

# Asymmetries of Current account in the intra-UE balance of payments



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# Asymmetries<sup>1</sup> of Current account in the intra-EU balance of payments

The work in the domain of balance of payment asymmetries covers two broad areas: identifying methodological improvements in each country and resolving the asymmetries at the aggregate level by a modelling approach. The latter approach has been pursued by the Eurostat Asymmetries Ad-hoc Committee (chaired by Stuart Brown – ONS, UK). The balance of payments asymmetries affect to some extent the accuracy of the Extra EU/Eurozone Current Account. Discussion is going on to determine the best way to reduce or to remove these asymmetries. This paper aims at presenting the evolution of intra-EU Current Account asymmetries, and to widen discussion of the work, particularly the modelling approach, amongst users of European aggregate statistics. Some experimental results from the models (in their current stage of development) are quoted in Part 1 for the intra-EU Balance of Payments statistics and in Part 2 for Trade in Goods. The aim of the models is to derive asymmetry-free European aggregates. They are not useable at the national (Member State) level, and they will not eliminate differences between the national and aggregate figures.

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## Part I - Reconciliation of intra-EU balance of payments

### 1. Introduction

The balance of payments (BoP) is a statistical statement that summarises, for a specific time period, the economic transactions of an economy with the rest of the world. It covers transactions for the most part between residents and non-residents. The transactions are economic flows that reflect the creation, transformation, exchange, transfer or extinction of economic values and involve changes in ownership of goods and/or financial assets or liabilities, the provision of services or the provision of labour and capital<sup>2</sup>.

The balance of payments statistics are a key economic indicator due to the close relationship existing between domestic economic and external developments. This relationship became stronger over the last decades with the growing interdependence of the world's economies and movement towards greater trade liberalisation and market integration. Balance of payments, international investment position, and related trade and financial statistics are used by agencies responsible for the formulation of policy on issues such as causes of structure imbalances, adjustment measures, merchandise trade, trade in services, etc. Financial transactions and positions have become huge, complex and are volatile. They have an impact on the monetary conditions in a given economy. The balance of current transactions holds an important place amongst macro-economic indicators often used: governments are sensitive to an external deficit or its deterioration, financial analysts use it as a major country-risk assessment tool, international organisations follow-up this information as one of the indicators to perceive the risk of a possible crisis.

In principle, the current account deficit and surplus of all countries of the world should cancel each other. In practice, it is not the case. The statistical discrepancies (asymmetries) between countries' current account balances becomes evident either in a bilateral comparison exercise, or when consolidating the items at an aggregated geographic level.

The reasons for these asymmetries can be attributed to many factors, such as:

- Different data collection systems which can have significant impact on the asymmetries: *e.g. bank settlement data, surveys to companies, estimations, imputations,*
- Errors in the classification of transactions (at disaggregated level, or between more aggregated levels<sup>3</sup>), timing of recording, geographical identification of the counterpart, misallocation;

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<sup>1</sup> Also called “discrepancies” or “imbalances”.

<sup>2</sup> As defined in the Fifth Edition of the International Monetary Fund's Balance of Payments Manual (BPM5).

<sup>3</sup> An example of the possibilities of misallocation between Goods and Services is given by OECD concerning the case of “international e-commerce transactions” to be considered as goods or as services (OECD's Statistics Brief, No1, October 2001, “Goods or Services? The case of international e-commerce”, p. 4). However, this type of misclassification does not affect the results of the Current Account at the most aggregated level.

- Dissimilar resources dedicated to recording transactions: *All countries do not have the same resources for recording and analysing the information and because of the special features of data collection they are sometimes obliged to depart from the recommended standards (in the case of insurance, for example);*
- Different treatment of complex transactions: *e.g. Portfolio income debits are generally allocated to known counterparts (brokers e.g. in London) even where a resident may be the ultimate beneficiary; also concerning related companies, the increasing speed of world-wide economic integration and proliferation of transactions between related companies, makes it difficult to correctly allocate flows;*

## 2. A world-wide problem

In its 2001 report, the IMF Committee on BoP presented the situation of global imbalances covering the period of 1994 to 2000. The global *current account* showed in 2000 a negative imbalance (an excess of recorded debits over recorded credits) of USD 128 billion, being 37 percent higher than the level of the (negative) imbalance in 1999. This situation is characterised mainly by a combination of downward trend in the level of *Goods* (positive)<sup>4</sup> imbalance since 1997, and an increase in the negative imbalance for *Services*, offset by a decrease in the negative imbalance for *Income*. While the discrepancies for *Goods* and *Income* items showed a decrease in their magnitude, the discrepancy in *Services* deteriorated in 2000 offsetting at the same time imbalances of its components: significant increase in the negative imbalance for *Transportation*; smooth upward trend of the *Travel* positive imbalance; substantial increase of the negative imbalance for *Government services*; upward trend in the positive imbalance of *Other services*.

Work being conducted both by EU and by country groupings other than EU or euro-zone, such as APEC<sup>5</sup> for example, showed the difficulties to compile comparable bilateral BoP data.

## 3. Evolution of the intra-EU asymmetries

In the recent years, the intra-EU asymmetries of *Current account* have become a source of great concern due to its size and continuity. Discrepancies identified in the bilateral balances of payments seriously hamper the compilation of the BoP for the European Union which is currently calculated by consolidating the individual BoP statements of the member states.

In principle EU “world” balance and “extra-EU” balance should be equivalent, since the sum of “intra-EU” balances for all member states should be equal to zero<sup>6</sup>. In practice this is not the case and intra-EU asymmetries introduce a bias that implies inconsistency between the EU “world” and “extra-EU” balances. Currently, Eurostat compiles the EU BoP as the sum of “extra-EU” balances for all the member states: the aggregates for the EU15 are compiled consistently on the basis of member states' transactions with residents of countries outside the European Union. The aggregated “extra-eurozone”/EU figures are compiled by Eurostat and European Central Bank (ECB).

The intra-EU asymmetries of the *Current account* became increasingly important since the beginning of the 90's. In 1998, these asymmetries reached ECU 64 Bn, equivalent to 0.84% of the EU-15 GDP. Since then, they have decreased to reach in 2001 EUR 34 Bn, equivalent to 0.39% of the EU-15 GDP:

<i>Mio ECU / EUR</i>	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Current account asymmetries (intra-EU15)	-17 295	11 151	9 342	22 022	35 727	50 276	64,334	43,858	47,319	34,299
<i>in % of GDP (EU15)</i>	-0.29	0.18	0.15	0.33	0.52	0.69	0.84	0.55	0.55	0.39

Source: NewCronos database (Eurostat), November 2002

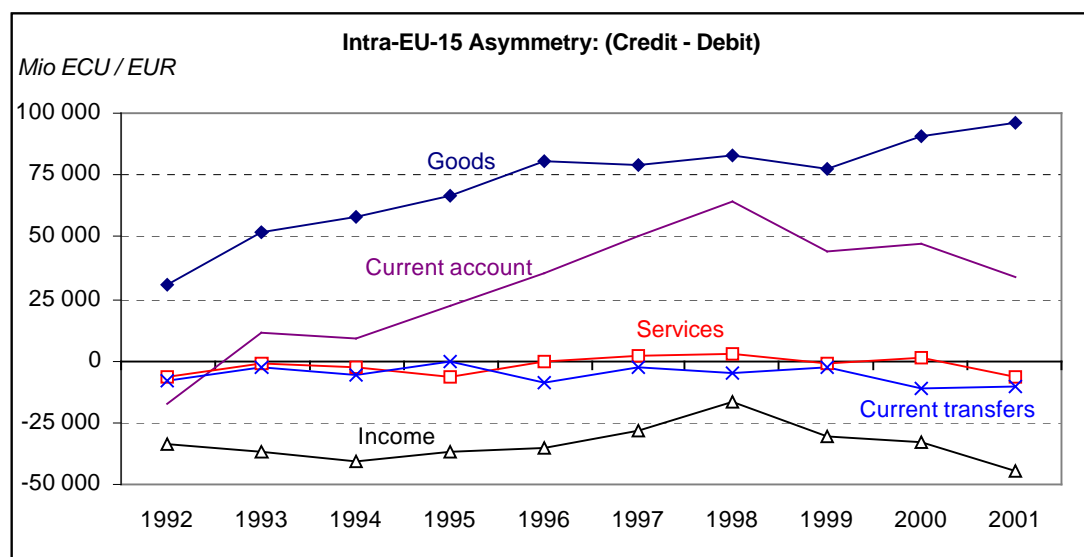
<sup>4</sup> Positive (*negative*): when reported exports or credit are higher (*lower*) than reported imports or debit.

<sup>5</sup> Asia-Pacific Economic Cooperation (APEC), <http://www.apecsec.org.sg/workgroup/tidwg/tid/chapters/chap5.html>. Among the reasons leading to bilateral data discrepancies between APEC's countries, one can note the changes in the international standards guiding the collection and compilation of statistics. The new edition (BPM5) introduced many significant changes, amongst which were differences in the dissection between goods and services transactions on the one hand, and between services and income transactions on the other. While some (APEC) members have already implemented the new classifications incorporated in BPM5 in their statistics, others still follow the earlier (Fourth) edition.

<sup>6</sup>  $EU_{World} = \sum_{MS} (World_{MS}) = \sum_{MS} (extra-EU_{MS}) + \sum_{MS} (intra-EU_{MS})$   
 $EU_{Extra} = \sum_{MS} (extra-EU_{MS}) = \sum_{MS} (World_{MS}) - \sum_{MS} (intra-EU_{MS})$   
In principle, if  $[\sum_{MS} (intra-EU_{MS}) = 0] \Rightarrow EU_{World} = EU_{Extra}$

During recent years, the situation concerning intra-EU asymmetries has been extensively analysed and reported by several Eurostat groups (in collaboration with European Central Bank and Member States): Ad Hoc Committee on Asymmetries, Technical Group (TG) on Asymmetries, and TG on Travel.

The major components of the *Current account* involved with the asymmetries are the *Goods* and *Income* items. As can be seen in the following chart, the asymmetry for the *Goods* item deteriorated since 1993<sup>7</sup>, with the exception that between 1996 and 1999 a relative stability was observed. Overall, the asymmetry of *Goods* increased from ECU +51 Bn in 1993 to EUR +96 Bn in 2001. Concerning the *Income* item, the asymmetry was always negative and lower in absolute value, than the asymmetry for *Goods* item. It represented ECU -37 Bn in 1993 against EUR -45 Bn in 2001:



Source: NewCronos database (Eurostat), November 2002

Goods statistics are based on the external trade statistics compiled by Member states. The intra-EU trade statistics are produced from data collected through Intrastat system where the coverage is less exhaustive than that of a customs-based system. Since the introduction of Intrastat in 1993, the intra-EU imports (*Arrivals*) has been on average around 5% below the value of intra-EU exports (*Dispatches*), indicating a substantial under-reporting of intra-EU imports and which causes an asymmetry in the trade balance. An analysis of the intra-EU trade statistics discrepancies and the reconciliation method applied are presented in the Part II of the document.

The use of Goods statistics in the BoP requires the valuation of imports (originally CIF based) at FOB resulting in an adjusted imports value lower than the imports statistics published (in CIF) by Member states<sup>8</sup>. In the case of intra-EU *Goods* item, the adjustment from CIF to FOB worsens the existing intra-EU discrepancies of the trade balance. The intra-EU imports figures that were already lower than the intra-EU exports, become lower due to the “CIF to FOB” adjustment which increases the gap between the two figures.

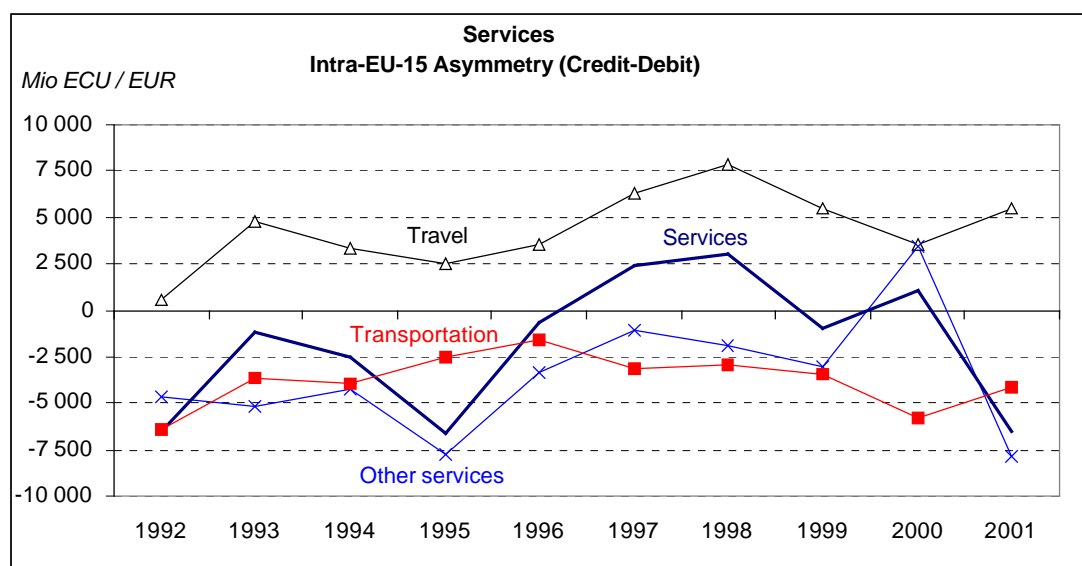
As the merchandise trade statistics represent a significant component of the Current Account in the BoP, the evolution of intra-EU statistics discrepancies has affected the overall intra-EU asymmetries of the balance of payments statistics. However factors other than Intrastat may also contribute to the discrepancies of the intra-EU asymmetries (e.g. Community and national concepts, risk of double counting of services for transactions of goods with non-residents<sup>9</sup>).

<sup>7</sup> Due to a reported *Dispatches* (intra-EU exports) higher than reported *Arrivals* (intra-EU imports).

<sup>8</sup> CIF (cost, insurance, freight) value = FOB (free on board) value of the exported merchandise + Freight and insurance costs related to its shipment.

<sup>9</sup> Irving Fisher Committee on Central-Bank statistics, IFC bulletin, No 10, October 2001, “Integration of the trade statistics in the balance of payments of the Belgian-Luxembourg Economic Union and the current account of Belgium”, by Guido Melis (National Bank of Belgium), p. 65-67. *Risk of double counting*: When goods are imported in Belgian for account of a non-resident, stored, eventually repacked and finally exported to other EU countries, the export registration is based on the invoice value, which encompasses not only the value of the imported goods but also the services rendered by Belgian residents, as well as the profit margin. As the services rendered mostly are already included in the appropriate items of the balance of payments, the integration of the trade statistics in the community concept (where transactions by non-residents are not excluded) may result in double counting.

Concerning the intra-EU *Services* item, although it seems relatively balanced at “total” level until 2000, the situation is much different when it comes to a lower level of aggregation for this item. Furthermore, the intra-EU asymmetry for *Services* deteriorated in 2001 due to a negative increase of *Other services* intra-EU asymmetry. The following chart presents the evolution of the asymmetry for the main components of *Services* item:



Source: NewCronos database (Eurostat), November 2002

The Eurostat’s *Asymmetries Ad-hoc Committee* under the co-ordination of the *Committee on Monetary, Financial and Balance of payments statistics (CMFB)* undertook some actions in order to identify, to propose and to apply adequate solutions. Two approaches were retained:

- **Bottom-up:** this approach consists of bilaterally analysing the differences between the member states so that the asymmetries can be resolved at source through agreement on general rules that are respected by each member state (so that asymmetries are avoided in future). Member states try to assess and improve the quality of their balance of payments statistics by conducting bilateral comparisons that may lead to identification of areas where there is still a need to harmonise concepts, definitions, and compilation methods. In addition, reporting gaps and weaknesses of the different reporting systems may be detected and may contribute to the debate on devising a future European data collection system.

This approach is gradual and requires a significant investment in time and resources. The main advantage is that the results affect and improve directly the quality of national BoP statements. It has already contributed to improve the comparability for “travel” and “compensation of employees” items through bilateral/multilateral studies undertaken between member states;

- **Top-down:** with the top-down approach asymmetries are eliminated on the basis of a model, i.e. starting from a number of mathematical rules and specific assumptions; Among the models being developed, the *BoP Global Method* is the one providing best results. The model is based on a probabilistic approach and uses qualitative information. It uses intra- and extra-EU<sup>10</sup> aggregate data and the outputs are “asymmetry free” intra-EU and adjusted extra-EU BoP figures. The model is applied to the whole of the balance of payments and takes into account three asymmetry factors, namely the “geographical” dimension, the “classification” dimension and the “over- or under-estimation of the values”. It runs a minimisation equation under constraint to estimate the three variables for each item. The model runs only on aggregated data and produces results for European aggregates only. The adjusted figures which are the results of the model do not substitute the official published BoP statistics for each country. It should be stressed that reduction of asymmetries at the national level will only come from a bottom-up approach for each component.

<sup>10</sup> Including “World not allocated”.

#### 4. Detailed description of the Global Method (top-down approach) for EU-15

The Global Method (based on the Stone econometric model) allows the distribution of the asymmetries. This distribution is carried out via the minimisation of a function under constraints<sup>11</sup> which enables the estimation of adjustment coefficients. There are three coefficients of adjustment for each flow (three for *credit* and three for *debit*). Each of these coefficients is related to one of the three types of possible errors that have been identified:

- q geographical allocation error: wrong allocation of partner country, for example when the final recipient country is sometimes wrongly identified because of transit operations.
- q classification (or allocation) error: when the exporting country does not classify this flow in the same heading as the importing country, it leads to an asymmetry for two BoP items.
- q over or under estimation error of flows: the value of the exchanges can lead to different calculation between the importing and the exporting countries, particularly when this calculation is carried out by estimations.

The error linked to the timelag is not taken into account. Indeed, while working on annual data, this type of error does not appear to be significant, except for ending year transactions. The other reason is that the model is by construction, working on one set of yearly data at a time. It is planned to incorporate a time series element into the model.

The coefficients are used to allocate all the asymmetry among the three errors before distributing it on the credit and debit flows to remove the asymmetry. The model incorporates qualitative information by using a probability matrix (obtained from BoP compilers, *see example below*) that distributes the global asymmetry among the three types of errors (geographical allocation, classification, over/under estimation), item by item, for the credit and for the debit.

In the following example, for a given item (say *Transport*) the potential errors are estimated by b.o.p. compilers to be more in the debits (57%) than credits (43%), and in each case the share of the main sources of errors are distributed according to their relative importance. This qualitative information allows the model to estimate adjusted values:

Credit				Debit				Grand total
Geo.	Class.	Estim.	Total	Geo.	Class.	Estim.	Total	
13	8	22	43	16	9	32	57	100

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**Global Method methodology:** The model makes a minimisation of an objective function, under two basic concepts and one assumption: (1) there is no error related to a wrong geographical allocation at the world level; (2) errors due to wrong classification are equal to zero, when summing up all items; (3) at intra level, the sum of errors related to over or under estimation of flows is supposed to be equal to the share of the world Errors and Omissions (E&O) due to intra exchange. The assumption is that in the absence of supplementary information, the distribution of E&O between intra and extra is in line with the distribution of current transactions. The result is a series of adjustment coefficients. Intra data is adjusted by the three coefficients related to the three type of error, and world data is adjusted by two coefficients (geographical error disappears at world level). Extra data is obtained by difference (Intra + Extra = World).

$$\text{Min } \frac{1}{2} (X^{**} - X^*) V^{-1} (X^{**} - X^*)$$

$$(AX^{**} - K) = 0$$

Where:

- $X^{**}$  represents the set of estimated coefficients (x, y, z) for the distribution of asymmetries;
- $X^*$  represents the set of probability coefficients (x, y, z) provided by member States;
- x: *geographical allocation error*, y: *classification error*, z: *over or under estimation error*;
- K: *Net Errors and Omissions (Intra)*;
- P: *items of the b.o.p.*
- $(AX^{**} - K) = 0$  summarises the following system of constraints:
  - (1)  $\forall p \in P, (x_p^{**} + y_p^{**} + z_p^{**} + x_p' + y_p' + z_p') = 1$
  - (2)  $\sum_{p \in P} A_p y_p^{**} = 0$  and  $\sum_{p \in P} A_p y_p' = 0$
  - (3)  $\sum_p (A_p z_p^{**} - A_p z_p') = k$



The tests carried out and the obtained results are encouraging. The model derives “asymmetry-free” BoP statistics for EU-15 using the given qualitative information. It allows also an overall adjustment, taking into account the links between “current transactions”, “financial transactions” and “Errors and Omissions”.

Concerning *Goods* item, it should be noted that in the model the BoP original intra-EU figure is replaced by the “asymmetry free” intra-EU trade statistics for goods estimated by Eurostat (see Part II). The extra-EU figures include “World not allocated” (*so that Intra-EU + Extra-EU = World*).

The output results of Global Method for the period of 1995 to 2001 are presented below:

**Table 1: Evolution of Current Account before and after adjustments**

Reporter: EU15	“Net” in billion ECU / EUR	2001	2000	1999	1998	1997	1996	1995
Intra-EU Current Account	Published (BoP)	34.3	47.3	43.9	64.3	50.3	35.7	22.0
	After adjustment for intra-EU Goods <sup>12</sup>	- 61.4	- 43.0	- 33.8	- 18.3	- 28.8	- 45.1	- 44.2
	Adjusted (GM approach)	0	0	0	0	0	0	0
Extra-EU (*) Current Account	Published (BoP)	- 22.2	- 67.2	- 8.5	27.5	68.1	41.0	35.9
	After adjustment for intra-EU Goods	- 22.2	- 67.2	- 8.5	27.5	68.1	41.0	35.9
	Adjusted (GM approach)	- 28.1	- 69.4	- 8.1	26.2	64.0	29.3	23.7
World Current Account	Published (BoP)	12.1	- 19.9	35.3	91.8	118.4	76.7	57.9
	After adjustment for intra-EU Goods	- 83.6	- 110.2	- 42.3	9.1	39.2	- 4.1	- 8.3
	Adjusted (GM approach)	- 28.1	- 69.4	- 8.1	26.2	64.0	29.3	23.7
World Errors and Omissions	Published (BoP)	- 12.4	- 73.7	10.4	- 42.9	- 25.9	- 45.7	- 38.4
	After adjustment for intra-EU Goods	83.3	16.6	88.1	39.7	53.2	35.1	27.8
	Adjusted (GM approach)	26.6	- 12.6	32.8	14.9	20.2	12.8	10.0

(\*) including “World not allocated”

**Table2-a: Evolution of intra-EU BoP before and after adjustments**

Reporter: EU15 Net (Credit – Debit), in Bn ECU / EUR	2001		2000		1999		1998		1997		1996		1995	
	Publ.	Adj.	Publ.	Adj.	Publ.	Adj.	Publ.	Adj.	Publ.	Adj.	Publ.	Adj.	Publ.	Adj.
Goods	95.7	0.0	90.3	0.0	77.7	0.0	82.7	0.0	79.1	0.0	80.8	0.0	66.2	0.0
Transportation	-4.2	0.0	-5.8	0.0	-3.4	0.0	-2.9	0.0	-3.2	0.0	-1.5	0.0	-2.6	0.0
Travel	5.5	0.0	3.5	0.0	5.4	0.0	7.9	0.0	6.3	0.0	3.6	0.0	2.5	0.0
Other services + Not allocated	-7.8	0.0	3.4	0.0	-3.0	0.0	-2.0	0.0	-0.7	0.0	-2.7	0.0	-6.5	0.0
Compensation of employee	0.0	0.0	-0.1	0.0	0.1	0.0	-2.6	0.0	-2.5	0.0	-2.1	0.0	-1.7	0.0
Investment income	-44.6	0.0	-32.8	0.0	-30.5	0.0	-14.1	0.0	-26.1	0.0	-33.4	0.0	-35.3	0.0
Current transfers	-10.3	0.0	-11.2	0.0	-2.4	0.0	-4.6	0.0	-2.6	0.0	-9.0	0.0	-0.6	0.0
<b>Current Account</b>	34.3	0.0	47.3	0.0	43.9	0.0	64.3	0.0	50.3	0.0	35.7	0.0	22.0	0.0
<b>Capital account</b>	2.4	0.0	11.2	0.0	3.7	0.0	-2.3	0.0	-1.7	0.0	-6.5	0.0	-6.6	0.0

**Table2-b: Evolution of extra-EU (\*) BoP before and after adjustments**

Reporter: EU15 Net (Credit – Debit), in Bn ECU / EUR	2001		2000		1999		1998		1997		1996		1995	
	Publ.	Adj.	Publ.	Adj.	Publ.	Adj.	Publ.	Adj.	Publ.	Adj.	Publ.	Adj.	Publ.	Adj.
Goods	2.4	2.4	- 54.3	- 54.3	11.4	11.4	44.6	44.6	67.0	67.0	43.3	43.3	34.9	34.9
Transportation	6.2	5.1	4.9	3.5	4.3	3.5	3.7	3.0	1.6	0.8	- 0.4	- 0.8	0.8	0.0
Travel	- 5.1	- 3.0	- 1.4	0.0	- 3.9	- 1.8	- 1.8	1.3	1.1	3.3	0.2	1.4	0.4	1.2
Other services + Not allocated	10.2	8.6	5.1	5.8	10.8	10.2	9.4	8.9	13.8	13.6	13.0	12.4	11.0	9.5
Compensation of employee	4.4	4.4	4.8	4.8	5.0	5.0	2.3	2.0	2.5	2.2	2.8	2.5	2.5	2.3
Investment income	- 6.2	- 10.0	2.1	0.9	- 9.4	- 9.4	- 9.2	- 11.5	4.0	- 0.4	2.6	- 7.3	11.7	1.3
Current transfers	- 34.1	- 35.7	- 28.5	- 30.1	- 26.6	- 27.0	- 21.4	- 22.0	- 22.0	- 22.4	- 20.6	- 22.1	- 25.4	- 25.5
<b>Current Account</b>	- 22.2	- 28.1	- 67.2	- 69.4	- 8.5	- 8.1	27.5	26.2	68.1	64.0	41.0	29.3	35.9	23.7
<b>Capital account</b>	- 6.6	- 6.1	- 5.4	- 3.1	- 6.5	- 5.7	- 1.3	- 1.6	- 2.6	- 2.8	- 2.9	- 3.9	- 0.5	- 1.5

(\*) including “World not allocated”

<sup>12</sup> includes Eurostat adjusted (asymmetry free) figures for intra-EU *Goods* item.

## Part II - Reconciliation of Intra-EU statistics on trade in goods

### 5. Evolution of the intra-EU asymmetries

Before the introduction of Intrastat in January 1993, intra- EU import and export flows were comparable at the aggregated level (all products). Since the implementation of the Intrastat system, a significant asymmetry has been observed between the two flows, with exports higher than imports (see graph). This bias is relatively stable and represents, each year, from 4 to 6% of the total amount of intra- EU exports, i.e. approximately 0.8% of the GDP of the European Union.

The external balance of the European Union (15 members) is not affected by this intra- EU asymmetry for reasons described below, but the external balance of the eurozone (12 members) is systematically overestimated, since Intrastat data are used to measure the balance with the 3 non eurozone EU countries. Consequently, the effect on the extra eurozone BoP current account is significant, considering the high share of trade in goods in this account.

As stated before, the BoP Global Method uses, for the *Goods* item, a specific model applied to intra- EU trade statistics.

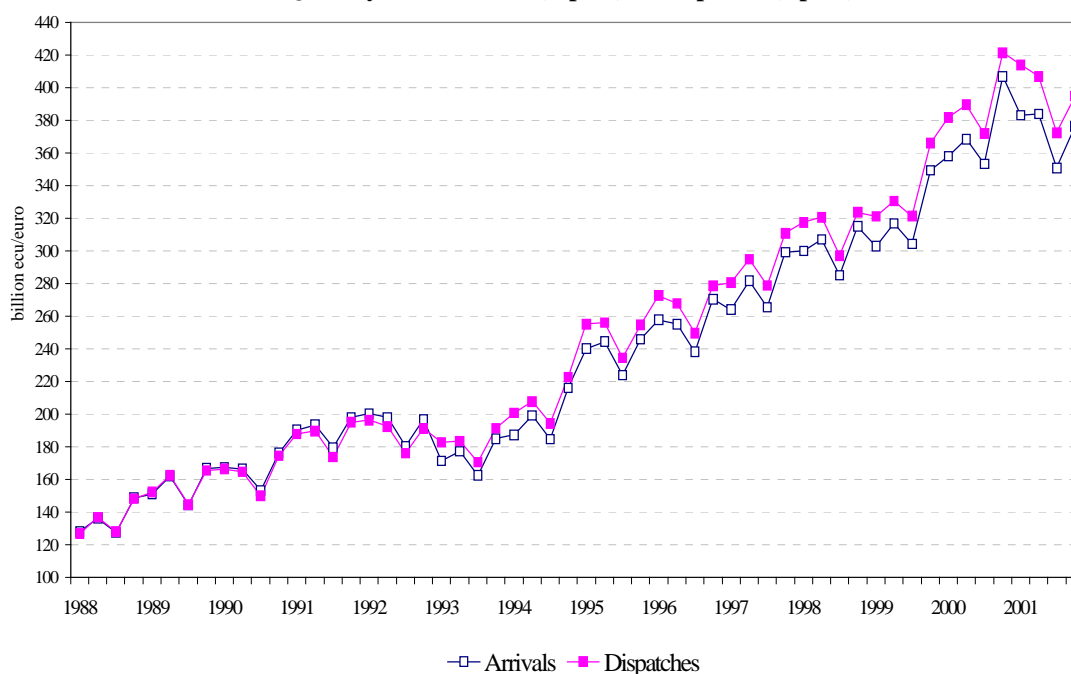
Indeed, trade in goods statistics show special characteristics:

- These statistics are based on specific declarations: the risk of confusion with other items of the BoP is very low.
- The collection systems are separate for the intra and extra- Community: the risk of error of geographical allocation between these two areas is therefore also very limited.
- Information on the extra- EU trade remains the customs declarations, a source which preserved a high level of quality and reliability.

The essential source of the error is therefore an over or under estimation of intra- EU flows, which may lead to a bias in the estimate of the eurozone external balance, since trade between the 12 eurozone members and the 3 non eurozone EU members is based on Intrastat declarations.

Another characteristic of trade statistics is the availability of monthly time series on a long period, which makes it possible to calculate automatically, from the data itself, the probability coefficients used by the model.

Evolution of intra-EU trade -  
Quarterly value of arrivals (imports) and dispatches (exports)



Source: Eurostat, June 2002

## 6. Work on reconciliation

The two approaches endorsed by the *Asymmetries Ad-hoc Committee* ("bottom- up" and "top- down") have been applied to trade in goods.

The "bottom- up" approach made it possible, starting from bilateral analyses between Member States, to identify the main causes of asymmetries. Since Intrastat has kept essentially the same concepts and definitions used for extra- Community customs declarations, it is clear that the absence of asymmetry before 1993 shows the limited role played by the conceptual aspects. The main causes of asymmetries are rather connected with the introduction of thresholds below which the companies are exempted from declaration, and to a non- response phenomenon from some companies above the thresholds.

The bilateral analyses however did not make it possible to quantify the effect of each cause of asymmetry and to define rules allowing a reconciliation of mirror flows.

On the contrary, the second approach ("top- down") makes it possible to reconcile flows, on the basis of statistical models.

A first model, based on time series analysis and detection of outliers, led to a partial reconciliation but was not optimal. A new model, which is more systematic and ensures a full reconciliation, has recently been developed. This "multivariate" model leads to reconciled levels that can be considered as optimal from a statistical point of view (see attached description of the methodology). The model uses techniques that have already been used in the framework of National Accounts (where inconsistencies between data from different sources is a current situation). The basic model has been originally specified by Stone, Champernowne et Meade (1942), Byron (1978). It has been developed more recently by Weale (1988, 1992), Smith and al (1998).

The model is flexible and can be combined with exogenous hypotheses, such as the introduction of a preference for one flow in specific cases.

Experimental results of the model, at the eurozone level, are the following:

### Extra eurozone trade balance

	Billion ECU / EUR					
	Export		Import		Balance	
	<i>Initial</i>	<i>Adjusted</i>	<i>Initial</i>	<i>Adjusted</i>	<i>Initial</i>	<i>Adjusted</i>
<b>1997</b>	755,5	752,7	682,7	689,0	72,8	63,7
<b>1998</b>	788,4	785,0	720,4	726,1	67,9	58,9
<b>1999</b>	822,9	819,3	790,1	795,8	32,9	23,4
<b>2000</b>	1001,3	994,9	1020,8	1025,1	- 19,4	- 30,2
<b>2001</b>	1052,5	1042,2	1004,9	1011,5	47,7	30,6

Results show that, without a correction of the Intrastat asymmetry, the overestimation of the eurozone trade balance is close to 10 billion ECU / EURO a year, except for 2001, where an increase of intra- EU asymmetries can be noticed (but data for 2001 are still provisional).

Such a correction could be applied in the future to the aggregated measure of eurozone trade flows. Nevertheless, the sensitivity of results to the model specification is more important at the level of Member States. This is why it is not planned to apply such a correction at the level of each Member State. For the same reason, it would be difficult to adjust statistics at the level of partner countries or detailed products.

## 7. References

- [1] Byron, R (1978), "The estimation of large social account matrices", *Journal of the Royal statistical Society*, Serie A, 141, 359- 367.
- [2] Smith R., Weale M et Satchell S. (1998), "Measurement Error with accounting constraints: point and interval estimation for latent data with an application to UK gross domestic product", *Review of Economic Studies*, n'65,

- [3] Stone, J.R.N, DA Champernowne et J.E Meade (1942), "The precision of national income accounting estimates", *Reviews of Economic Studies*, 9, 111- 125.
- [4] Weale, M.R. (1988), "The reconciliation of values and prices in the national accounts", *Journal of the Royal Society, Serie A*, 151, 211- 221.
- [5] Weale, M.R. (1992), "Estimation of data measured with error and subject to linear restrictions", *Journal of Applied Econometrics*, 7, 167- 174.

### Methodology of trade data reconciliation

This method is based on multivariate models under constraints. The objective of this modelling is to correct existing bias by estimation of the part of the present errors with statistical tools. The basic idea consists in maximising the log- credibility function under constraints. The method considers difference between mirror time series as measurement errors.

$y_t = y_t^* + \varepsilon_t$  with  $Cy_t^*=0$ , where  $y_t$  : vector of observed flows  
 $y_t^*$  : vector of unknown true value of flows  
 $\varepsilon_t$  : vector of errors  
 $C$  : matrix of constraints expressing equality of mirror flows

By modelling the process of error, one considers a series smoothed with regard to disturbances. Several models are tested according to the process trend and error type. Precisely, the six following models are tested:

- Stationary process, white Noise;
- No stationary (integrated) process, white Noise,
- Cointegrated process, white Noise;
- Stationary process, MA (1);
- Stationary process, MA (4);
- Stationary process, MA (12);

All these models are specified and estimated at chapter level (2 first digits of the Harmonised System) for all links between Member States, using sliding monthly time series over 5 years. For each link at chapter level, the best model is selected on a minimisation of the BIC criterion (Bayesian Information Criterion). The method also takes into account various factors relative to the behaviour of the external trade series and particularly the fact that, in theory, the declarations of expeditions are better than the declarations of arrivals in term of quality. Consequently, a weighted BIC criterion as well as a distinction on series were introduced.  $\mu_1$  and  $\mu_2$  parameters were so introduced:

- $\mu_1$  parameter allows to distinguish series. In case the proportion for which the number of months where expeditions are superior or equal to arrivals, is superior or equals in  $\mu_1$  then the adjusted BIC criterion is used on these series otherwise, a pure BIC is applied.  $\mu_1$  parameter was fixed to 0.333 i.e. 12 observations.
- $\mu_2$  parameter allows to weight the BIC criterion so as to consider the quality of expeditions, supposed more reliable when expeditions are significantly higher than mirror arrivals. This criterion weighted the model which minimises distance with the BIC criterion (min BIC) and distance with flow of expeditions (Min RMSE). The expression is as follow :

$$Adjusted\ BIC = \mu_2\ min\ RMSE + (1 - \mu_2)\ min\ BIC$$

This parameter was fixed to 0.666.

The production of reconciled balances is made by a treatment in several stages. At first, data to be reconciled are extracted at 2 digits and the confidential trade and adjustments are redistributed in proportion to the importance of declarations by product at 2 digits. In a second step, data are reconciled over five sliding years by relation of a reporter with a partner. Finally, reconciled trade balances are calculated by various aggregations of estimated flows on a temporal and geographic base.