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The CEPII CHELEM database (Trade in Services)

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Methodology of CEPII's Database on Trade in services

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The CEPII (Centre d'études prospectives et d'informations internationales), France's leading institute for research in international economics, builds a database called CHELEM (Comptes Harmonisés sur les Echanges et l'Economie Mondiale). It comprises three sub-databases on International Trade, GDP and Balance of Payments. The aim of the CEPII's database is to provide coherent long term time series for most countries of the world. Therefore, the data are updated every year. Thus, in the new version of the Balance of Payments' database (called CHELEM-BOP), disseminated at the beginning of the summer, data will be available from 1967 to 2002. Statistics on Trade in services are broken down into the 13 items recommended by BPM5^{2,3} and listed in the IMF's Balance of Payments' Statistics Yearbook⁴. In addition, aggregates for "Transportation services", "Other services" and "Commercial services" have been calculated. Data are provided in current US dollars (millions) and are completed and corrected, when necessary.

If the IMF's Balance of Payments database is the initial source, the geographical coverage is widened thanks to national data for Taiwan, for instance. While for Honk Kong, country for which the IMF publishes data only for the period 1998 - 2001, data prior to 1998 are repatriated from the previous years' CHELEM-BOP database. Due to the foundation of the Republic of Yemen united in 1999 gathering People Democratic Republic of Yemen and Arab Republic of Yemen, prior to 1989, data on the two latter countries have to be added to proxy the balance of payments of Yemen. Regarding Belgium and Luxembourg economic union (BLEU), the zone excludes the intra-area operations until 2001 and includes them in 2002, as the two countries now make separated declarations.

The aim of the Cepii's database is to construct coherent long-time series on trade in services. With this purpose, three steps are followed:

- First, inconsistencies between each aggregate (transport and other services, on one hand and total services, on the other hand) and the sum of its components are corrected;
- Second, missing data for the latter years or inter-period of less than four years are estimated thanks to a linear interpolation;

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² The Fifth Manual of Balance of Payments published in 1993 by the IMF.

³ Namely, the thirteen sectors of services are: sea transport, air transport, other transport, travel, communication, construction, insurance, financial services, computer and information services, royalties and license fees, other business services, personal, cultural, and recreational services and government services .

⁴ This list of services is considerably extended in the list defined in the "Manual on Statistics of International Trade in Services" (EUROSTAT, OECD, UNSD, 2002). The Updated version of BPM5, to be published in 2008, will also follow this extensive list (IMF, 2003b).

- Third, old data registered in the shorter nomenclature described in BPM4 (1977) and *memorandum items* associated are allocated to new items of the new detailed nomenclature of IMF's BMP5 (1993) in order to obtain longer time series.

These three steps will be successively presented.

1. Consistency between the aggregates and the sum of their components

The causes of difference between an aggregate and the sum of its components are either specific to services or usual (i. e. used for current and capital transactions).

1.1. Usual causes

Reconciling aggregates "Transportation services" and total "Services" with the sum of their components, relies sometimes on a standard solution applied to all current and capital account transactions. Services operations are, with the exception of insurance services, established on a gross basis: credits are always positive and debits are always negative. Thus five reasons of divergences between an aggregate and the sum of its components were identified for current and capital transactions:

- *1st case*: only the aggregate is available, none of the components is registered; the aggregate is allocated to the residual item either "233: Transport, non included elsewhere" or "982: Services, not included elsewhere";
- *2nd case*: the gap between the aggregate and the sum of its components is negative for a credit, positive for a debit, reflecting a greater amount of the sum of elements: the aggregate is then recalculated as the sum of its components;
- *3rd and 4th case*: the gap is equal to one or several components which is counted twice or the aggregate does not include one or several components; only the sum of components is relevant to measure the aggregate;
- *5th case*: the sum of components is smaller than the aggregate and the difference is not identifiable; the gap is reallocated to the residual variable now defined as the sum of its initial value and of the gap observed.

1.2. Causes specific to services

The treatment differs for the aggregates "Transportation services" and "Services", while no reallocation is needed for "Other services".

Divergences for "Transport"

Regarding transport, since last year we have decided to opt for the decomposition into modes (air, sea or other transport) instead of the distinction between what is transported (freight, passengers or other). If this choice is consistent with the new definition of services, it does not permit to build long time series, as many countries do not reproject their data before 1995 on average. As our database is based on individual flows which need to be additive, we face the constraint to put a number in each case and we need to find out a decomposition by mode of transport. The database cannot rely on the single aggregate transport. Therefore, the data are estimated using the following method.

- ① Countries belonging to the same broad geographical area defined by the IMF's Direction of Trade Statistics Yearbook, are gathered. When the number of countries is sufficient, the zone is subdivided into enclosed countries and non-enclosed countries. Eight groups are thus obtained: Industrial

countries, enclosed Africa, non-enclosed Africa, Asia, enclosed CEEC (Central and Eastern European Countries), non-enclosed CEEC, Middle-East and Western Hemisphere.

- ② For each of the eight areas, the average share of each mode in the aggregate transport is calculated for each year in credit and in debit.
- ③ For a given country, for each missing year, the amount earned or spent in each mode of transport is then recalculated as the product of the aggregate transport of that country and of the average share of the mode in the area to which it belongs.
- ④ It happens, in particular for CEEC, that there is no recording of the share of each mode for the older years. In this case, the total amount of earnings or expenditure of transport is imputed in the residual item “233: Transport, not included elsewhere”.

No reallocation for “Other services”

In the opposite, there are only few cases of gap between the aggregate and the sum of its components regarding “other services”. Moreover, in all occurrences, the sum of components is greater, in absolute value, than the aggregate. Then, the aggregate has to be recalculated, at the end, as the sum of all services except transport and travel. In consequence, there is no need for creating a residual item like “Other services, not included elsewhere” which would always be imputed to zero.

Divergences for total “Services”

There exist few cases where the sum of the 13 services differs from the total of services. But, for three countries there is not any breakdown available, neither for credit nor for debit and not even for transport. This happens for Japan from 1985 to 1990, due to a methodological change, for Korea in 2002 and for Vietnam from 1998 to 2002. For the two former countries, ventilation by mode is available for the other years. Thus for Japan, the share of each mode of transport is supposed to be equal to their average share in 1991 to 1993, with the exception of insurance credit⁵, period during which the breakdown is relatively stable and reflects the average observations. For Korea, the average share of the three preceding years is used to estimate the missing breakdown. As far as there is no information at all on the ventilation for Vietnam, for each missing year, the share of each item is equalized to the average breakdown of services of the area Asia, previously defined.

For Uganda and Equatorial Guinea, the breakdown of the data is missing, for some years, only for debits. The ventilation is available only for two years (1987 and 1988) for Equatorial Guinea, but despite this weak information, using the average share of these two years gives better results than reallocating data according to the share of the non-enclosed Africa.

Regarding Uganda, for 2002, the breakdown is estimated by the average share observed in 1999 to 2001. This average of the last three years available sensibly over-estimates the share for “Other services” (93 % of total services, debit) due to missing value for “Travel”. Therefore, we retain the mean of the years 1998 to 2000 for the latter, which is more on line. Regarding “Travel”, data are only available until 1998; we then use the average of the last three years (1996 to 1998). As the mean of the share is based on different years, we then have to normalise then in order that their sum equals a 100 %. It also happens that the breakdown is missing, for other items than transport, for years preceding 1999. Then, for these years, the

⁵ For insurance credit, the average share between 1991 and 1993 is negative. As negative value remains an exception for insurance credit, we have decided to apply the average share between 1993 and 1995.

average share of each non-transport item in the sum of “Travel” and “Other services, for the same years as for total services, is applied.

2. The estimation of missing data and the addition of information on missing countries

The sign of the current and capital transactions are verified. Except for insurance services, credits have to be positive and debits negative.

An estimation of missing data is made for the four last years (1998 to 2001), only for current account's transactions. A world balance is built, for each detailed item of the current account, adding the data for all countries. For each country and each year, the share of each heading of the current account in the world balance of payments is calculated. Finally, each missing value for a given item and a given country is obtained by multiplying its previous year's share by the world operations of the corresponding year.

3. Matching data from BPM4 and BPM5 classifications

The aim of CHELEM database is to offer long time series. When implementing BPM5's classification, most countries have not reinterpolated data in BPM5's classification for early years, late 60's and 70's or even 80's. It was then necessary to establish a matching table between the classifications in the 4 items of BPM4 and the 13 headings forming trade in services in CHELEM-BOP.

The matching table was built in three steps.

First, a careful study of France's balance of payments permits to establish a matching schedule for four headings of the classification in 112 items recommended by BPM4 (“Transportation services”, “Travel”, “Royalties and license fees” and “Government services”). In addition two matching were established with *memorandum items*, fulfilled in addition, on a voluntary basis, by some countries (see appendix 1).

Second, this list was tested for nine other countries both developed and developing: Germany, Greece, Italy, Japan, Mexico, Morocco, Spain, United Kingdom and United States. When the matching did not work for a country it was suppressed. It happens that France was a special case with less matching keys than the other countries of the sample so that the corresponding keys have in fact increased from six to nine (see appendix 1).

Third, for each detailed item when the value was missing in the IMF database (in practice was equal to zero) and the corresponding figure (when existing, non zero) was allocated to the related item of BPM5's classification. These data reported in the former BPM4 classification are extracted either from an earlier version of CHELEM-Bop database (prior to 1999) for the 112 basic items or from detailed data computed by the IMF for the non-mandatory *memorandum items*.

It happens that it is difficult to reinterpolate the breakdown by mode of transport for data established in BPM4 classification. Therefore, total amount of transportation is allocated to the residual item “233: Transport, not included elsewhere”.

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Appendix I : Matching table between the old IMF nomenclature and the new classification

Long-time series are obtained thanks to a matching between the 4th Manual of Balance of Payments on one hand and the 5th Manual on the other hand. Some member countries have added *memorandum items* when more details were available than the prerequisite of the 4th Manual. For instance, in France, trade in services was disaggregated into 13 items, while the 4th Manual only distinguished three of them (transport, travel and other services). These memorandum items are represented by the codes like: Q1DA B H or Q1DA B 2. The difficulty relies on the attribution of a given code to different items according to countries. Thus, this matching has been built with great care on the sample of ten countries: France, Germany, Greece, Italy, Japan, Morocco, Mexico, Spain, United Kingdom and United States.

NAME OF THE ITEMS	IMF's Codes (5 th Manual)			IMF's Codes (4 th Manual)	
	CREDIT	DEBIT	BALANCE	CREDIT	DEBIT
B. Services	2 200	3 200	4 200	Σ	Σ
Transportation services	2 205	3 205	4 205	05 + 03 + 07	06 + 04 + 08
Sea transportation services	2 206	3 206			
Air transportation services	2 210	3 210			
Other transportation services	2 214	3 214			
Travel	2 236	3 236		09 : Q1DDA 4	09 : Q1DDB 4
Other services	2 200 BA	3200BA	4 200 BA	Σ	Σ
Communications	2 245	3 245		Q1DM3A W (USA) Q1DM3A P (ITA)	Q1DM3B W (USA) Q1DM3B P (ITA)
Construction	2 249	3 249		Q1DM3A X (DEU) Q1DM3A V (FRA, ITA)	Q1DM3B X (DEU) Q1DM3B V (FRA, ITA)
Insurance	2 253	3 253		Q1DM3A 7 (USA) Q1DM3A Q (DEU, FRA) Q1DB A 2 + Q1DM3A X (ITA, MEX, MAR) Q1DB A 2 + Q1DM3A Y (Esp, Grèce)	Q1DM3B 7 (USA) Q1DM3B Q (DEU, FRA) Q1DBB 2 + Q1DM3B X (ITA, MEX, MAR) Q1DB B 2 + Q1DM3B X (Esp, Grèce)
Financial services	2 260	3 260		Q1DM3A T (USA) Q1DM3A Y (ITA)	Q1DM3B K (USA) Q1DM3B Y (ITA)
Computer and information services	2 262	3 262			
Royalties and license fees	2 266	3 266		29 : Q1DM2A 4	30 : Q1DM2B 4
Other business services	2 268	3 268		Q1DM3A 4 (GBR, MAR) Q1DM3A W (MEX, ESP, GRC)	Q1DM3B 4 (GBR, MAR) Q1DM3B W (MEX, ESP, GRC)
Personal, cultural, and recreational services	2 287	3 287			
Government services	2 291	3 291		21 + 23 + 25	22 + 24 + 26