	0.3	0.1	0.8	7.3	0.2	0.0	0.1	0.1	1.5	2.4	1.4	0.1	0.4	0.0	0.0	0.6	0.0	0.5	0.1	0.1	0.0	0.1	0.0	0.0	29.0
LUX	4.3	0.0	0.0	0.0	0.2	3.9	0.1	0.3	0.0	0.0	0.7	1.4	0.4	0.0	0.4	0.0	0.0	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	4.7
NLD	23.1	0.1	0.0	0.1	3.6	17.3	0.2	2.9	0.2	0.2	1.6	3.7	4.6	0.1	0.7	1.4	0.3	0.0	0.1	0.7	0.7	0.1	0.1	0.1	0.0	0.1	28.9
PRT	1.8	0.0	0.0	0.0	0.2	1.4	0.0	0.0	0.0	0.1	0.2	0.3	0.3	0.0	0.1	0.1	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	2.6
ESP	7.9	0.0	0.1	0.0	0.5	5.9	0.1	0.2	0.0	0.0	0.9	1.3	0.9	0.1	0.8	0.7	0.2	0.4	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	13.6
SWE	11.9	0.0	0.3	0.1	2.2	4.7	0.0	0.3	0.0	0.4	0.5	1.0	0.8	0.0	0.7	0.2	0.2	0.5	0.0	0.1	0.0	0.7	0.1	0.1	0.0	0.0	14.9
XEF	5.3	0.0	0.1	0.1	1.4	3.5	0.0	0.1	0.4	0.1	0.1	0.2	1.4	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	6.7
HUN	1.8	0.0	0.0	0.0	0.7	0.9	0.1	0.1	0.0	0.1	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6
POL	1.7	0.0	0.0	0.0	0.0	1.4	0.2	0.1	0.0	0.0	0.1	0.7	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	2.6
SVK	0.7	0.0	0.0	0.0	0.1	0.4	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	1.0
CZE	1.4	0.0	0.0	0.0	0.2	1.0	0.1	0.0	0.0	0.0	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	2.1
WLD	613.0	7.9	52.4	24.8	108.5	344.7	11.6	17.5	5.3	4.7	31.2	77.7	58.8	3.5	29.1	36.2	7.1	31.5	2.3	13.4	14.7	6.8	3.3	3.2	1.4	2.5	813.5

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