

**Challenging the “snapshot theory” of  
Purchasing Power Parities:  
Eurostat’s revision of the PPP 1995 to 2000**

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by

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## 0 Summary and structure of the paper

Between April 2002 and December 2003 Eurostat undertook together with the 31 countries participating in the Eurostat coordinated part of the European Comparison Programme (ECP) a thorough revision of the Purchasing Power Parities (PPP) 1995 to 2000. Such a thorough and systematic revision is unprecedented in the history of PPP and represents a break with the traditional “snapshot” theory of PPP.

The objective of the revision was threefold:

- to have a consistent time series of national accounts (NA), aggregates and detailed weights, underlying the calculations;
- to ensure consistency of the prices used in PPP with those underlying the values in NA;
- to obtain consistency over time of the practical approaches used by the price statisticians, particularly for difficult cases.

This was necessary as the introduction of ESA95 did not occur at once in all its parts and not in all countries at the same point in time. Consequently, a multitude of breaks in the time series existed and affected the comparability of volume indicators over time or between countries within one given year, which was widely criticised by economists, politicians and in the media.

The paper describes the work undertaken during the revision and presents the main results for all countries at aggregated level in the form of a before-after comparison. It is shown that the revision was necessary, successful and addressed the criticisms raised with regard to the reliability of PPP and related economic indicators. The paper also discusses uses of PPP and limitations of their use. The revision revealed that educating users about how to use and not to use PPP is as important as producing good quality data. The data presented here are the preliminary results of the revision as of December 2003. Final results will be published by Eurostat in July 2004.

It needs to be underlined that economic history has not been re-written by the revision. Taking the general level of statistical error associated with PPP into account, which does not allow to rank countries exactly according to their GDP per head in PPS, only one of the EU Member States<sup>1</sup> has changed the “group of comparable level” it belongs to for any of the six years under revision. The only exception concerns one year and the switch to the next higher group by just crossing the borderline.<sup>2</sup>

The changes in the PPP results compared to prior to the revision are mostly due to changes to input data delivered by the participating countries and some methodological decisions consistently incorporated into the data sets for all years and countries. Correction of treatment errors was a very rare case. The revised input data delivered by the countries, again, in the big majority of the case represented more complete, consistent and up-to date data. Correction of errors was only in individual cases the reason for change.

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<sup>1</sup> The terms Member States, Accession Countries and Candidate Countries used in the paper refers to the political map of the EU as of December 2003, see also annex 3.

<sup>2</sup> The major changes for Cyprus (1999) and Malta among the EU Accession Countries are related to the introduction of ESA95, coming from outdated national accounting systems. For Malta the data before and after revision are not comparable at all.

The paper has the following structure:

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## **1 The revision of PPP and related economic indicators 1995 to 2000**

### **1.1 Why did we need this revision?**

Traditionally, PPP have been seen as snapshots in time, which, once established, are never revised. This snapshot theory, however, is not entirely satisfactory. It has some advantages like simplicity for users and less workload for data producers, but the disadvantage is that it leads to data sets that become both internally and externally inconsistent when time elapses.

Inconsistencies arise because of the three forms of input data which the overall PPP calculations depend on - price survey results, GDP and expenditure weights and other input data (e.g. rents and salaries in General Government) - only price survey results have a snapshot character; i.e., once collected, prices cannot be re-collected or revised. NA related input data – e.g. GDP weights – are subject to **regular revisions** according to the national timetables. These national revision timetables are not (yet) harmonised across the EU; although, the annex B of the ESA95 regulation defines the points in time when certain information has to be delivered to Eurostat. However, regular NA revisions up to 24 months are and can be taken in to account in establishing the PPP. The regular Eurostat production calendar of PPP has been adjusted to the transmission programme of ESA95 (see Box 1).

But other type of NA revisions - so called **major revisions** e.g. because of considerable methodological changes – have not so far been taken in to account in the PPP. One such change was the switch from ESA79 to ESA95, which is the most important reason for the revision of European PPP.

The introduction of ESA95 did not occur at once in all its parts and not in all countries at the same point in time. For the original 15 Member States the main aggregates had to be delivered in April 1999 but some of the detailed tables only two years later. Some Member States have had derogations to its implementation, some of which stretch into 2005. The other countries introduced ESA95 progressively over the pre-accession period. Due to the step by step introduction of ESA95, different national timetables and derogations NA related input data in the PPP calculations

before 2000 referred to ESA79 or ESA95 at different points in time in the individual Member States.

Consequently, the comparability of volume indicators over time or even between countries within one given year was affected, which was widely criticised by economists<sup>3</sup>, politicians and in the media – giving Eurostat further assurance of the need of the revision.

### **Box 1: Regular annual PPP revisions at Eurostat**

**PPP** are established on an annual basis, therefore only annual revisions apply. According to the regular publication calendar, PPP are released as preliminary estimates 12 months after the end of the reference year (T) and revised to final data after 24 months. In addition, an early estimate of PPP, a so-called nowcast is published - at a high aggregation level - 5 months after the end of the reference year. This regular PPP revision / release calendar is in line with the data delivery timetable for NA data as given in the ESA95 regulation<sup>4</sup>. The current regular Eurostat revision calendar for PPP is summarised as follows:

- T+5 months: now-cast of PPP for the year T, based on the first GDP and main aggregates estimates for T (available T+4 months)<sup>5</sup> and extrapolated prices of T-1;
- T +12 months: preliminary PPP for the year T, based on the first estimate of detailed GDP expenditure weights (available T+9 months), the first consumer price survey of T; and first estimates of other input data
- T+24 months: final PPP for the year T, based on revised detailed GDP expenditure weights (available T+21 months), both consumer price surveys for T and revised data for all other input data

In addition, the changes of the level of GDP and other aggregated expenditure data are taken into account with regard to volume indicators, as the PPP are always applied to the latest available NA data. These revisions of NA aggregates are frequently done in one or more of the 31 participating countries, affecting the relative position of the country and the EU average.

The weights underlying the PPP calculations, however, are not always fully consistent with the latest aggregated GDP data to which the PPP are applied. This is due to a built-in feature of the NA compilation and revision process, where more aggregated data may be revised more often than the detailed expenditure weights, which are usually revised only once a year and submitted to Eurostat with delays of T+9, T+21 months etc. To obtain full consistency the PPP calculation should be re-run after each ESA95 data delivery to Eurostat. Obviously, this is not feasible and thus, establishing and revising PPP in line with the NA delivery calendar for detailed expenditure weights and applying these PPP always to the latest available aggregated data is a compromise between up-to-dateness of data, stability of data and workload.

Another justification for the revision was the situation of the EU Candidate Countries, who, during the same period as the ESA95 switchover was made, upgraded their NA systems from older systems - such as MPS, SNA68 or even own national systems – to European standards. And who all, in addition, became fully participating members of the European comparison project at the same era. Only few of the Candidate Countries participated fully in PPP price surveys in years

<sup>3</sup> **Dalgaard, Esben and Henrik Sejerbo Sorensen (2002)**; “Consistency between PPP Benchmarks and National Price and Volume Indices”; Paper presented to the 27th General Conference of the International Association for Research in Income and Wealth, Stockholm; **Magnien, François (2002)**; “The Measure of GDP per capita in Purchasing Power Standards (PPS): a Statistical Indicator Tricky to Interpret”; Paper presented to the OECD NA Experts Meeting, Paris; **Varjonen, Seppo (2001)**; “Consistency between GDP Based on PPPs and NA Time Series”; Paper presented to the OECD NA Experts Meeting, Paris; **Varjonen, Seppo (2002)**; “Improving the Quality of PPP Series”; Paper presented to the OECD NA Experts Meeting, Paris.

<sup>4</sup> ESA95; European System of Accounts 1995, Commission Regulation (EC) 2223/1996 of 25 June 1996

<sup>5</sup> According to latest EU legislation concerning data delivery from Member States to Eurostat, the t+4 months deadline has been changed in July 2003 to T+70 days for early delivery of aggregated NA data. As soon as all countries are able to fulfil this requirement, the nowcast could be published earlier, too.

before 1999. Therefore, there was a need to review respective retrapolation of the PPP in the light of revised deflators coming from the revised NA.

In summary, for the majority of the participating countries, the reference year 2000 was seen as the first year where the PPP input data coming from the NA were based uniformly on ESA95. Moreover, since the reference year 1999, all Candidate Countries have fully participated in the price surveys according to the Eurostat survey cycle. Eurostat, therefore, believed that it was the right time to make the PPP revision in order to achieve consistency with ESA95 and improve spatial and temporal comparability of volume indicators, such as GDP per head in PPS.

At the same time, other inconsistencies detected in the process of reviewing input data and executing the revision calculations were corrected. Particularly, important improvements were made in two areas. Firstly, the consistency over time and between countries of other input data – rents and government salaries – was studied and checked against Eurostat’s guidelines for data collection. An interesting finding was that the interpretation of PPP as a “snapshot in time” had led to less emphasis on the temporal consistency of the input data at the national and Eurostat level. In addition, changing interpretations of guidelines due to changes in staff seemed to be a major source for breaks in the time series of input data. Secondly, the conceptual consistency between the prices collected for the PPP and the prices underlying the GDP expenditure weights was reviewed and improved.

## 1.2 Main results of the revision at GDP level and for actual individual consumption

It is not an easy task to present the results of such a large scale and complex operation like the revision of PPP. The results can be analysed from many points of view. In this paper results at a high level of aggregation– GDP and actual individual consumption (AIC) - of the revision and description of the changes made are presented.

In table 1, the volume index per head of GDP and of AIC is given in a “before” – “after” comparison as far as data is available at this point in time. Mainly for the EU Member States, the results for the GDP are commented on and further analysed. Annex 1 (table 8) and annex 2 (table 9) provide the before and after comparison of the respective PPP and price level indices without further comments. “Before” describes the data as they have been published in December 2002<sup>6</sup>, “after” contains the preliminary revision results as of December 2003. As explained later under 2.2, particularly the results for the EU Accession and Candidate Countries may change from the presented ones, as the ESA95 revisions of NA has not yet been finished in all countries. The way how PPP are established within the European comparison excludes that these changes will influence the results of the Member States<sup>7</sup>.

Table 2 addresses the grouping of countries according to the level of the GDP volume index per head. Finally table 3 deals with the analysis of the revision results over time.

It is, however important to understand the different status of the information, given below<sup>8</sup>:

Country groups	1995	1996	1997	1998	1999	2000
<b>MS</b>	Revision	Revision	Revision	Revision	Revision	Revision
<b>ACC and CC</b>	Retrapolation (PL, MT, CZ, RO n.a.)	Retrapolation (PL, MT, CZ, RO n.a.)	Retrapolation (PL, MT, CZ, RO n.a.)	Retrapolation (PL, MT, CZ, n.a.)	Revision (CZ n.a.)	

<sup>6</sup> See: Statistics in focus, Theme 2- 56/2002, Eurostat, 2002 for the year 2000. The years 1999 to 1995 given here represent the data as they were published in the Eurostat dissemination database New Cronos at this point in time.

<sup>7</sup> The Eurostat PPP results are established by application of fixity to the results of the EU Member States. The results presented here were calculated with fixity EU15.

<sup>8</sup> For abbreviations see annex 3.

### ***Volume index per head of GDP and AIC***

Table 1, overleaf, presents the GDP per head in PPS and the Actual Individual Consumption (AIC) per head as percentage of the EU15 average. The per head volume index of AIC has been calculated using the respective specific PPP.

There are two main features of the results of the revision when compared to the situation before. Firstly, the level of GDP / AIC per head in PPS for some countries has been revised consistently for the years under revision, reflecting now better the relative position of these countries to the EU average and other countries. This is e.g. the case for Denmark, Germany, France, Sweden, Iceland and Switzerland. Secondly, the revised data show for many countries by far more logical development over time than before -even if over time comparison is not the main purpose for which PPP have been developed<sup>9</sup>. Formerly observed “jumps”, which where hard to explain, have been removed successfully. This is e.g. the case for Belgium, Denmark, France and UK.

The change of the volume index per head of GDP / AIC before and after the revision is an overall result of a multitude of influencing factors that can add to each other or cancel each other partly or fully out. Among the factors there are those that come directly from the own data of a country, like changes to:

- the price data reported
- the nominal value of GDP / AIC
- the expenditure structure of GDP / AIC
- the population figure

However, as the PPP exercise is a truly multilateral exercise, it is also possible that a PPP, price level index (PLI) or volume index of a country changes without any changes to its own input data and only because the data of other countries have changed. During the revision exercise changes to national data, which had a big impact on other countries, were the revisions of the UK population figures and rents and the French and UK salary data. As in the latter case the revisions to the French and UK data went into opposite directions, the overall effect on other countries was partly cancelled out.

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<sup>9</sup> See also part 3 of this paper.

**Table 1: Volume index per capita of GDP and AIC 1995 to 2000, EU15=100**

		GDP						Actual individual consumption					
		1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000
BE	published end-2002	112	113	112	112	106	107	106	109	109	109	101	102
	after revision	109	107	107	105	105	106	105	105	102	102	99	101
DK	published end-2002	116	118	123	121	121	118	117	121	121	122	114	108
	after revision	113	114	114	113	116	116	109	109	110	110	111	106
DE	published end-2002	111	109	109	106	107	106	112	110	110	107	106	107
	after revision	108	107	105	104	103	102	108	108	106	104	104	103
GR	published end-2002	66	67	66	68	68	67	73	72	73	73	73	72
	after revision	65	65	66	65	65	66	72	72	73	72	70	70
ES	published end-2002	77	78	79	79	82	82	74	75	76	73	81	81
	after revision	79	79	80	81	84	83	79	78	78	79	82	82
FR	published end-2002	108	104	102	99	100	101	105	102	105	103	99	99
	after revision	104	103	104	104	104	104	103	103	103	103	102	101
IE	published end-2002	93	93	101	112	110	115	84	80	82	89	91	91
	after revision	90	94	102	106	111	115	80	82	86	87	89	91
IT	published end-2002	103	103	100	104	103	102	103	102	99	106	105	102
	after revision	104	104	102	103	102	101	102	100	100	102	101	101
LU	published end-2002	169	162	167	176	183	195	146	145	131	137	141	142
	after revision	161	161	168	175	189	199	136	137	136	139	144	142
NL	published end-2002	107	107	110	114	115	111	100	99	102	102	104	102
	after revision	109	109	110	110	110	111	97	98	99	99	99	100
AT	published end-2002	108	113	113	110	111	114	103	108	105	101	110	112
	after revision	114	115	113	113	114	114	111	113	112	110	112	112
PT	published end-2002	67	70	73	72	73	70	69	74	73	73	78	73
	after revision	66	66	67	68	70	70	70	70	71	72	73	74
FI	published end-2002	96	97	99	101	102	104	88	90	87	86	86	87
	after revision	96	96	101	103	102	104	82	83	85	86	85	86
SE	published end-2002	101	102	102	102	103	106	96	97	97	96	98	98
	after revision	107	107	106	104	108	109	101	100	100	99	102	103
UK	published end-2002	96	99	101	102	100	102	103	105	106	107	107	110
	after revision	100	101	104	103	103	104	108	110	112	112	112	114
IS	published end-2002	118	120	117	121	120	117	114	125	121	129	121	122
	after revision	113	116	115	117	116	115	111	114	114	116	121	121
NO	published end-2002	122	130	130	123	125	147	104	106	107	109	107	110
	after revision	120	127	129	121	129	147	108	111	109	109	109	109
CH	published end-2002	134	127	129	128	125	120	121	119	117	118	115	110
	after revision	128	123	125	124	120	119	118	116	116	114	111	109
BG	published end-2002					27	25					32	28
	after revision	28	25	23	24	24	25					27	27
CY	published end-2002					84	75					89	82
	after revision	75	74	73	73	74	76					80	83
CZ	published end-2002					59	56					60	56
	after revision						60						57
EE	published end-2002					37	40					40	42
	after revision	31	32	35	36	35	37					38	40
HU	published end-2002					50	49					50	49
	after revision	45	45	46	47	48	49					48	49
LV	published end-2002					29	31					32	33
	after revision	26	27	29	30	30	31					33	34
LT	published end-2002					33	36					39	43
	after revision	31	32	34	35	34	35					41	41
MT	published end-2002					*	*					*	*
	after revision					71	71					78	77
PL	published end-2002						40						41
	after revision					41	41					44	43
RO	published end-2002					24	23					27	25
	after revision				24	23	23					27	26
SK	published end-2002					48	46					51	47
	after revision	40	42	43	43	43	44					45	44
SI	published end-2002					68	67					67	65
	after revision	61	62	64	64	67	66					66	65
TU	published end-2002					26	25					27	26
	after revision	27	28	30	29	27	28					29	29

\*The last data published for Malta referred to 1999 and an outdated NA system. They are not comparable with the data after the introduction of ESA95, given in the table above.

### Grouping of countries

Table 2 below presents the grouping of countries according to the GDP per head in PPS as percentage of the EU average. In the table the countries are grouped in the same way as they are normally presented in Eurostat publications of overall PPP results and related economic indicators, i.e. below 50%, between 50 and 75, between 75 and 90%, between 90 and 110% (around the average), between 110 and 125% and above 125 % of the EU average.

**Table 2: Volume index per capita of GDP, EU Member States and Acceding Countries by groups of comparable level**

	1995	1996	1997	1998	1999	2000	2001	2002 P
More than 125% of EU15 average	LU	LU	LU	LU	LU	LU	LU	LU
110% - 125% of EU15 average	DK, AT	DK, AT	DK, AT	DK, AT	DK, IE, AT	DK, IE, NL, AT	DK, IE, NL, AT	DK, IE, NL, AT
90% - 110% of EU15 average	BE, DE, FR, IT, NL, FI, SE, UK	BE, DE, FR, IE, IT, NL, FI, SE, UK	BE, DE, FR, IE, IT, NL, FI, SE, UK	BE, DE, FR, IE, IT, NL, FI, SE, UK	BE, DE, FR, IT, NL, FI, SE, UK	BE, DE, FR, IT, FI, SE, UK	BE, DE, FR, IT, FI, SE, UK	BE, DE, FR, IT, FI, SE, UK
75% - 90% of EU15 average	ES, IE,	ES	ES	ES	ES	ES, CY	ES, CY	ES, CY
50% - 75% of EU15 average	EL, PT, CY, SI	EL, PT, CY, SI	EL, PT, CY, SI	EL, PT, CY, SI	EL, PT, CY, MT, SI	EL, PT, CZ, MT, SI	EL, PT, CZ, HU, MT, SI	EL, PT, CZ, HU, MT, SI
Less than 50% of EU15 average	EE, HU, LV, LT, SK	EE, HU, LV, LT, SK	EE, HU, LV, LT, SK	EE, HU, LV, LT, SK	EE, HU, LV, LT, PL, SK	EE, HU, LV, LT, PL, SK	EE, LV, LT, PL, SK	EE, LV, LT, PL, SK

Note: P preliminary

The table captures the situation after the revision. It would, however, look for the EU Member States and most Acceding and Candidate Countries very similar to the situation before the revision, except that the rank of individual countries within a given group might have been different. As it can, however, not been underlined often enough that PPP results are not suitable for strict rankings, this is not shown and the countries in the individual groups are in alphabetical order.

Within the group “around the EU average” (90% - 110% of EU15 average) it can be observed that the countries cluster more and more around a very narrow range of outcomes<sup>10</sup>. This means e.g. that the four big Member States Germany, France, Italy and UK for the years 1997 to 2000 practically have been at the same level.

An extraordinary development over time can be observed for Ireland. Belonging to the second lowest group in 1995 (75 - 90 % of the EU15 average), the country has climbed to the second highest group (110 - 125% of the EU15 average) in 2000, and only in six years. To a large extent, this reflects the high growth rate of GDP that has been well above the EU average during this period.

### **Benchmark PPP results for 2000 versus extrapolation of 1995 data with NA growth rates**

Because PPP have been primary developed for spatial comparisons they should be used for temporal comparisons with the necessary care. Part 3 below gives more detail on why full simultaneous transitivity over time and space is not possible.

Nevertheless, Table 3, overleaf, summarises the improvements to the time dimensions obtained by the revision. The analysis is done by comparing the results of two “benchmark” years from the PPP exercise, 1995 and 2000, with a benchmark - extrapolation calculation for the same period. This extrapolation was done by multiplying the 1995 GDP per head in PPS of each country with the NA GDP growth rate 2000 over 1995, relative to the EU average, and dividing it with the population growth rate 2000 over 1995, relative to the EU average. This has been done for the data sets before and after the revision and finally the difference between the benchmark PPP

<sup>10</sup> See also part 3 of this paper.



results and the extrapolated figures has been compared for the situation before and after the revision, expressing the extrapolations as percentage of the PPP results.

Table 3 indicates that the very big differences, which existed before the revision between the benchmark GDP per head coming from the PPP exercise at the one side and the extrapolations of a “benchmark” year, using NA growth rates, at the other side could be reduced considerably for many countries as e.g. Belgium, France, Ireland, Austria and Switzerland.

If one expresses, for the EU Member States, the extrapolation results 2000 as a percentage of the benchmark results 2000, the average relative difference over all Member States is 2.8 % before the revision and goes down to 1.8 % after the revision.

However, big differences still remain for some countries - particularly for Ireland, Luxembourg, Iceland and Norway. This is explained by the openness of their economies and, particularly in the case of Norway as an oil exporter, by the effects of erratic changes in the exchange rates (which are used as export and import prices in the PPP calculation). In the case of Ireland, also the high growth of the economy plays a role here, as this is connected with bigger changes to relative prices.

**Table 3: Difference between PPP benchmark results and extrapolations using NA growth rates; before and after the revision of PPP 1995 to 2000**

Country	before revision			after revision			Diff. before revision, %	Diff. after revision, %
	VI GDP PPP-1995	VI GDP PPP-2000	VI GDP extrap.NA-2000	VI GDP PPP-1995	VI GDP PPP-2000	VI GDP extrap.NA-2000		
	1	2	3	4	5	6		
BE	112	107	113	109	106	109	5,3	2,6
DK	116	118	115	113	116	112	-2,3	-3,1
DE	111	106	107	108	102	104	0,6	1,9
GR	66	67	67	65	66	67	-0,3	1,1
ES	77	82	81	79	83	83	-1,3	-0,2
FR	108	101	107	104	104	103	6,1	-0,4
IE	93	115	125	90	115	121	8,9	4,9
IT	103	102	100	104	101	101	-1,7	-0,1
LU	169	195	197	161	199	188	1,4	-5,2
NL	107	111	110	109	111	112	-0,3	1,5
AT	108	114	109	114	114	115	-4,3	0,8
PT	67	70	71	66	70	70	1,9	-1,0
FI	96	104	106	96	104	105	2,2	1,3
SE	101	106	105	107	109	111	-1,6	1,5
UK	96	102	98	100	104	102	-3,7	-1,7
IS	118	119	134	113	115	128	12,2	11,7
NO	122	147	126	120	147	123	-14,5	-16,3
CH	134	120	128	128	119	122	6,2	2,5

## 2 Detailed information about the revision by subject area

### 2.1 Organisational, timing and resource aspects of the revision

The revision was undertaken between April 2002 and December 2003, following a very strict and tight timetable. Reviewing input data of 7 years and re-doing all the respective calculations for 31 countries involved a substantial resource commitment at Eurostat level and in the NSIs – where both PPP and NA departments were closely involved. The revision was made without a discontinuity in the current PPP production.

In order to successfully carry out the revision Eurostat involved experts from the NSIs and OECD in the detailed planning, management and supervision of the revision. To gain that end a **task force “Revision”** was established, which comprised Austria, Belgium, France, Italy, Portugal,

OECD and Eurostat. Its function was to plan the revision in detail, to follow-up each stage and to solve methodological questions. The task force met during the revision four times.

The **NSIs** co-ordinated the work between PPP and NA at national level and provided Eurostat with revised input data according to the agreed timetable. They were also responsible for checking newly calculated PPP data.

**Eurostat**, who initiated this revision, was responsible for the overall co-ordination and the management of the revision. It made the initial review of the data and reported inconsistencies and suspected errors in the data sets to the task force and the countries. Eurostat finally undertook the new calculations for establishing the revised PPP, PLI and volume indicators, and drafted the revision publications<sup>11</sup>.

## 2.2 The scope of the revision

Table 4 below summarises the scope of the revision. The detailed steps taken are described under the points 2.3 to 2.8 below.

**Table 4: Scope of the revision**

Subject area	Scope of revision
GDP and expenditure weights	<ul style="list-style-type: none"> <li>➤ consistent use of the ESA95 data</li> <li>➤ improvement of the internal consistency of the expenditure weights</li> <li>➤ improvement of consistency of PPP prices and price underlying NA</li> <li>➤ more comprehensive treatment of missing expenditure weights</li> </ul>
Consumer price survey data	<ul style="list-style-type: none"> <li>➤ collected prices cannot be revised and are assumed to be the <b>most reliable part of the PPP exercise</b>, however, few extreme outliers found in over time comparisons, were deleted</li> <li>➤ re-classification of all respective basic headings according to the latest COICOP classification</li> </ul>
CPI	<ul style="list-style-type: none"> <li>➤ re-classification according to the latest COICOP classification</li> <li>➤ use of consistently based CPI time series</li> </ul>
Equipment goods and construction prices	<ul style="list-style-type: none"> <li>➤ consistent application of survey guidelines,</li> <li>➤ comparison over time with other related indicators available, e.g. NA</li> <li>➤ retrapolation of reliable data for 2000 or 2001 to earlier years</li> <li>➤ consistent application of VAT exemptions in line with NA</li> </ul>
General Government	<ul style="list-style-type: none"> <li>➤ consistent application of survey guidelines for salaries,</li> <li>➤ comparison over time with other related indicators available, e.g. NA</li> <li>➤ consistent application of methodology over time</li> </ul>
Housing services	<ul style="list-style-type: none"> <li>➤ review of price data and consistency to NA expenditure data,</li> <li>➤ review of quantity approach data,</li> <li>➤ review of the methodology for Candidate Countries for housing services in NA and PPP</li> </ul>
population	<ul style="list-style-type: none"> <li>➤ use of figures according to the NA definition of population; allow for corrections after the last census in individual countries</li> </ul>
PPP, PLI, volume indicators	<ul style="list-style-type: none"> <li>➤ new calculation based on reviewed price data, expenditure weights and other input data</li> </ul>

Generally, it was thought that the revision at the same level of detail as the regular annual PPP calculations should only be undertaken for the years 1995 to 2000. Earlier years will be revised

<sup>11</sup> We would like to particularly thank Dr. Sergey Sergeev who supported Eurostat with this task.

using rougher methods, such as retriapulation of PPP using consumer price indices (CPI), NA based implicit deflators or ratios coming from the revision. The level of retriapulation will be decided after appropriate test calculations. It is foreseen to publish revised longer time series together with the final revision results by July 2004.

In the case of the **EU Candidate Countries**, revising data back to 1995 in detail turned out to be too difficult because of the absence of consistent price and other NA related input data. As mentioned above, the EU Candidate Countries participated fully in all PPP Eurostat prices surveys only from 1999. It was, therefore, decided to limit a detailed revision of the PPP of the EU Candidate Countries to the years 1999 and 2000. The revised PPP of 1999 was then used to retriapulate the years 1998 to 1995, as far as suitable retriapulation factors were available at this point in time. The aggregation was based on the new consistent GDP expenditure weights, as far as they were provided at this point in time by the Candidate Countries for the period 1995 to 2000.

**Table 5: Summary of most important changes to countries' data for the year 2000 during the revision, %**

	GDP	Population	PHC	Housing*	Equip. Goods	Construction	Salaries**
	Mio. Nat. Curr.	Mio.	PLI	PLI	PLI	PLI	PLI
BE	0	0	0	5	-4	3	2
DK	-1	0	0	6	-5	1	4
DE	0	0	0	5	2	10	1
GR	0	3	0	8	2	-9	-10
ES	0	0	0	-4	2	-4	6
FR	0	0	-1	7	4	-6	-17
IE	-1	0	0	-4	-3	-4	4
IT	0	0	2	10	-6	-3	9
LU	4	-1	0	11	5	-1	7
NL	0	0	-1	-3	1	-5	3
AT	1	0	0	7	-2	-5	5
PT	0	2	0	-6	-1	-14	12
FI	-1	0	0	11	-2	-12	9
SE	5	0	-6	8	6	3	4
UK	0	-2	0	-23	-2	8	10
IS	-2	0	0	4	0	-7	4
NO	0	0	1	-2	1	-1	3
CH	0	0	1	7	-2	3	2
BG	0	0	18	-5	-2	5	-11
CY	0	4	6	-40	-2	4	1
CZ	0	0	-5	9	0	2	5
EE	0	0	6	30	1	5	5
HU	0	2	-3	25	-1	5	4
LV	0	0	-6	26	1	-1	4
LT	-1	0	-3	23	2	-14	4
MT	7	0	-3	31	-4	-7	10
PL	4	0	-2	11	-1	-7	4
RO	0	0	-1	-20	3	-10	16
SK	3	0	0	0	1	-2	4
SI	5	0	0	32	7	-15	26
TU	0	0	-6	-15	-3	-6	5

\* Housing, water, electricity, gas and other fuels \*\*salaries in general government

Table 5 above summarises the most important changes to countries' data, expressing the numbers as of December 2003 (preliminary revision results) as a percentage of the numbers as of December 2002. The year 2000 has been chosen as an example to give an impression of the order of magnitude of the revisions. Further comments are given in the parts 2.3. to 2.8. below.

## 2.3 GDP and expenditure weights

One of the main reasons for undertaking the revision was to produce PPP data which have underlying NA **weights** that are for all years in line with ESA95. As ESA95 is now uniformly implemented throughout the EU, the first precondition – i.e. having weight structures compiled according to the same principles in all countries – to obtain reliable results is met. In addition, there are two more requirements. The weights have to be for each country internally consistent within each year. The weights also have to be complete, no gaps should exist, except for those categories where in reality no expenditure exists in a given country, e.g. on railway services in Iceland in the absence of a railway system.

As important as the structure of GDP is the total **level** of GDP. Often the PPP deflated level of GDP is the focus of international comparisons. In the EU, also the allocations of funds in the framework of the EU regional policy are based on a level criterion, the GDP per head in PPP terms.

### ***Revision of level of GDP***

The data provided by the countries revealed for some countries considerable changes to the level of GDP, after the underlying NA systems have been brought into line with ESA95 (see table 5).

For the **EU Accession and Candidate countries** an additional problem needs to be taken note of. All Eurostat NA projects for the full implementation of ESA95 in these countries, including an exhaustiveness project and a project with regard to dwelling services, which both have non-negligible impact on the level of GDP, were scheduled with a final deadline at mid-2004, the point in time of EU accession.

It must be, therefore, underlined that the GDP volumes presented in this paper may undergo further changes, particularly for the EU Accession and Candidate countries.

### ***Revision of the GDP expenditure weights***

All 31 countries provided revised GDP expenditure weights for all years except Poland (only 1999, 2000), Romania (only 98 to 2000), Czech Republic (only 2000) and Malta (only 2000). Malta provided, in addition, the level of GDP for 1999, to which the structure of 2000 could be applied as a first approximation of detailed expenditure weights for those years. All countries announced full weights sets for the final revision calculations by mid-2004.

The problems detected in the submitted revised weights could be classified under a) internal inconsistencies in the data and b) missing data.

As far as the **internal consistency** of data is concerned, Eurostat strongly recommended the countries to complete the GDP weights questionnaire (which provides detailed NA breakdowns of GDP) “bottom up”. However, still many cases were found where data did not add up to the aggregates at various aggregation levels. This was corrected in bilateral discussions.

Furthermore, the initially sent revised data still contained many gaps, even if guidance was given by Eurostat to keep the number of **cells with missing data** to a minimum. The following order of tackling the missing values was suggested:

- a) exploitation of new data sources not being used so far, e.g. household budget survey
- b) use of structures of less recent years for certain aggregates
- c) use of expert estimates,
- d) use of structures of “similar” countries or equal distribution of aggregates between the basic headings concerned.

In cases where countries could not supply complete structures, extensive work was undertaken by Eurostat to **estimate missing values**. In a number of instances the proposals made by Eurostat encouraged countries to come up with their own estimates. However, in the majority of cases the

proposals of Eurostat for estimating missing values were accepted by the countries concerned without amendments.

Eurostat also put emphasis on checking if the **development over time** of the revised expenditure weights showed a plausible pattern. At detailed level the annual (current price) change of expenditures and of the expenditure shares were analysed. In general, the dynamics of the GDP weights over time looked plausible for all countries.

## 2.4 Consumer prices and CPI

### **Consumer prices**

Consumer prices are seen as the most reliable part of the PPP exercise. The changes occurring during the revision, therefore, were in the overwhelming majority of the countries comparatively modest (see table 5). The way that the surveys are organised in the Eurostat-OECD comparison does, however, cause problems when one wants to review them over several years.

In this area, the **first problem** for the revision was that consumer prices for PPP are collected using a rolling benchmark approach over 3 years. This means that prices for all items underlying private household consumption are only available after a full survey cycle is finished. The system has the consequence that every year the annual basic heading PPP are based on new price information for one third of the basket and for two thirds on extrapolations. The extrapolation factors are the CPIs that are applied to the respective basic heading PPP for which prices have been collected one and two years ago. To cover the years 1995 to 2000 in the revision, for consumer prices, consequently, one would have to go back to 1993, as the basic heading<sup>12</sup> PPP for 1995 make use of prices collected in 1993, 1994 and 1995. Every re-calculation of basic heading PPP on the other hand involves an enormous workload.

To tackle the problem raised above it was decided that the revision of consumer prices with subsequent re-calculation of the basic heading PPP should be restricted to the surveys between 1999 and 2001. In addition, it was restricted to significant mistakes found in price data, as not every apparent error in the detailed price data has noticeable consequences at the aggregated level. In the end only a handful of changes were reported and only by six countries. These were incorporated into the calculations. The anomalies were identified by over time comparison of basic heading PPP. The exercise confirmed consumer prices being a relatively reliable and stable part of the exercise.

The **second problem** arises from the fact that in every year under revision a different and increasing number of countries participated in the comparison and different management arrangements applied. An overview of the situation is given in Annex 1. The calendar year 2001 was the first when all 31 countries participating today in the Eurostat co-ordinated group were on an equal footing in terms of consumer price surveys, as only then everybody had participated in a full three-year survey cycle.

To address this problem, it was decided that the respective basic heading PPP for the EU Accession and Candidate Countries for the years 1999 to 2001 should be formed exclusively based on the price data collected during the survey cycle 1999 to 2001. This meant for instance that the year 1999 was formed by the prices collected in 1999 and by retrapolating basic heading PPP from 2001 and 2000, rather than extrapolating 1997 and 1998.

A **third problem** was that a survey of prices in the area of health was only carried out in 1996 and 2001. To avoid extrapolations over too long a period in time, it was decided to use the basic heading PPP of 2001 to retrapolate to 2000 and 1999 and to use the basic heading PPP of 1996 to extrapolate 1997 and 1998.

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<sup>12</sup> A basic heading is the smallest, more or less homogenous, group of goods or services for which a PPP is calculated. Eurostat currently uses 282 basic headings.

**Fourthly**, the problem of different classifications in use during the period 1995 to 2000 had to be addressed. During 1995 to 1998 the 217 basic headings for consumer goods and services were classified according to the “classification of households goods and services” (CHGS) in line with ESA79, and from 1999 for the 199 basic headings now in use the “classification of individual consumption by purpose” (COICOP) in line with ESA95 was applied. For the re-classification, existing Eurostat linking tables were firstly reviewed and refined and secondly applied. In this process few errors in applying the linking tables, which were made in the past by Eurostat were corrected. The very time consuming work of re-classification was one of the most imports “backbones” of the revision.

### ***Consumer price indices (CPI)***

CPI plays an important role in the PPP calculations as they are used for extrapolating basic heading PPP between survey years. Normally, the CPI data itself is very seldom revised. However, as different basic heading classifications were used in different years, Eurostat asked the participating countries to provide a consistent set of CPI for all years according to the COICOP classification. In addition, it was taken care that countries delivered CPI with the base always being the previous year equal to 100. In the pre-revision data sets it was discovered that this was not always the case. This had led to some errors in application of the right CPI, what now has been corrected. The consistent set of CPI, all rightly based, was the second important “backbone” of the revision.

## **2.5 Dwelling services**

Dwelling services are a very difficult area in both NA and PPP and at the same time, the share of dwelling services in GDP is very high. As a consequence, inconsistencies between e.g. rent data in PPP and NA have a big influence not only on the price level index and volume index of dwelling services, but also at the total GDP level. A part of the volatility observed prior to the revision in PPP and related data, even at the level of GDP, was clearly related to dwelling services.

PPP for rents are established using two different methods, the price approach and the quantity approach. The price approach is applied for countries where well-developed rental markets exist and, in addition, the rents paid in the rented sector are representative of the owner-occupiers sector. For countries with a very small and unrepresentative rented sector, e.g. dwellings rented mainly by foreigners in superior quality dwellings, the volume of owner-occupied housing services has to be estimated directly. The latter situation is typical for the housing markets in most EU Accession and Candidate Countries. The direct volume estimate is done by multiplying a quantity indicator, usable living area in m<sup>2</sup> adjusted with a price per m<sup>2</sup>, and a quality indicator comprising the share of dwellings with a certain set of facilities. In this case PPP are finally derived indirectly by dividing the expenditure on housing service (value indicator) by the volume indicator. When using two methods to establish PPP for two country groups, finally the PPP need to be linked together. This is currently done via Austria, which provides sufficiently detailed information for both, the price and quantity approach.

The special situation with the housing market in most of the EU Accession and Candidate Countries has not only consequences for the PPP calculations but also for NA. The high share of owner occupation and the non-representativity of the small rented sector do not allow estimating output for owner occupied housing services using rents from similar dwellings. A task force comprising EU Member States', Accession Countries' and US experts investigated the problem and developed a user cost method<sup>13</sup> for estimating owner occupied housing in countries with the above described non-market situation on the dwellings market. The method was subsequently tested by all countries concerned and proofed to be not only applicable, but also leading too much

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<sup>13</sup> See A. Katz (2004) “Estimating Dwelling Services in the Candidate Countries: Theoretical and Practical Considerations in Developing Methodologies Based on the User Cost of Capital Measure”, paper at the SSHRC International Conference on Index Number Theory and the Measurement of Prices and Productivity, Vancouver

more plausible results for both the GDP at current prices in the NA as well as for the PPP deflated volumes.

### ***Rents – price approach***

Concerning rents, actual rents and imputed rents have to be distinguished. Actual rents are those which tenants pay to their landlords when they rent a certain dwelling on the housing market. For owner-occupiers rents have to be estimated (imputed) by applying rents from similar dwellings rented at the housing market.

During the revision various aspects of rents' data have been analysed. These were mainly:

- the dynamics of actual and imputed rents and of the respective expenditure weights over time
- the conformity of the rents reported in PPP with the rents underlying NA
- coverage of rents and the change in the basic heading classification

As to dynamics of rents and respective weights over time, it was realised that there was often unexplainable volatility. Subsequently, the countries undertook enormous efforts to provide improved rents data and weights, which show a much smoother development over time.

Countries also checked if the rents reported for the PPP exercise are in line with those used to establish the NA. In a few countries subsequently the level of rents was adjusted (see table 5). The most prominent example is the UK, whose new PPP rents data set now is fully in line with the rents underlying the NA. This correction had considerable influence on the PPP deflated volume even at GDP level for the UK and, as the UK has a big weight in the EU average, also on other countries.

Another issue of importance in the case of rents is services related to the dwelling. Under the former basic heading classification, services like water supply, sewerage, refuse collection etc. were included in the rent. The new COICOP classifies these items under separate headings. In fact, this issue of coverage of rents has two aspects as the problem exists in the rent's data that is reported for PPP as well as for the GDP expenditure weights. During the revision the coverage of rents in PPP and NA has been carefully verified and appropriate corrections have been made consistently over all years.

### ***Rents- quantity approach***

Due to the structure of their dwelling markets, the quantity approach has been applied for the following 11 countries: Bulgaria, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia. For some EU Member States and EFTA countries in addition to the price data the quantity information was collected. This made test calculations possible which showed sufficient consistency of the results obtained by the two approaches.

The revised calculations for the quantity approach brought particular improvements of the overall results for Cyprus and Malta. Previously, for these countries the price approach was applied which produced unreliable results. For both countries these improvements were mainly responsible for the considerable changes to the volume index of GDP.

## **2.6 Equipment goods and construction prices<sup>14</sup>**

Equipment goods and construction is another very difficult area in the PPP exercise, which is without any doubt responsible for a fair share of the volatility observed in PPP and related indicators prior to the revision. The much specialised technical nature of the equipment goods and

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<sup>14</sup> For this part of the paper text passages of draft PPP manual have been used, which is currently commonly established by Eurostat and OECD.

construction projects to be priced, moreover, makes it necessary to involve industry experts, as most statistical offices do not have the necessary technical expertise available in-house.

The approach adopted for the survey of **equipment good prices** is similar to that followed for consumer goods and services – that is, specification pricing. This is the pricing methodology that involves the selection of a basket of precisely defined products with a view to having comparable products priced in each country. Products are fully defined in terms of all characteristics that influence their purchasers' price. The objective is to price to constant quality in order to produce price relatives between countries that reflect "pure" price differences. The characteristics specified will cover both the product (performance, operation and quality) and the transaction (order size, discounts, delivery and installation). Ideally the products priced by countries would be identical, but in practice they have to be equivalent. For equipment goods, this means that the products priced do not necessarily have to be the same brand and model and some deviation from the technical parameters is tolerated. The transaction characteristics, however, have to be respected since countries are required to report actual transaction prices and not list or catalogue prices.

The objective of comparisons of **construction prices** is to compare the purchasers' prices actually paid, as always in PPP price comparisons, for comparable and representative buildings and civil engineering works across participating countries. In construction, however, the complexity and the country specific nature of the products of the construction industry make it difficult to achieve both complete comparability and representativity in the same comparison. Countries participating in Eurostat-OECD construction price comparisons are required to price a number of standard, but fictitious, construction projects covering different types of residential buildings, non-residential buildings and civil engineering works. Although not real constructions, the standard construction projects are based on actual construction methods and practices. Each standard construction project has its major components and their elementary components itemised and defined in a product specification called a "bill of quantities". In addition to detailing the components, the bill of quantities also provides a "preamble" describing the project, its location and other factors that need to be taken into account when the pricing it. Each bill is accompanied by a set of technical drawings.

### ***Retrapolation versus historic price data***

There was general consensus among the members of the revision task force that it will be virtually impossible for NSIs or industry experts to confirm or correct historical prices for bills of quantities for construction projects or for the equipment goods items surveyed in the years concerned by the revision.

Over time analyses of PLIs at basic heading level have, however, shown remarkable volatility. Therefore, retrapolation of PPP from 2000 or 2001 backward has been considered as a possible alternative solution. This thought was also based on the considerable work which the NSI, industry experts and Eurostat had put into the improvements of the capital goods and construction price surveys for these two years which produced by far more plausible results than for earlier years. As suitable retrapolation factors, on grounds of availability, the implicit deflator from the NA for Gross Fixed Capital Formation or for its sub-aggregates was used for all countries.

### ***Non deductible VAT***

For international comparisons of equipment goods and construction projects' prices another problem arises, the different national rules for deductibility of VAT and its consistent treatment for the PPP prices and the underlying NA weights. In NA, only that part of the VAT is recorded in the gross fixed capital formation that is effectively paid by the investing unit. The difference between the VAT applied to the product and the "effectively paid VAT" come from the fact that market producers can deduct the VAT, i.e. the VAT paid is reimbursed by the tax office.

Normally, the deductibility rules apply for companies, i.e. in many cases the VAT is deductible and not paid when purchasing an investment good. Still there could be certain goods on which the deductibility does not apply (business buildings) or does not apply in full amount (cars). On the other hand, for the units belonging to the government sector, the VAT on capital goods is normally



to a large extent non-deductible, i.e. they pay almost the full amount. This is because general government normally does not have market sales on which it pays VAT against which VAT paid on investment goods can be set. Still some deductibility may apply as the government may have some market sales and pay VAT on these sales. Again, even when having market sales, there may be still some products for which the deductibility rules could be different from “normal”.

For construction projects, in the past the industry experts provided a VAT rate applicable in their countries and in the PPP calculations this given rate was applied. The experts in some cases tried to allow for different rules for deducting VAT, however, this was not done consistently over all countries. All equipment goods were handled net of VAT.

To improve consistency between the NA and the prices for **construction projects** in PPP, in the process of the revision the average VAT rates over all investing sectors of the economy as established in the NA were applied for all years and those countries that provided them. This step produced considerable revisions of the volume index of GDP for those countries where particular high VAT deductions apply which had previously not been taken into account, see table 5.

For **Equipment goods** the prices net of VAT for all countries have been corrected with the average VAT rate as available in the framework of their NA.

## 2.7 Government non-market services - salaries<sup>15</sup>

Government services are services provided to households and society in general by general government. They comprise individual services and collective services. Individual services, such as health and education, are those which are provided by general government and benefit or are consumed by specific identifiable households. Collective services, such as defence, public order or safety, are provided by general government simultaneously to all members of the community and are consumed collectively.

Only government produces collective services. Individual services can be either produced by government or purchased by government from market producers – the mix varies from country to country. Collective and individual services produced by government itself are referred to as non-market services as they are provided free or substantially below market price. National accountants have developed a convention of estimating expenditure on non-market services by summing up the cost of producing them. To maintain consistency with the price underlying these expenditures in NA, it is necessary to use the purchaser's prices of inputs to calculate the PPP for non-market services. This is the so-called input price approach.

The PPP for individual services purchased by government from market producers are calculated using output prices. The output prices used for countries where households pay the whole purchaser's price to market producers prior to being reimbursed in total or partially by government are actual market prices – that is the price paid by households. The output prices for countries where households pay only a part of the purchaser's price to the market producers and the remainder is paid to the market producer by government are composite market prices. These prices are obtained by summing up the part paid by the households and the part paid by government. This is referred to in the PPP exercise as the “full price concept”.

The **input price approach for non-market services** requires breaking down expenditure by cost components. These are taken from the government production accounts and comprise compensation of employees, intermediate consumption, consumption of fixed capital, net taxes on production. Receipts from sales have to be deducted to arrive at government consumption of non-market services. However, this cost structure has been introduced into the Eurostat-OECD PPP comparison only for the two most important individual services of government, namely health and

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<sup>15</sup> See footnote 14.

education and for collective services all together. For the remaining individual services – housing, recreation and culture and social protection, **reference PPP**<sup>16</sup> are used.

Government expenditure is broken down into 39 basic headings, for only nine of which prices are collected directly. This is due to the general poor availability of prices for the remaining 32 basic headings. The PPP for the latter are based on prices collected for other parts of the comparison. Such PPP are called reference PPP. They serve as proxies for the PPP that would have been calculated had prices been collected for the basic headings for which no prices were collected. The underlying assumption and the criteria for selecting reference basic headings is that the price relations between countries for the basic heading with a reference PPP would be similar to those which have been observed for the basic heading the reference PPP makes use of.

The nine basic headings for which “prices” are collected all refer to **compensation of employees**. Countries report compensation of employees for a selection of occupations in general government, public education and public hospitals. The selected occupations are defined using job descriptions from ISCO-88<sup>17</sup>. The respective Eurostat annual survey questionnaire is also referred to as the “salary” questionnaire. Only salaries were reviewed and revised for 1995 to 2000, the system of reference PPP for the other basic headings has not been touched.

### ***Revision of salaries***

The long introduction above shows that government services are just another very difficult to tackle part of the PPP exercise. Many conventions have to be applied and the only tangible part of the data collection, compensation of employees or “salaries”, itself is highly complicated.

The salary data reported to Eurostat by the participating countries suffered prior to the revision shortcomings for two main reasons. Firstly several methodological changes had been introduced at different points in time and secondly countries did not pay sufficient attention to follow the survey instructions or do so consistently over time. To be fair, it has, however, to be said that the latter is extremely difficult as the selected occupations may not be easily matched nationally and pay scales are constructed very differently from country to country. Changing statisticians may in addition interpret survey guidelines slightly different and introduce inconsistencies in the time series.

The following changes in the methodology had to be addressed during the revision:

#### *1) Adjustments for equal standard working time*

When comparing salaries, the working time they relate to should be an equal standard working time in all countries. The salaries should e.g. not include payments for overtime. The adjustment for equal standard working time was only introduced in 1997, the data for the years 1995 and 1996 included overtime. During the revision this was corrected and if countries were not able to provide adjusted data for 1995 and 1996, the data for 1997 were retrapolated by a suitable index.

In addition two special problems had to be addressed. Firstly, it was impossible to unify the understanding of working time for teaching staff between countries. Secondly, many countries claimed that there is no “working time” for military staff, as they are, in principle, always on service. Consequently, salary data without adjustment have been applied for all years for these two groups of occupations. This methodological change had considerable consequences for the results in some countries, e.g. Greece.

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<sup>16</sup> Reference PPP are PPP that are used for basic headings for which no prices are collected. They are based on prices collected for other basic headings. Reference PPP serve as proxies for the PPP that would have been calculated had prices been collected for the basic headings for which no prices were collected.

<sup>17</sup> International Standard Classification of Occupations 1988, International Labor Office, Geneva 1990

## 2) *Weights*

Weights in the form of the share of number of employees for the selected occupations in the total number of employees were only introduced into the Eurostat comparison in 1997, before that equal weights were used. The use of weights was theoretically an improvement, however, connected with a multitude of practical difficulties for the countries to interpret the respective survey guidelines correctly.

Realising that some countries reported very arbitrary weights, which in addition had very illogical patterns over time, Eurostat undertook some experiments to see the difference for the basic heading PPP established using weights or unweighted salaries. These turned out to be not very significant.

Therefore, from a practical point of view it would have been possible to return to an unweighted calculation. This would not have been desirable from a theoretical point of view. Consequently, countries were asked to revise the weights of at least 1-year, which were also applied to the other years. This was done under the assumption that structures of employment usually do not change very much from year to year.

## 3) *Salaries for "education"*

From 1999, salaries in the area of education have been collected for 4 basic headings. This breakdown is based upon the education level categories of the "international standard classification of education" (ISCED-97) of the UNESCO. Before 1999, only one basic heading was used.

For the revision it was decided to use one basic heading for all years. Technically, the salary data reported by the countries for the 4 basic headings for education in 1999 and 2000 were combined and the obtained PPP was used for all 4 basic headings. Simultaneously, this addressed the problem that many countries had reported only few salary data observations for teaching staff for the 4 separated basic headings.

### ***Interpretation of survey guidelines***

Another problem to be addressed during the revision was the consistent interpretation of the Eurostat **survey guidelines**. The guidelines recommend selecting for each occupation the salary grade that is the most representative in a country, the so-called modal grade. For all the occupations, the appropriate step within each grade for which salaries are to be reported is the one, which assumes **5 years seniority** in the position. However, it seems that not all countries interpreted the recommendation about the selection of the modal grade in the same way and sometimes different for different years. Of all countries, France undertook the most significant revision in this respect, which had substantial influence on the upwards revision of the French GDP in volume terms and due to the high weight of France on the EU average (see table 5).

## **2.8 Population**

Population figures in most countries are based on rather infrequent population censuses and extrapolations, e.g. based on administrative information on births, deaths, migration, etc. During the period of the revision, in several countries new censuses have been carried out. For the per head calculations in the framework of the revision, the latest population figures have been used.

Remarkable revisions to the population figures have been reported for Greece, Portugal, UK, Cyprus, and Hungary. The downwards revision of the population figure for the whole time series for the UK and consequently the respective higher volume index of GDP per head had, due to UK's high weight, consequences for the EU average and, therefore, for other countries.

Eurostat also ensured that the population figures were those according to the residency concept used in the NA.

### 3 Uses of PPP and limitations of their use<sup>18</sup>

PPP are not a concept that is immediately and easily understood by users. This has sometimes generated misunderstandings as PPP are used for purposes for which they are not suited and /or PPP are not used even when they are the right concept.

In relation to the revision 1995 to 2000, it was, therefore an important task to educate users about PPP in general and particularly on the use and mis-use of PPP and related results.

In table 6 below, the most common possible “uses” of PPP are divided into three groups, “recommended uses”, “uses with limitations” and “non-recommended uses”, as it is currently used by Eurostat and OECD.

**Table 6: What for to use and not to use PPP**

<b>Recommended uses of PPP</b>	<ul style="list-style-type: none"> <li>• spatial volume comparisons of GDP, GDP per head, GDP per hour worked, size of economies</li> <li>• grouping of countries by volume index of GDP</li> <li>• spatial comparisons of relative price levels</li> </ul>
<b>Use of PPP with limitations</b>	<ul style="list-style-type: none"> <li>• time series analysis of relative GDP per capita or relative prices</li> <li>• analysis of price convergence</li> <li>• cost of living index across countries</li> <li>• use of PPP established for expenditure categories for the deflation of other values, e.g. household income.</li> </ul>
<b>non-recommended uses of PPP</b>	<ul style="list-style-type: none"> <li>• as a precision tool to establish rankings between countries</li> <li>• as a way of constructing national growth rates</li> <li>• as a measure to generate output and productivity comparisons by industry (unless there are industry-specific PPP)</li> <li>• as a measure to undertake price level index comparisons at detailed level.</li> <li>• as an indicator for the over- or under-valuation of a currency</li> <li>• as equilibrium exchange rates</li> </ul>

#### **(a) Volume comparisons of GDP and ranking of countries**

As outlined above, PPP converted GDP data are well suited to compare the real size of economies and productivity at GDP level. Nevertheless, GDP and GDP per head are often used to **rank countries exactly** by economic size and economic welfare. However, neither the indices of real final expenditure on GDP nor the indices of real final expenditure per head on GDP should be used to establish a strict ranking of countries. As it can be seen from table 7 overleaf, there is sometimes no difference at all between two ranks in the rounded figures or 100-300 Euros more or less can change the rank of a country<sup>19</sup>, as they are mostly clustered around a very narrow range of outcomes. This is statistically simply not significant. Instead PPP related indicators are best used to assign countries to groups as, for example, in all Eurostat and OECD publications on PPP.

PPP are statistical constructs rather than precise measures so they provide only an indication of the relative order of magnitude of economic activity or economic well-being in a country in relation to others in the comparison. The statistical uncertainties surrounding PPP depend on the reliability of the expenditure weights and the price data as well as to the extent to which the particular goods and services selected for pricing by participating countries truly represent the price levels in each country. As is the case with NA data generally, it is not possible to calculate precise error margins for PPP and the real expenditure levels derived from them. Nonetheless, at the level of GDP, a

<sup>18</sup> For this part partly passages of the OECD publication on the results of the 1999 comparison round have been used. See: Purchasing Power Parities and Real Expenditure, 1999 benchmark year; OECD 2002

<sup>19</sup> If one looks at the year 1998, rank 6 to 12 and in the years 1999 and 2000 rank 8 to 11 means more or less the same position.

broad and arbitrary rule of thumb is that differences in indices of real final expenditure and real final expenditure per head need to be at least five percentage points to be considered as statistically significant. At the level of the main aggregates or analytical categories, error margins are larger and differences in indices of real final expenditure and real final expenditure per head will also need to be larger to be statistically significant.

**Table 7: GDP per capita in PPS, absolute difference between consecutive ranks within EU15**

rank \ year	1995	1996	1997	1998	1999	2000	
1	-	-	-	-	-	-	
2	-8300	-8500	-10300	-12600	-15600	-18800	125% of the EU15 average
3	-300	-200	-200	0	-400	-100	
4	-700	-900	-700	-600	-600	-200	110% of the EU15 average
5	0	-300	-700	-800	-300	-800	
6	-100	-100	-200	-200	-400	-400	110% of the EU15 average
7	-200	-100	-100	-200	-500	-600	
8	-500	-400	-200	0	-300	-500	90% of the EU15 average
9	0	-200	0	-100	-200	0	
10	-700	-400	-300	-100	0	-100	90% of the EU15 average
11	-800	-900	0	0	-200	-400	
12	-1000	-400	-300	0	-100	-200	75% of the EU15 average
13	-1900	-2700	-4100	-4500	-3900	-4000	
14	-2300	-2400	-2400	-2600	-2800	-2900	75% of the EU15 average
15	-200	-300	-400	-600	-1100	-1000	

Below analytical category level (currently 48 categories in the Eurostat comparison) data are not published, as the number of observations underlying each detailed category is not sufficient to draw statistically sound conclusions. The PPP programme is built to deliver justifiable results at highly aggregated level, not at product group or even item level. If one would like to achieve statistically significant and stable results at those disaggregated levels, the number of price observations, currently about ten per item, and the number of items underlying each product group, currently up to 50, would have to be increased by a very large factor to achieve representative samples at product group and item level. The cost of this would be huge, at national and international level, and nobody is so far willing and able to bear it.

**Comparison of relative price levels, an indicator for the over- or undervaluation of a currency and equilibrium exchange rates**

The comparative price level index of a country is established by dividing the PPP of this country with the exchange rate. Comparative price levels at the level of GDP allow the general price levels of countries to be compared for a given year: a value over 100 indicates a higher general price level than in the EU average, a value under 100 indicates a lower general price level. Comparative price levels at the level of GDP also indicate the degree to which a country's exchange rate reflects its general price level vis-à-vis the general price level of the reference country: a value over 100 indicates that the exchange rate understates the general price level; a value under 100 indicates that the exchange rate overstates the general price level. This is **not** the same as saying a currency is undervalued or overvalued.

Although PPP appear in international trade theory in the context of equilibrium exchange rates<sup>20</sup> - that is the underlying rates of exchange to which actual exchange rates are assumed to converge in the long term - the PPP discussed here are not relevant for this purpose as they do not refer

<sup>20</sup> “[...] I propose to call this parity ‘purchasing power parity’. As long as anything like free movement of merchandise and a somewhat comprehensive trade between two countries take place, the actual rate of exchange cannot deviate very much from the purchasing power parity.” Gustav Cassels in “Abnormal deviations in international exchanges”, *Economic Journal* 28, 1918.

solely to domestically-produced tradable goods and services valued at export prices. They have been calculated specifically in order to enable international price and volume comparisons to be made for GDP and its components. As such, they refer to the entire range of final goods and services, which make up GDP as a whole including many items, such as construction and government services, which are not traded internationally. Moreover, except for net foreign trade, they are valued at domestic market prices and are calculated using expenditure weights that reflect domestic demand.

### ***Time series analysis of relative GDP per capita or relative prices***

It has been the source of much discussion that the relative GDP of countries, let's say for 2000, established using PPP data and the result of an extrapolation of a benchmark year of the PPP exercise, let's say 1995 with relative growth rates of GDP 2000 over 1995, coming from the NA, do not yield the same results, for some countries even not approximately. This is particularly a problem, as policy makers want to know where their countries stand relative to other countries and how this position has evolved over time.

So, why are there differences? First of all, the relative GDP 2000 of countries from the PPP exercise have been calculated based on current international prices 2000. The extrapolation of 1995 to 2000, at the other hand is based on fixed international prices 1995. One source of differences is thus changes in price structures, which occurred between 1995 to 2000. The longer the extrapolation time frame the bigger the differences ought to be.

However, there are other reasons as well. **PPP** price samples tend to be small and change over time: this makes the temporal comparison of price levels difficult. But PPP samples are conceived to maximise comparability of items across countries at a given point in time. Samples for **temporal price indices** tend to be larger and conceived to maximise comparability over time within a country. But they are not set up to deliver international comparability of items. Thus, when PPP samples change over time, it makes little sense to compare prices and related indicators over time. This is particularly true for disaggregated data, where the underlying PPP samples are even smaller than at GDP level.

As little as user may like it, PPP and constant price measures in NA have been developed for different purposes and should be used accordingly. PPP converted data are suitable for spatial price and volume comparisons in a given year, constant price data from the NA are best for over time comparisons.

From the said above, it is also clear that PPP converted GDP data should never be used to establish growth rates of GDP. The appropriate base for growth rate calculations is the GDP at constant prices and national currency, as it is only this GDP which is based on temporal price indices which are constructed to ensure comparability over time within a given country.

To at least partly overcome the problem of lacking transitivity over space and time, Eurostat and OECD recommend constant PPP for time-series analysis. However, one has to see very clearly that this is a trade-off between the advantage of consistency with NA and the disadvantage of imposing a constant international price structure of the base year. The latter leads to a situation where the volume aggregates of countries whose national price structure is far away from the imposed international price structure are systematically over- or underestimated, depending on the direction of the deviation.

Comparisons of **relative price levels** of countries over time suffer from the same limitations as described for relative GDP above. In addition, as the comparative price level index is calculated by dividing the PPP by the exchange rate, these types of comparisons depend on the development of the exchange rate. For countries outside the Euro zone this needs to be taken into account and may make such comparisons in times of erratic exchange rate changes even meaningless. If

comparisons of relative price levels are undertaken over time, it should be at least limited to rather highly aggregated data.

Finally, it needs to be mentioned, that for some countries it is virtually impossible to achieve consistency between developments derived from PPP data and NA. These are countries, which have very open economies with exposure to exchange rate movements, countries whose

economy depends on changes to raw material prices and countries which undergo fast structural changes, as e.g. most EU Accession and Candidate Countries.

### ***Price convergence***

Even if the same limitations apply to price convergence as outlined above, in principle, the spread of prices over time can be used to make a statement about price convergence, in particular in the Euro area, where the changing exchange rate problem does not apply.

But, price convergence investigations do not make sense for all products as only tradable goods' prices possibly can be expected to converge; a special basket may be needed. In addition, due to the small sample size in PPP surveys, such convergence cannot be measured at product level. A respective EU structural indicator is, therefore, only defined at the level of total private household consumption.

### ***Cost of living index across countries***

The relative price level of actual final consumption can be seen as a kind of cost of living indicator across countries. It is, however, necessary to see that the relative prices of actual consumption in the PPP exercise are aggregated using expenditure pattern of the resident population.

The expenditure pattern of expatriates, at the other hand, is usually very different from those of the resident population. Establishing the correction coefficients for the EU staff working outside the EU, Eurostat uses therefore special weights reflecting expatriates expenditure pattern. In addition a rent survey is executed for this purpose, reflecting the up-market kind of accommodation, expatriates normally rent.

### ***Use of PPP for deflation of other values***

To a limited extent, PPP established for expenditure categories can be used to deflate other values, for which PPP cannot be established, as they cannot be divided into a meaningful volume and price component. The PPP to be used should be chosen carefully and should have a logical relation to the value to be deflated. A good example is the use of the PPP for private household consumption expenditure for deflating household income. Surely one would not use e.g. the capital goods PPP for this purpose.

### ***Output and productivity comparison by industry***

In the absence of industry specific PPP, users often use the overall PPP of GDP and apply it to output data of industries or use it for productivity comparisons of industries. These PPP, however, are established from the expenditure side of GDP and should not be used to deflate output of individual industries. What would be needed are PPP based on output prices for the products and services of this industry.

#### **4. Where do we go from here?**

Eurostat believes that a revision exercise does not only look backwards. The lessons learned from an in-depth review, both at national and international level have already and will further provide valuable input into the future work. Such areas of future work are in particular:

1. The review of the dwellings services questionnaire and its stratification and further work to bring PPP rents and NA rents and their coverage closer to each other.
2. The review of the salary questionnaire concerning the occupations covered.
3. The review of survey guidelines to make them clearer and better understandable, particularly for dwelling services and salaries.
4. Research into consumer price areas difficult to price, such as financial services and health.
5. Provision of methodological documentation (Eurostat and OECD PPP manual)
6. Establishment of better systems of institutional memory at national and international level.
7. Development of regular training course for data providers, users and the media to promote the appropriate use of PPP.

Concerning regular PPP production, Eurostat is going to continue to work according to the annual revision and publication calendar now in place (see box 1). It is also foreseen to continue the rolling benchmark approach concerning consumer prices for PPP, as this has proved to be the best way for allocating cost and workload more evenly and ensuring continuity of expertise at national and international level.

Thorough and systematic revisions as the one we reported on in this paper will remain rather infrequent events, accommodating only major future changes in the NA compilation system and or in the underlying PPP methodology. The next revision of SNA93 and ESA95 could be such an event.



Table 8: PPP for GDP and AIC 1995 to 2000

		GDP						Actual individual consumption					
		1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000
BE	published end-2002	40,484	39,9259	39,7641	39,6769	41,0421	40,1188	41,4448	40,1705	40,0289	39,8878	41,2995	40,5319
	after revision	41,9161	41,3821	41,4746	41,5524	41,3976	40,4665	42,4053	41,666	41,7911	41,8424	42,0181	40,9119
DK	published end-2002	9,27369	9,02948	9,06758	9,10234	8,9808	9,05928	9,55093	9,19445	9,31323	9,27542	9,09199	9,08495
	after revision	9,68155	9,55462	9,48759	9,45389	9,18486	9,15142	9,80238	9,65287	9,52686	9,47564	9,20271	9,20751
DE	published end-2002	2,22088	2,19823	2,13056	2,13737	2,08288	2,00845	2,18272	2,16816	2,1094	2,12459	2,07107	1,97712
	after revision	2,26304	2,20663	2,1818	2,17762	2,14381	2,0896	2,21783	2,15994	2,13672	2,1364	2,10613	2,05389
GR	published end-2002	223,762	231,923	246,614	252,644	251,295	256,625	227,323	237,408	252,521	256,259	256,402	257,667
	after revision	222,328	232,943	241,184	250,924	253,306	253,95	227,418	238,202	244,846	255,03	257,143	256,791
ES	published end-2002	134,508	134,1	134,613	138,571	135,817	136,646	134,177	132,398	133,845	138,81	136,243	135,4
	after revision	132,895	133,549	134,743	135,282	133,2	134,44	134,291	135,214	136,261	136,725	133,338	133,636
FR	published end-2002	7,11798	7,12544	7,1334	7,11452	6,95242	6,71243	7,28196	7,28954	6,91577	6,86389	6,8416	6,64708
	after revision	7,09238	6,96329	6,77855	6,74198	6,64744	6,5345	7,15079	7,00352	6,76964	6,72075	6,63072	6,52701
IE	published end-2002	0,69932	0,72919	0,71651	0,76438	0,78821	0,81962	0,70147	0,73023	0,71769	0,76296	0,79244	0,82379
	after revision	0,7255	0,72644	0,72537	0,76154	0,79247	0,81744	0,74939	0,75363	0,74408	0,77341	0,80551	0,82962
IT	published end-2002	1708,17	1716,36	1744,1	1719,3	1693,39	1693,47	1695,62	1690,07	1744,57	1714,52	1694,42	1715,01
	after revision	1693,13	1720,02	1732,66	1718,97	1711,15	1703,1	1731,19	1766,98	1772,91	1754,22	1747,62	1745,48
LU	published end-2002	42,8305	43,0529	43,7656	44,0897	43,2076	43,1372	42,4988	41,7501	42,5921	43,3247	42,3418	42,2354
	after revision	45,5969	45,3536	45,5175	45,1635	43,289	43,4174	45,4935	44,8002	44,784	44,4339	42,3203	42,3062
NL	published end-2002	2,23389	2,21694	2,15792	2,12568	2,14219	2,21693	2,23349	2,19557	2,11599	2,061	2,0788	2,12828
	after revision	2,24349	2,21527	2,20486	2,22099	2,22766	2,21828	2,21719	2,17821	2,1556	2,17258	2,1773	2,16149
AT	published end-2002	15,1314	14,7228	14,4291	14,5636	14,1764	13,5993	15,2958	14,8043	14,5673	14,6519	14,0103	13,4707
	after revision	14,7331	14,4635	14,2916	14,3211	13,9882	13,6938	15,0014	14,6687	14,4355	14,4368	13,9716	13,6541
PT	published end-2002	131,2	132,7	129,698	136,487	138,638	146,657	134,069	135,257	134,312	139,35	140,463	147,13
	after revision	138,375	140,228	141,336	143,538	142,144	141,995	140,61	142,021	142,64	145,091	143,816	142,708
FI	published end-2002	6,45831	6,38169	6,41182	6,51919	6,4535	6,41131	6,83771	6,70581	6,88061	6,95793	6,94595	6,80115
	after revision	6,565	6,44538	6,32759	6,39655	6,37696	6,33738	7,22866	7,07026	6,89809	6,95355	6,91674	6,84922
SE	published end-2002	10,7187	10,4934	10,3873	10,4567	10,501	10,2799	10,9502	10,7874	10,7703	10,8525	10,9016	10,6682
	after revision	10,619	10,4013	10,3927	10,4875	10,2031	10,0073	10,9501	10,7965	10,7494	10,8046	10,3844	10,1218
UK	published end-2002	0,72049	0,69828	0,69046	0,69187	0,70862	0,70134	0,72335	0,70681	0,71003	0,71419	0,71985	0,71406
	after revision	0,70304	0,70156	0,6914	0,70148	0,70331	0,68862	0,70381	0,69893	0,69054	0,70091	0,70327	0,6859
IS	published end-2002	83,5976	83,212	85,0366	88,5256	88,469	90,4116	90,0376	83,8532	88,2614	91,9708	90,8233	92,3776
	after revision	84,7191	84,0487	84,7837	87,5689	88,5404	90,6221	88,566	87,4883	88,2544	91,5651	90,9449	91,774
NO	published end-2002	10,0753	9,8807	9,88859	10,1581	10,0724	9,78338	10,4928	10,3413	10,3032	10,4455	10,4364	10,3393
	after revision	10,1591	9,97924	10,0656	10,3547	10,065	9,81796	10,1218	9,97327	10,1693	10,3538	10,3065	10,3075
CH	published end-2002	2,21564	2,225	2,10796	2,07963	2,0589	2,07145	2,28233	2,27357	2,22814	2,1987	2,17995	2,16134
	after revision	2,26644	2,25431	2,14979	2,11939	2,12551	2,08373	2,38835	2,33136	2,26978	2,23928	2,23986	2,16811
BG	published end-2002					0,48245	0,5662					0,48381	0,55997
	after revision	0,02103	0,04516	0,46004	0,56052	0,56626	0,5895					0,56884	0,59007
CY	published end-2002					0,4172	0,46405					0,43147	0,47039
	after revision	0,46369	0,45882	0,45893	0,46301	0,46127	0,46077					0,46515	0,46384
CZ	published end-2002					14,7525	15,2133					13,5265	14,2086
	after revision						15,4685						14,4239
EE	published end-2002					6,76391	7,01593					6,24877	6,30427
	after revision	5,16597	6,19569	6,71461	7,25438	7,3836	7,51307					6,75521	6,77948
HU	published end-2002					107,166	114,716					97,9784	103,819
	after revision	68,5255	80,7386	93,1562	103,279	109,113	116,742					98,7229	105,484
LV	published end-2002					0,26831	0,2627					0,25516	0,25381
	after revision	0,2019	0,2282	0,23883	0,24654	0,25294	0,25675					0,23794	0,24383
LT	published end-2002					1,65358	1,59778					1,55205	1,48299
	after revision	1,24951	1,47682	1,64207	1,70293	1,65345	1,60476					1,54401	1,50136
MT	published end-2002												
	after revision					0,26741	0,26606					0,27234	0,26999
PL	published end-2002						2,01804						2,00899
	after revision					1,89337	1,97919					1,79029	1,91203
RO	published end-2002					4808,16	6775,15					4800,11	6993,68
	after revision				3389,45	4877,97	6845,49					4941,87	6863,79
SK	published end-2002					14,7653	16,2184					14,1765	14,6745
	after revision	15,1252	15,3895	15,8377	16,4407	17,0788	17,4455					15,3231	16,1638
SI	published end-2002					126,579	133,567					123,264	130,493
	after revision	108,94	117,53	124,503	131,9	136,174	141,015					134,046	140,097
TU	published end-2002					214775	323196					215082	338367
	after revision	26143,1	45208,6	79931	138207	209495	294985					211277	300641

\*The last data published for Malta referred to 1999 and an outdated NA system. They are not comparable with the data after the introduction of ESA95.

**Table 9: Comparative price level index for GDP and AIC;  
1995 to 2000**

		GDP						Actual individual consumption					
		1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000
BE	published end-2002	105	102	98	98	102	99	108	102	99	98	102	100
	after revision	109	105	102	102	103	100	110	106	103	103	104	101
DK	published end-2002	127	123	121	121	121	122	130	125	124	124	122	122
	after revision	132	130	127	126	124	123	134	131	127	126	124	124
DE	published end-2002	119	115	108	109	106	103	116	114	107	108	106	101
	after revision	121	116	111	111	110	107	118	113	109	108	108	105
GR	published end-2002	74	76	80	76	77	76	75	78	82	77	79	77
	after revision	73	76	78	76	78	75	75	78	79	77	79	76
ES	published end-2002	83	83	81	83	82	82	82	82	81	83	82	81
	after revision	82	83	81	81	80	81	82	84	82	82	80	80
FR	published end-2002	109	110	108	108	106	102	112	112	105	104	104	101
	after revision	109	107	103	102	101	100	110	108	102	102	101	100
IE	published end-2002	86	92	96	97	100	104	86	92	96	97	101	105
	after revision	89	92	97	97	101	104	92	95	100	98	102	105
IT	published end-2002	80	88	90	88	87	87	80	86	90	88	88	89
	after revision	79	88	90	88	88	88	81	90	92	90	90	90
LU	published end-2002	111	110	108	109	107	107	110	106	105	107	105	105
	after revision	118	115	112	111	107	108	118	114	110	109	105	105
NL	published end-2002	106	104	98	96	97	101	106	103	96	93	94	97
	after revision	107	104	100	100	101	101	106	102	98	98	99	98
AT	published end-2002	115	110	104	105	103	99	116	110	105	106	102	98
	after revision	112	108	103	103	102	100	114	109	104	104	102	99
PT	published end-2002	67	68	65	68	69	73	68	69	68	69	70	73
	after revision	71	72	71	71	71	71	72	73	72	72	72	71
FI	published end-2002	113	109	109	109	109	108	120	115	117	116	117	114
	after revision	115	111	108	107	107	107	127	121	117	116	116	115
SE	published end-2002	115	123	120	117	119	122	117	127	124	122	124	126
	after revision	114	122	120	118	116	118	117	127	124	121	118	120
UK	published end-2002	87	86	100	102	108	115	87	87	103	106	109	117
	after revision	85	86	100	104	107	113	85	86	100	104	107	113
IS	published end-2002	99	98	106	111	115	125	106	99	110	115	118	127
	after revision	100	99	105	110	115	125	105	103	110	115	118	126
NO	published end-2002	122	121	123	120	121	121	127	126	128	123	126	127
	after revision	123	122	126	122	121	121	122	122	127	122	124	127
CH	published end-2002	143	142	128	128	129	133	148	145	136	136	136	139
	after revision	147	144	131	131	133	134	155	149	138	138	140	139
BG	published end-2002					25	29					25	29
	after revision	24	20	24	28	29	30					29	30
CY	published end-2002					72	81					75	82
	after revision	78	78	79	80	80	80					80	81
CZ	published end-2002					40	43					37	40
	after revision						43						41
EE	published end-2002					43	45					40	40
	after revision	34	41	43	46	47	48					43	43
HU	published end-2002					42	44					39	40
	after revision	42	42	44	43	43	45					39	41
LV	published end-2002					43	47					41	45
	after revision	29	33	36	37	41	46					38	44
LT	published end-2002					39	43					36	40
	after revision	24	29	36	38	39	43					36	41
MT	published end-2002					*	*					*	*
	after revision					63	66					64	67
PL	published end-2002						50						50
	after revision					45	49					42	48
RO	published end-2002					29	34					29	35
	after revision				34	30	34					30	34
SK	published end-2002					33	38					30	34
	after revision	39	40	42	42	39	41					35	38
SI	published end-2002					65	65					63	63
	after revision	70	68	69	71	70	68					69	68
TU	published end-2002					48	56					48	59
	after revision	44	44	47	47	47	51					47	52

\*The last data published for Malta referred to 1999 and an outdated NA system. They are not comparable with the data after the introduction of ESA95.

## List of abbreviations in alphabetical order:

ACC	EU Accession Countries (December 2003: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia; as of 1 May 2004 these countries are EU Member States)
AIC	Actual Individual Consumption
AT	Austria
BE	Belgium
BG	Bulgaria
CC	EU Candidate Countries (Bulgaria, Romania, Turkey)
CH	Switzerland
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL or GR	Greece
ES	Spain
EU15	Group of the EU Member States before 2004 EU enlargement
FI	Finland
FR	France
GDP	Gross Domestic Product
GR or EL	Greece
HU	Hungary
IE	Ireland
IS	Island
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MS	EU Member States (December 2003: Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden, UK; as of 1 May 2004 the ACC joined as Member States)
MT	Malta
NL	Netherlands
NO	Norway
PL	Poland
PLI	Price level index
PPP	Purchasing Power Parities
PPS	Purchasing Power Standards
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
TU	Turkey
UK	United Kingdom
VI	Volume index