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Prices and purchasing power parities

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Contents

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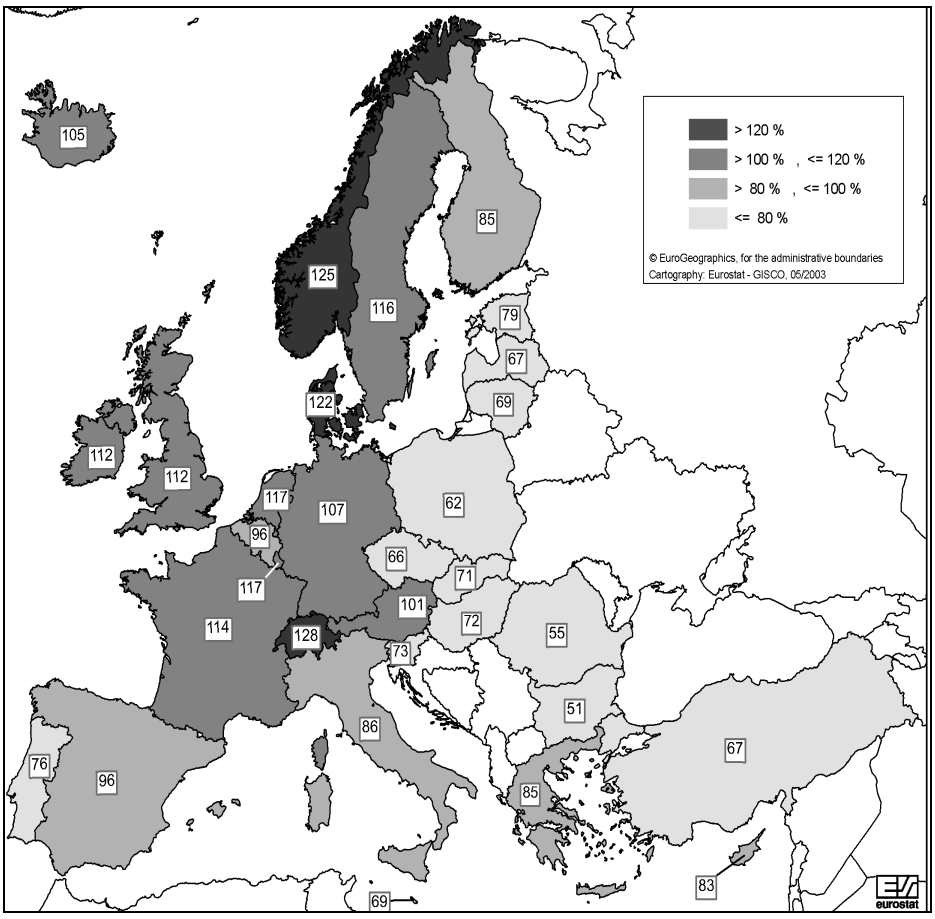
Gross Fixed Capital Formation

Comparative price levels in EU, EFTA[1] and Candidate Countries for 2001, 2002 and 2003

Price surveys in the area of Gross Fixed capital Formation, namely on: "Construction and civil engineering", "Machinery and equipment" and "Other products" took place in order to produce Purchasing Power Parities (PPPs) for the 31 countries participating in the Eurostat coordinated group of the European Comparison Programme (ECP)[2]

Eurostat presents the price level indices for Gross Fixed Capital Formation derived from the PPP's as part of a series of studies regularly released in the framework of the ECP in which Eurostat closely co-operates with the OECD. The data in this publication are preliminary for 2003 and final for 2001 and 2002. The PLIs are presented in relation to the EU 25 average.

Price level indices for Gross Fixed Capital Formation (GFCF) in 2003. EU25=100



(1) Excluding Liechtenstein
(2) The 25 EU Member States, the Candidate Countries, Iceland, Norway and Switzerland

Gross Fixed Capital Formation (GFCF)

The price level indices (PLIs) for Gross Fixed Capital Formation (Capital Goods) in 2003 highlight the following country groups:

- **Group 1** (≥120% of EU average): Switzerland, Norway and Denmark;

- **Group II** (≥100% and < 120% of EU average): Netherlands, Luxembourg, Sweden, France, Ireland, United Kingdom, Germany, Iceland, and Austria;
- **Group III** (≥80% and < 100% of EU average): Belgium, Spain, Italy, Finland, Greece, and Cyprus.
- **Group IV** (<80% of EU average): Estonia, Portugal, Slovenia, Hungary, Slovakia, Malta, Lithuania, Turkey, Latvia, Czech Republic, Poland, Romania and Bulgaria.

As can be observed **in table 1** these groups were the same for 2001 and 2002 with two exceptions: Cyprus and Estonia. Cyprus was in group IV in 2001/2002 and in group III in 2003 whereas Estonia was in group III in 2001/2002 and in group IV in 2003.

Bulgaria presents the minimum PLI for the 3 years (49, 49 and 51) it is therefore the cheapest country in the 31 analysed. The maximum PLIs (133, 137, and 128) correspond to Switzerland in 2001 and 2003 and to Norway in 2002. This means that a comparable basket of capital goods costs 2.7 and 2.5 times more in Switzerland than in Bulgaria in 2001 and 2003 respectively. In 2002 the largest difference can be found between Norway and Bulgaria, the cost in Norway was 2.8 times the cost in Bulgaria.

The Candidate Countries and the new Member States, with the exception of Cyprus in 2003 and and Estonia in 2001 and 2002, were below the 80% of the EU average for the three years.

Box 1: What are Price level indices?

Gross Fixed Capital Formation (GFCF) is one of the main aggregates in the Eurostat-OECD expenditure classification. It accounts for around 20 per cent of final expenditure on GDP in most of Member States and OECD Member Countries. It is broken down into three expenditure categories: "machinery and equipment", "Construction and civil engineering" and "other products".

Purchasing Power Parities (PPPs) are currency conversion rates that are applied to convert economic aggregates in national currency to an artificial common currency, called Purchasing Power Standard (PPS), which equalise the purchasing power of different national currencies.

Purchasing Power Parities (PPP's) are calculated by comparing the prices actually paid for comparable and representative products in the countries participating in the comparison.

To work out PPPs for GFCF, two different price surveys are conducted every two years: the survey of Construction prices and another which prices Machinery and equipment and Other products together which is named Equipment Goods survey. The PPPs are estimated for the year in which there are no price surveys. The two mentioned surveys were conducted in 2001 and in 2003. In 2002, the surveys exceptionally were carried out in the UK and in the Candidate Countries (in 2002).

Price level indices are calculated as the ratio between Purchasing Power Parities (PPP's) and exchange rates for each country, in relation with the EU average. When the PLI is higher than 100, the country concerned is relatively more expensive compared with the EU average and vice versa. The methods used to compile PPPs could give rise to differences between the PLIs, neither statistically nor economically significant therefore these indicators can be used to classify the countries into groups of a comparable level, rather than for the exact ranking of countries.

Table 1: 2001-2003 comparative PLI for Gross Fixed Capital Formation (GFCF), EU 25=100

	GROSS FIXED CAPITAL FORMATION			Construction			Equipment goods		
	2001	2002	2003	2001	2002	2003	2001	2002	2003
Belgium (BE)	98	97	96	99	98	100	98	96	94
Czech Republic (CZ)	65	69	66	49	50	49	85	93	89
Denmark (DK)	122	124	122	133	134	136	114	116	109
Germany (DE)	111	108	107	117	114	112	106	102	102
Estonia (EE)	86	81	79	80	75	69	93	89	92
Greece (EL)	85	84	85	72	71	72	104	102	103
Spain (ES)	92	93	96	95	94	95	90	92	97
France (FR)	105	109	114	105	112	119	106	106	109
Ireland (IE)	109	110	112	109	109	117	111	112	108
Italy (IT)	83	84	86	77	78	81	89	91	93
Cyprus (CY)	73	78	83	60	65	68	91	97	108
Latvia (LV)	72	72	67	60	60	55	86	86	83
Lithuania (LT)	67	68	69	56	53	55	80	89	88
Luxembourg (LU)	115	114	117	125	124	126	105	104	105
Hungary (HU)	66	73	72	56	63	60	78	85	87
Malta (MT)	76	72	69	57	54	53	99	96	91
Netherlands (NL)	112	115	117	130	129	131	95	100	102
Austria (AT)	107	103	101	107	106	106	107	101	97
Poland (PL)	71	69	62	55	49	44	91	92	85
Portugal (PT)	79	77	76	64	60	58	99	100	101
Slovenia (SI)	71	73	73	56	60	60	90	90	90
Slovaquia (SK)	66	68	71	47	52	52	89	86	94
Finland (FI)	90	86	85	79	74	74	106	103	103
Sweden (SE)	114	114	116	134	139	142	100	96	97
United Kingdom (UK)	117	119	112	132	131	123	107	108	101
Iceland (IS)	101	104	105	96	98	99	109	111	114
Norway (NO)	131	137	125	133	138	130	132	138	123
Switzerland (CH)	133	131	128	161	161	166	112	112	104
Bulgaria (BG)	49	49	51	31	30	33	72	74	75
Romanía (RO)	52	54	55	30	35	36	84	79	83
Turkey (TR)	60	71	67	40	48	47	96	108	98
Maximun	133	137	128	161	161	166	132	138	123
Minimun	49	49	51	30	30	33	72	74	75
Max/Min	2.7	2.8	2.5	5.3	5.4	5.1	1.8	1.9	1.6

Box 2: Some characteristics of 2003 Construction survey

Hardly any building or civil engineering work is identical or comparable with another one, within a country, and even less between different countries. Moreover, not every country would build a specific project every year, e.g. a bridge. Therefore, 26 fictitious standard construction projects have been defined (e.g. "detached house" or "asphalt road"), which are designed to be representative of real constructions in the countries. They are broken down into 579 elementary components (in total) that are precisely describing the individual steps of building a construction project (e.g. "Foundation masonry in 20/25 cm solid concrete blocks; unit: m; quantity: 13") and define the unit and quantity.

For the elementary components unit prices have been collected. These were then multiplied with the pre-defined quantities and afterwards summed up to the projects' prices. The project prices have then been aggregated to PPPs for the 11 Basic Headings for construction. The project prices are requested to be purchasers' prices, i.e. what the purchaser would actually pay to the contractor. The final project prices therefore include not only the producers' direct costs (such as materials, labour, hire of equipment, sub-contractors' fees), but also such items as architects' fees, non-deductible VAT, profits (or losses) of the contractor.

For creating the construction projects as well as for the price collection specific expertise is required, therefore this work was done in close conjunction with construction companies. The data of all aggregation levels have been validated over time (between the different survey years) as well as across countries. As certain countries have generally outstanding price levels, for the across countries validation the general price level (of the next higher aggregation level) was taken into account.

The price level indices of Gross Fixed Capital Formation and of its two main components "Construction and civil engineering" and "Machinery and equipment and Other products", which will simply be named "construction" and "Equipment Goods", can also be seen in **table 1**.

The table shows that, Bulgaria always had the minimum price level indices in both Construction and Equipment Goods with an only exception: Romania in 2001 presented the lowest level for Construction; conversely, Switzerland presented the maximum level for Construction and Norway for Equipment Goods for the three years.

The ratio between the maximum and the minimum PLI gives an idea of the differences in prices between countries. It can be observed that the major variations occurred in Construction (5.3, 5.4 and 5.1) rather than in Equipment Goods (1.8, 1.9 and 1.6). This means that for Construction Switzerland was more than five times expensive as Bulgaria while for Equipment Goods Norway was less than twice expensive as the cheapest country, which was again Bulgaria.

Chart 1 shows the price level indices for GFCF and its components for 2003, as can be seen the countries which present lowest PLI for GFCF have a level of prices in Construction lower than in Equipment Goods and vice versa, the same situation can be found with few exceptions in 2001 as well as in 2002.

Number of countries with PLI < 80 % of EU average

Group IV	2001	2002	2003
Gross Fixed Capital Formation	13	13	13
Construction	16	17	16
Equipment Goods	2	2	1

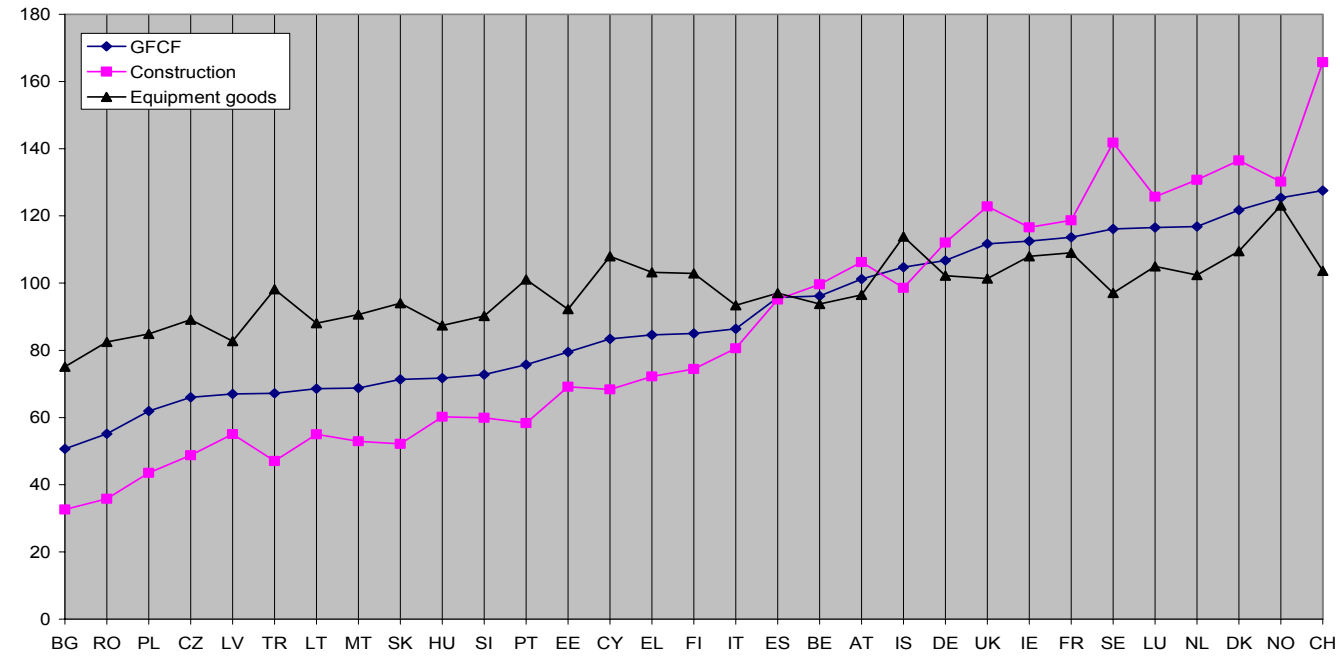
Analysing the countries with a PLI less than 80 % of the EU average (group IV), it can be seen that for Construction prices, 16 countries came into this category and were the same in 2001 and in 2003, in 2002 it was another country into the group. In contrast, for Equipment Goods, only two countries were in group IV in 2001 and in 2002 and only Bulgaria in 2003. This provides another illustration of the major price differences between Construction and Equipment Goods.

The following table demonstrates a stable situation with the countries with highest price levels. For Equipment Goods, only Norway recorded a PLI larger than 120, while for Construction there were 7 countries in this group in all three years.

Number of countries with PLI ≥ 120 % of EU average

Group I	2001	2002	2003
Gross Fixed Capital Formation	3	3	3
Construction	7	7	7
Equipment Goods	1	1	1

Chart 1: 2003 Price level indices for the main components of GFCF



From the above section it can be concluded that Construction is mainly responsible for the price dispersion of Gross Fixed Capital Formation (Capital Goods).

Table 2 overleaf for 2003 the PLIs for the main sub-groups of Construction and Equipment Goods, which permit a more detailed analysis.

Table 3: Price dispersion by country and product groups in 2003

(Max-Min)*100/Min	EU 12	EU 15	EU 25	ALL31
CAPITAL GOODS	54	61	97	152
Construction	**124**	**143**	**226**	**408**
Residential buildings	166	205	326	591
Non-residential buildings	110	129	239	352
Other construction, etc.	102	118	147	297
Equipment goods	**17**	**17**	**32**	**64**
Metal products and equipment	24	26	42	75
Electrical and optical equipment	41	41	53	64
Transport equipment	27	36	44	47
Other products	34	34	86	107

Table 3, which is based on table 2, provides a measure of price dispersion within the Euro zone, the EU 15, the EU 25 and the group of all countries participating in the comparison. The measure used is, for each product group, the difference between the maximum and the minimum price level indices expressed as percentage of the minimum price level index of the respective group of countries. The larger this number is the higher the price dispersion in the respective country and product group.

The Construction of residential buildings is the group which presents the widest PLI dispersion in all country groups. The major difference between the "EU 25" and "all 31" groups derives from the fact that the six additional countries include Bulgaria, Norway and Switzerland which show the minimum and the maximum PLIs respectively for nearly all product groups.

For all country groups the dispersion is wider in Construction than in the Equipment Goods.

Box 3: Some characteristics of 2003 Equipment Goods survey

The survey took place in May- June of 2003.

It was based on a sample of 116 products, which together with alternatives produced a list totalling 235 items. The selection of products was made by looking for comparable items across all the countries participating in the comparison and representative of their markets, for the 17 Basic Headings into which "Equipment Goods" are broken down.

A minimum number of products by Basic Heading were required which total the number of 80 for the whole survey.

The prices collected were transaction or market prices – that is, prices that purchasers actually paid for the products to be delivered/assembled /installed at the time and the place required by the purchasers. As such, they include trade margins, transport and delivery costs, assembly and installation costs. They were also net prices inclusive of all discounts, surcharges and rebates.

Particular expertise is required to draw up the product list together with the detailed technical specifications and subsequently to price them. As this expertise is sometimes not available in National Statistical Institutes, where necessary the work is contracted out to consultancy firms.

The prices were validated by all the countries and Eurostat using the "Quaranta tables". Any future changes to the 2003 figures will derive from new data on GFCF analysis rather than from prices that have been confirmed by Eurostat and by each participating country in the comparison.

Table 2: Comparative price level indices for the main sub-groups of GFCF, EU 25= 100										
Year 2003	GFCF	Construction	Residential buildings	Non-residential buildings	Other construction, etc.	Equipment goods	Metal products and equipment	Electrical and optical equipment	Transport equipment	Other products
Belgium (BE)	96	100	103	96	97	94	100	85	92	96
Czech Republic (CZ)	66	49	41	48	63	89	87	94	99	73
Denmark (DK)	122	136	158	122	119	109	106	100	123	110
Germany (DE)	107	112	117	120	87	102	97	109	108	94
Estonia (EE)	79	69	65	74	69	92	88	106	90	86
Greece (EL)	85	72	67	73	77	103	109	108	101	92
Spain (ES)	96	95	87	89	123	97	95	95	95	102
France (FR)	114	119	119	110	129	109	117	99	105	111
Ireland (IE)	112	117	128	122	83	108	103	113	109	105
Italy (IT)	86	81	81	82	71	93	94	97	90	91
Cyprus (CY)	83	68	75	65	59	108	111	110	108	95
Latvia (LV)	67	55	46	57	63	83	87	78	88	75
Lithuania (LT)	69	55	53	53	61	88	91	89	88	83
Luxembourg (LU)	117	126	128	123	127	105	99	119	90	116
Hungary (HU)	72	60	52	60	81	87	83	100	86	83
Malta (MT)	69	53	50	48	73	91	98	91	95	62
Netherlands (NL)	117	131	138	130	115	102	103	97	98	110
Austria (AT)	101	106	112	105	97	97	100	88	107	86
Poland (PL)	62	44	37	42	64	85	82	100	85	72
Portugal (PT)	76	58	52	62	64	101	106	114	114	86
Slovenia (SI)	73	60	55	59	73	90	86	105	88	86
Slovaquia (SK)	71	52	46	56	56	94	92	106	97	80
Finland (FI)	85	74	73	81	65	103	100	109	109	95
Sweden (SE)	116	142	143	140	139	97	93	93	109	97
United Kingdom (UK)	112	123	107	142	123	101	106	98	97	102
Iceland (IS)	105	99	103	92	95	114	124	109	114	96
Norway (NO)	125	130	137	130	119	123	116	128	121	127
Switzerland (CH)	128	166	181	168	137	104	101	107	100	107
Bulgaria (BG)	51	33	26	37	35	75	71	85	83	61
Romania (RO)	55	36	31	39	44	83	83	85	97	63
Turkey (TR)	67	47	40	55	50	98	96	109	104	74
Maximun	128	166	181	168	139	123	124	128	123	127
Minimun	51	33	26	37	35	75	71	78	83	61
Max/Min	2.5	5.1	6.9	4.5	4.0	1.6	1.7	1.6	1.5	2.1

How to interpret this table?

The prices underlying table 2 are average annual national prices for the respective product groups. In the columns, the table provides a direct comparison of the price levels for the respective product groups across all 31 participating countries. For example, the PLI for Transport equipment is 5% above the EU average in France and 8% in Germany. Transport equipment is, therefore in Germany 3% more expensive than in France (108/105=1.03).

By row, the table presents the PLIs of different product groups within one country and the interpretation is more complicated. All PLIs are expressed in relation to the EU average for the respective product group. For example, for Metal products and equipment, level in Finland is equal to EU average and for Electrical and optical equipment: 9% above the EU average. In relation to the respective EU average, therefore, Metal products and equipment are relatively cheaper in Finland than Electrical and optical equipment. However, intra-country analysis of PLIs is limited because of the use of different scaling factors per product group and the general non-additivity of the underlying aggregation method.

➢ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

Use of Purchasing Power Parities

PPP is a concept that is not immediately and easily understood. This has generated misunderstandings as sometimes PPPs are used for purposes for which they are not suited. In essence PPPs are price comparison in space and therefore the most recommended applications are spatial ones - i.e. comparisons of PPP converted indicators across countries at a given point in time. The most common usages of PPPs are to generate comparable
Volume measures in per capita terms across countries and to calculate general price level indices. They can be also used in other areas such as labour productivity comparisons at GDP level and in measuring the relative size of
economies.

The differences in values of GDP between countries, even when re-valued in a common currency using exchange rates, do not only correspond to a "volume of goods and services" component but also to a "level of prices" component, which can sometimes assume sizeable proportions. Exchange rates are determined by many factors, which reflect demand and supply on the currency markets, such as international trade and interest rate differentials. In other words, exchange rates usually reflect other elements than price differences alone. To obtain a pure comparison of volumes, it is essential to use special conversion rates (spatial deflators) which remove the effect of price level differences between countries. Purchasing Power Parities (PPPs) are such currency conversion rates that convert economic indicators expressed in national currencies to an artificial common currency, called Purchasing Power Standard (PPS). This conversion equalises the purchasing power of different national currencies.

Despite being designed for spatial comparisons, PPPs and related economic indicators can be used for inter-temporal comparisons but with certain limitations and with necessary care. In addition, the sampling of items and price collection for PPPs are not designed to capture the pure price change over time as in the case of consumer price indices but price differentials over space. In effect, GDPs converted using PPP should be understood more like current price volume series.

Finally, it needs to be underlined that PPP-based indices cannot be used to establish a strict ranking of countries because PPPs are statistical constructs rather than precise measures. They provide only an indication of the relative order of magnitude in a country in relation to others in the comparison. Therefore, these indicators are best used to assign countries to groups as, for example, in all Eurostat and OECD publications on PPP. In Table 4 below the uses of PPP-based data are divided into three groups, "recommended uses", "uses with limitations", "and non-recommended uses" in a summary form.

Table 4: Uses and limitations of PPP-based data

Recommended uses	• Spatial volume comparisons of GDP, GDP per head, GDP per hour worked, size of economies • Grouping of countries by volume index of GDP • Spatial comparisons of relative price levels
Use with limitations	• Inter-temporal analysis of relative GDP per capita or relative prices • Analysis of price convergence • Cost of living index across countries • Use of PPP established for expenditure categories for the deflation of other values, as e.g. household income.
Non-recommended uses	• As a precision tool to establish rankings between countries • As a way of constructing national growth rates • As a measure to generate output and productivity comparisons by industry (unless there are industry-specific PPPs) • As a measure to undertake price level index comparisons at detailed level. • As an indicator for the over- or undervaluation of a currency • As equilibrium exchange rates

To know more about:

"Purchasing Power Parities and Real Expenditures. 2002 benchmark year Eurostat-OECD 2004 "

"Purchasing Power Parities and related economic indicators for EU, Candidate Countries and EFTA. Data 1991 to 2003 including final results of the revision 1995-2000". Statistics in Focus 37/2004, Eurostat, 2004

"Purchasing Power Parities and related economic indicators for EU, Candidate Countries and EFTA. Final results 2002 and preliminary results 2003". Statistics in Focus 53/2004, Eurostat, 2004

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