A NOTE ON THE NEW OECD BENCHMARK PURCHASING POWER PARITIES FOR 1985

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CONTENTS

Introduction 184

I. Using PPPs 184
II. Calculating PPPs 186
III. Results for 1985 187
IV. Comparison of the 1980 and 1985 PPPs 190
V. Extrapolations for 1986 and 1987 192
VI. Future work on PPPs 194

Bibliography 196

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INTRODUCTION

Two years ago, the OECD released a set of Purchasing Power Parities (PPPs) for eighteen OECD countries based on price and expenditure data for **1980.** Some of the main results were published in OECD ***Economic Studies,*** No. **6** (Hill, **1986),** and in the **1986** edition of ***National Accounts,*** Vol. **1** (OECD, **1986),** and a detailed description of the methods and results of these **1980** benchmark PPPs is given in Ward **(1985).** The **1980** PPPs were calculated jointly by the Statistical Office of the European Communities (EUROSTAT) and the Economic Statistics and National Accounts Division of the OECD Economics and Statistics Department. A new set of benchmark PPPs is now available for twenty-two OECD countries based on price and expenditure data for **1985.** These PPPs were again calculated in collaboration with EUROSTAT, which collected price and expenditure data for its own Member countries, while the OECD arranged for comparable data to be provided by the non-EEC members of OECD[1].

The main purpose of this note is to present these new PPPs based on **1985** and to explain how they differ from the **1980** benchmark estimates. First, however, there is a brief discussion of some of the uses that can be made of PPPs, followed by a short description of how they have been calculated. A final section gives some estimates for **1986** and **1987.**

I. USING PPPs

As their name implies, Purchasing Power Parities are the rates of currency conversion that ***equalize*** the ***purchasing power*** of different currencies; thus, **$100** converted into Yen at the PPP 'rate of exchange" will buy the same basket of goods and services in Japan as in the United States. The PPPs discussed here have been calculated using, as weights, final expenditures on the GDP, and so they can be used

– and this is their main purpose – to make inter-country comparisons of GDP and its expenditure components in real terms. When the GDPs of two countries are converted into a common currency using PPPs, comparisons can be described as being in "real terms" in the same way that changes in a country's GDP over time are measured in "real terms" by revaluing current GDP using the constant prices of some base year.

Much of the OECD's analytic work involves comparisons of economic aggregates between Member countries, and the ability to make such comparisons in real terms is in itself a sufficient justification for the time and expense devoted to the calculation of PPPs. In addition, however, PPPs and the price data underlying their calculation offer other interesting possibilities for economic and statistical research. It has long been known, for example, that the relative prices of goods and services vary in a consistent way with the level of GDP; Hill (**1986**) used the **1980** PPP results to examine this phenomenon in a previous issue of ***Economic Studies.*** The PPPs for the expenditure components of GDP show striking inter-country differences in the relative prices of capital ***versus*** consumer goods and of government ***versus*** private consumption (Ward, **1985**); these differences clearly have implications – hitherto little explored – for studies of, respectively, capital productivity and the growth of the public sector. The comparison of successive benchmark estimates of PPPs provides an independent check on the reliability of the price and quantity indices used in the national accounts, since the change in a country's PPP-converted GDP between two successive benchmark years (such as **1980** and **1985**) should be close to the real growth rate recorded in that country's national accounts estimates. The fact that there are frequently significant differences suggests that some countries' estimates of real growth and price inflation may be subject to substantial errors; the Economics and Statistics Department expects to investigate this question in the near future.

A final word should be added on a use for which the PPPs presented here are not relevant, namely for forecasting movements in exchange rates. This may seem odd since the concept of purchasing power parity was originally developed by Cassel (**1916**) in his work on "equilibrium" exchange rates, i.e. "underlying" rates of exchange towards which actual exchange rates are assumed to converge in the long term. To serve as a plausible candidate for an equilibrium exchange rate, a PPP would have to refer to ***domestic production*** of ***tradeable*** goods and services valued at ***export prices.*** By contrast, the PPPs presented here refer to final ***expenditures,*** including ***non-tradeables*** such as government services and construction, valued at ***domestic market*** prices, including sales taxes. However, while the PPPs presented here are not appropriate for explaining or predicting exchange rates, the relationship between them is of considerable interest. The ratios of exchange rates to PPPs can

be interpreted as spatial price indices which quantify the differences in price levels between countries in the same way that temporal price indices measure changes in price levels over time.

II. CALCULATING PPPs

PPPs are calculated, like temporal price indices, from the relative prices of large numbers of carefully specified goods and services. For the 1985 PPPs, final expenditures on the GDP were first broken down into 239 categories referred to as "basic headings"[2]. These 239 categories represent the most detailed level for which the participating countries were required to supply expenditure weights. "Cheese", "dental services" and "single-family dwellings" are examples of basic headings. The next step was to identify a number of particular goods and services within each basic heading. A "250 gramme pack of Camembert cheese", an "extraction of a single-root tooth without complications" and a "5-room, detached, single-family house of 110 m^2 habitable surface with a 21 m^2 garage" are examples of the specific goods and services whose prices were used in calculating the 1985 PPPs.

The list of specific items was built up in consultation with statisticians from all the countries participating in the study so as to ensure that it contained a representative selection of the goods and services commonly found in each country. The items selected do not have to be available in all countries but they must obviously be available, and commonly purchased, in at least two. In total, some 3 600 specific items were defined[3], and statistical agencies in the participating countries then arranged to supply the corresponding price data. To be consistent with the national accounts, these data refer to the average prices over the whole year and over the whole country, and they are market prices, i.e. they include consumption taxes.

For each basic heading, a matrix of size 22 x m is then constructed containing prices supplied by the 22 participating countries for the m items selected to represent that basic heading. This is then used to derive a matrix containing the 22 x 22 price ratios for the basic heading concerned. Almost invariably, there are two problems with this derived matrix. First, some of the price ratios are missing because, as already noted, not all 22 countries can supply prices for all the *m* items. Secondly, the ratios of the prices that are available are inconsistent between

countries in the sense that the price ratios between countries A and B and between countries A and C are not consistent with the price ratio obverved between countries C and B: this is usually referred to as the problem of intransitivity. Price ratios are estimated for missing cells using the price ratios available for "bridge" countries, and the complete matrix is then made transitive by a process of geometric averaging referred to as the "EKS" method after the initials of its inventors[4].

The EKS procedure generates a set of 22 transitive PPPs for each of the 239 basic headings and the next step is to aggregate these first to sub-groups such as "milk, cheese and eggs" and "residential buildings"; secondly to groups such as "food, beverages and tobacco" and "construction"; thirdly to the main components of final expenditure, such as "private consumption expenditure" and "gross fixed capital formation"; and finally to total GDP. Several weighting schemes have been suggested for this aggregation procedure, but the most widely-accepted, and the one currently used by EUROSTAT and the OECD, is the Geary-Khamis (GK) method which uses as weights the quantities consumed throughout the entire group of participating countries. An attractive feature of the GK method is that it treats countries as though they were regions of a single super-country, with the PPPs being obtained in the same way that ***national*** price indices would be obtained from regional indices compiled separately for large cities, small towns, rural areas, etc. An objection to the GK method is that it is in some sense "unfair" to small countries because the weights largely reflect the expenditure patterns of the bigger members of the group. Different weighting systems would of course produce different PPPs, but the obvious alternative – equal country weights – seems unacceptable on intuitive grounds for a group of countries ranging in size from Luxembourg and Portugal to Japan and the United States. Hill (1982), Eurostat (1980 and 1983) and Ward (1985) describe the EKS and GK procedures in some detail, with the first two also discussing the merits of alternative methods.

III. RESULTS FOR 1985

Table 1 gives some of the main results of the 1985 benchmark study showing per ***capita*** GDP in the 22 participating countries in real terms (using PPPs) and in nominal terms (using exchange rates). Only two OECD countries were unable to participate in the 1985 project – Iceland and Switzerland.

The 1985 project covered four countries – Australia, New Zealand, Sweden and Turkey – for which PPPs had never been calculated before. The results for these countries broadly conform with prior expectations. Australian ***per capita*** GDP in real terms is about the same as in Japan, with real ***per capita*** GDP in New Zealand about 15 per cent lower. Sweden's real ***per capita*** GDP is similar to that of its Nordic neighbours – above Finland and Denmark but below Norway. Turkey's real GDP is the lowest of the 22 countries shown in Table 1, amounting to less than two-thirds the ***per capita*** figures for the next two lowest countries – Portugal and Greece. There are some grounds for thinking that Table 1 understates Turkish real ***per capita***

Table 1. **Purchasing power parities, comparative dollar price levels and real GDP** per capita

1985 Benchmark results

	Purchasing power panties	Exchange rates	Comparative dollar price levels	Per *capita* GDP in US dollars		International volume index
	Currency units per US dollar		US = 100 (1)/(2)	Real[a]	Nominal[b]	US = 100[c]
	(1)	(2)	(3)	(4)	(5)	(6)
Australia	1.23	1.43	86	11 740	10 120	71
Austria	16.9	20.7	81	10730	8 740	65
Belgium	44.6	59.4	75	10680	8 020	65
Canada	1.22	1.37	90	15 230	13640	92
Denmark	9.79	10.6	92	12 240	11 310	74
Finland	5.98	6.20	96	11 440	11040	69
France	7.26	8.99	81	11 440	9 250	69
Germany	2.48	2.94	84	12 180	10240	74
Greece	77.3	138.1	56	5 870	3 280	36
Ireland	0.732	0.946	76	6 750	5 150	41
Italy	1301	1909	68	10840	7 390	66
Japan	222	239	93	11800	10980	72
Luxembourg	43.1	59.4	73	13430	9 750	81
Netherlands	2.54	3.32	77	11270	8 630	68
New Zealand	1.36	2.02	67	10040	6 720	61
Norway	8.64	8.60	100	13900	13 960	84
Portugal	66.2	170.4	39	5 570	2 160	34
Spain	95.3	170.0	56	7 600	4 260	46
Sweden	8.17	8.60	95	12640	12010	77
Turkey	153	522	29	3 590	1060	22
United Kingdom	0.567	0.779	73	10910	7 940	66
United States	1.00	1.00	100	16490	16490	100

a) Converted to US dollars using PPPs.
b) Converted to US dollars using exchange rates.
c) From column (4).

GDP, but because of problems with the GDP estimate rather than with the PPP. Turkey's national accounts are believed to understate the value added generated in construction, trade, services and possibly in certain agricultural and manufacturing activities; this would lead to an understatement of private consumption which is essentially derived as a residual. However, Turkey would remain last in a ranking by ***per capita*** GDP even on the extreme assumption that Turkey's GDP is understated by a third.

The "comparative dollar price levels" in column 3 of the table are defined as the ratios of PPPs to exchange rates, and can be interpreted as spatial price indices with the United States used as base. They show the number of dollars needed in each country to buy a representative basket of final goods and services costing $100 in the United States. The table shows that "dollar price levels" are closely correlated with ***per capita*** GDP. In 1985, Americans visiting the two poorest OECD countries – Portugal and Turkey – would have found that their dollars bought around three times as many goods and services as in the United States, but only about the same quantity in the next two richest countries – Canada and Norway. It is tempting to interpret column 3 as a value-for-money guide for tourists. Strictly speaking, this would be a mistake since tourists purchase only a small selection of all the goods and services entering final expenditure on the GDP. In practice, though, these figures give a useful indication of comparative price levels for the international tourist, and Section V gives a price-level matrix for 22 countries updated to 1987.

Column 4 (and the corresponding indices in column 6) gives the most widely used measure of relative living standards – namely ***per capita*** GDP converted into dollars using PPPs[5]. The 22 countries fall into four groups. The United States and Canada are super-rich countries with ***per capita*** GDP in excess of US$15 000. Next come the five high-income Europeans – Norway, Luxembourg, Sweden, Denmark and Germany – with ***per capita*** GDP between $12-14 000. Ten out of the 22 countries fall in the modal "affluent" group with ***percapita*** GDP between $10- 12 000; from richest to poorest these are Japan, Australia, France, Finland, Netherlands, United Kingdom, Italy, Austria, Belgium and New Zealand. At the bottom of the scale, Spain, Ireland, Greece, Portugal and Turkey form a low-income group with ***per capita*** GDP below ***$8*** 000.

The composition of the modal "affluent" group is interesting for two reasons. In the case of Italy, an important benchmark revision has recently been made to the national accounts in order to better measure value added by "informal" producers such as small firms in the construction and trade sectors. The revised series, which were published in early 1987, have raised 1985 GDP by over 17 per cent compared with the former series. Prior to this revision, real ***per capita*** GDP situated Italy some way below the affluent category although still well above the low-income group.

A second point of interest is that the United Kingdom is ranked among a number of neighbouring countries which, in the United Kingdom itself, are widely perceived as being substantially better off. In terms of GDP per capita, Table 1 puts the United Kingdom ahead of Belgium and Austria and only a little way below France and the Netherlands. This result provides a statistical context for discussions as to whether or not the United Kingdom can afford the public amenities and infrastructure enjoyed by its continental neighbours.

IV. COMPARISON OF THE 1980 AND 1985 PPPs

Table 2 compares the 1980 benchmark PPPs with the 1985 benchmark estimates for the 18 countries that participated in both studies. To make this

Table 2. Purchasing power parities and real GDP *per capita*, comparison of the benchmark results for 1980 and 1985

	Purchasing power parities				Real GDP *per capita*			
	per US$		per Deutschmark		US = 100		Germany = 100	
	PPP1	PPP2	PPP1	PPP2	PPP1	PPP2	PPP1	PPP2
Austria	15.4	16.9	7.03	6.81	71	65	86	88
Belgium	38.2	44.6	17.4	18.0	76	65	92	88
Canada	1.15	1.22	0.525	0.492	98	92	118	124
Denmark	8.59	9.79	3.92	3.95	85	74	102	100
Finland	5.44	5.98	2.48	2.41	76	69	92	93
France	6.47	7.26	2.95	2.93	78	69	94	93
Germany	2.19	2.48	1.00	1.00	83	74	100	100
Greece	70.4	77.3	32.1	31.2	39	36	47	49
Ireland	0.613	0.723	0.280	0.292	48	41	58	55
Italy	1139	1301	520	525	75	66	90	89
Japan	206	222	94.1	89.5	77	12	93	97
Luxembourg	38.6	43.1	17.6	17.4	91	81	110	109
Netherlands	2.38	2.54	1.09	1.02	73	68	88	92
Norway	7.29	8.64	3.33	3.48	100	84	120	114
Portugal	66.7	66.2	30.5	26.7	33	34	40	46
Spain	86.1	95.3	39.3	38.4	51	46	61	62
United Kingdom	0.533	0.567	0.243	0.229	70	66	84	89
United States	1.00	1.00	0.457	0.403	100	100	120	135

PPP1: 1980 benchmark PPPs extrapolated to 1985.
PPP2: 1985 benchmark PPPs.

comparison, the **1980** PPPs have been extrapolated to **1985** using the ratio of each country's GDP deflator to that of the United States. This extrapolation procedure can be expected to produce a close approximation to the PPPs that would be obtained from a benchmark PPP study involving detailed price comparisons. It is only an approximation because the deflators used for extrapolation are weighted by the expenditure patterns of each country, whereas benchmark PPPs are calculated using the weighted average of the expenditure patterns in all participating countries.

The first two columns compare the **1980** extrapolated parities (PPP**1**) with the **1985** benchmark parities (PPP2) taking the US dollar as equal to unity. On this basis, the **1980** PPPs appear to have understated the "true" parities obtained from the **1985** programme for all countries except Portugal – and by quite large margins. For example, the benchmark **1985** PPPs for Belgium and Germany are, respectively, **17** and **13** per cent higher than the extrapolated **1980** PPPs. The reason is believed to be that errors were made in calculating the United States PPP in **1980,** and so the picture is changed dramatically if another country is chosen as base. This can be seen from the next two columns where the Deutschmark has been set to unity. It now appears that, with one important exception, the two sets of parities are remarkably consistent. For **13** of the **18** countries, the differences between the two parities are 5 per cent or less which is an unremarkable difference, given that the extrapolation procedure is only expected to approximate the **1985** benchmark results and that both the PPPs and the price deflators are subject to measurement error.

The important exception, of course, concerns the United States for which, with the Deutschmark set to unity, the **1985** benchmark parity is **13** per cent lower than the extrapolated **1980** PPP. A number of special difficulties were encountered in calculating the United States PPP for **1980,** which are explained in detail by Ward (1985), and it now seems clear that the **US** PPP was overstated in **1980** and, as a result, real US GDP per capita was understated in relation to the other **17** countries. It is particularly unfortunate that an error was made in calculating the **US** parity since the United States is widely used as the reference country for international comparisons. It should, however, be emphasized that, in multilateral comparisons of this kind, errors affecting one country have a relatively small impact on estimates for other countries. The ratios of PPPs (and *per capita* GDP) between most pairs of other countries are broadly consistent as between the PPP1 and PPP2 results.

With the Deutschmark as reference, the other large discrepancy between the **1980** and **1985** results concerns Portugal, the extrapolated **1980** PPP being about **14** per cent above the **1985** benchmark PPP. As **1980** was the first time that Portugal participated in an international comparison project, a natural conclusion would be that the **1985** estimate is closer to the true PPP, with the difference

between the two estimates representing Portuguese statisticians' progress along the learning curve.

The only other countries whose Deutschmark PPPs differ by more than **5** per cent are the Netherlands, the United Kingdom and Canada, where the differences are between **6** and **6½** per cent. These differences are somewhat surprising since all three countries have well-developed statistical systems and the first two have had long experience in work on international comparisons. One possibility is that these countries are overestimating price inflation or – the other side of the coin – underestimating real growth of GDP.

V. EXTRAPOLATIONS FOR **1986** AND **1987**

As noted above, PPPs can be estimated for other years by extrapolating the benchmark PPPs by each country's rate of inflation relative to that of the reference country. Thus, country i s PPP for GDP in year ***t*** is determined as:

$$PPP_{it} = PPP_{i\ 1985} \times \frac{I_{it}}{I_{USAt}}$$

Here, I_{it} is the GDP deflator for country ***i*** in year ***t*** (with **1985** = 100) and $I_{USA\ t}$ is the corresponding deflator for the United States. Table **3** gives extrapolated PPPs and real per ***capita*** GDP for **1986** and **1987** based on the rates of inflation and GDP growth published in ***Economic Outlook*** 4***1*** (OECD, June **1987).** The table also shows comparative dollar price levels, i.e. the ratio of PPPs to exchange rates. For **1987,** the exchange rates are averages over the first five months of the year.

Table 4 gives the **1987** comparative dollar price levels rescaled to show each country in turn as the reference country. As the exchange rates used refer to the first five months of **1987,** Table 4 provides only an approximate guide to international price levels in **1987.**

Table 4 is to be read vertically, each country's column showing the price levels in the other 2**1** countries relative to the price level in that country. For example, the first column shows that Australians converting Australian dollars at the estimated **1987** exchange rate will find that the general level of prices in Austria is about 40 per cent higher than in Australia. In Belgium, the price level is about 30 per cent

Table 3. Purchasing power parities, comparative dollar price levels and real GDP per *capita*

Estimates for 1986 and forecasts for 1987[a]

	1986			1987		
	Purchasing power parities	Comparative dollar price levels	International volume index	Purchasing power parities	Comparative dollar price levels	International volume index
	(Currency units per US dollar)	(US = 100)	(US = 100)	Currency units per US dollar)	(US = 100)	(US = 100)
Australia	1.29	86	70	1.35	93	70
Austria	17.0	111	66	16.8	131	65
Belgium	45.4	102	65	44.9	119	65
Canada	1.23	88	92	1.23	92	93
Denmark	10.0	124	76	10.1	147	73
Finland	6.11	121	69	6.12	136	70
France	7.45	108	69	7.41	122	69
Germany	2.49	115	74	2.45	134	74
Greece	89.9	64	35	98.3	74	34
Ireland	0.750	101	40	0.757	111	39
Italy	1374	92	66	1400	108	67
Japan	220	130	72	213	143	71
Luxembourg	42.9	96	82	42.1	111	82
Netherlands	2.50	102	68	2.37	115	68
New Zealand	1.49	78	60	1.58	88	59
Norway	8.25	111	86	8.36	121	86
Portugal	76.1	51	34	80.4	57	35
Spain	103.3	74	47	106.1	83	48
Sweden	8.53	120	76	8.62	134	76
Turkey	195	29	22	240	31	23
United Kingdom	0.573	84	66	0.579	92	67
United States	1.00	100	100	1.00	100	100

a) The PPPs and international volume indices were estimated using the rates of inflation and growth of GDP published in *Economic Outlook* 41 (OECD, June 1987). The comparative dollar price levels are the ratios of the PPPs to exchange rates. For 1987, the exchange rates used are the averages over January to May 1987.

higher, while in Canada it is slightly lower than in Australia. There are striking differences between the 1987 price levels given for the United States in Table 4 and the corresponding figures for 1985 given in column 3 of Table 1. In 1985, only Norway's dollar price level equalled that of the United States, but by 1987 dollar price levels in most other countries exceeded that in the United States – and by 30 per cent or more in no less than six countries. This is almost entirely due to changes in the denominator – specifically to the sharp decline in the dollar exchange rate since 1985.

Table 4. Comparative international price levels 1987[a]

Reference countries = 100

	Aus (1)	Aut (2)	Bel (3)	Can (4)	Den (5)	Fin (6)	Fra (7)	Ger (8)	Gre (9)	Ire (10)	Ita (11)	Jap (12)	Lux (13)	Neth (14)	NZ (15)	Nor (16)	Por (17)	Spa (18)	Swe (19)	Tur (20)	UK (21)	US (22)
(1) Australia	100	71	78	101	63	68	76	69	126	84	86	65	84	81	106	77	163	112	69	300	101	93
(2) Austria	141	100	110	142	89	96	107	98	177	118	121	92	118	114	149	108	230	158	98	423	142	131
(3) Belgium	128	91	100	129	81	88	98	89	161	107	110	83	107	103	135	98	209	143	89	384	129	119
(4) Canada	99	70	77	100	63	68	75	69	124	83	85	64	83	80	105	76	161	111	69	297	100	92
(5) Denmark	158	112	124	160	100	108	120	110	199	132	136	103	132	128	167	121	258	177	110	474	160	147
(6) Finland	146	104	114	148	93	100	111	101	184	123	126	95	123	118	155	112	239	164	101	439	148	136
(7) France	131	93	103	133	83	90	100	91	165	110	113	85	110	106	139	101	214	147	91	394	133	122
(8) Germany	144	102	113	146	91	99	110	100	181	121	124	94	121	117	152	111	235	161	100	432	146	134
(9) Greece	80	56	62	80	50	54	61	55	100	67	69	52	67	64	84	61	130	89	55	239	80	74
(10) Ireland	119	85	93	121	76	82	91	83	150	100	103	78	100	97	126	92	195	134	83	358	121	111
(11) Italy	116	82	91	117	73	79	89	81	146	97	100	76	97	94	123	89	189	130	81	348	117	108
(12) Japan	154	109	120	155	97	105	117	107	193	129	132	100	129	124	163	118	251	172	107	461	155	143
(13) Luxembourg	119	85	93	121	76	82	91	83	150	100	103	78	100	97	126	92	195	134	83	358	121	111
(14) Netherlands	124	88	97	125	78	85	94	86	155	104	106	80	104	100	131	95	202	139	86	371	125	115
(15) New Zealand	95	67	74	96	60	65	72	66	119	79	81	62	79	77	100	73	154	106	66	284	96	88
(16) Norway	130	92	102	132	82	89	99	90	164	109	112	85	109	105	138	100	212	146	90	390	132	121
(17) Portugal	61	44	48	62	39	42	47	43	77	51	53	40	51	50	65	47	100	69	43	184	62	57
(18) Spain	89	63	70	90	56	61	68	62	112	75	77	58	75	72	94	69	146	100	62	268	90	83
(19) Sweden	144	102	113	146	91	99	110	100	181	121	124	94	121	117	152	111	235	161	100	432	146	134
(20) Turkey	33	24	26	34	21	23	25	23	42	28	29	22	28	27	35	26	54	37	23	100	34	31
(21) U.K.	99	70	77	100	63	68	75	69	124	83	85	64	83	80	105	76	161	111	69	297	100	92
(22) U.S.A.	108	76	84	109	68	74	82	75	135	90	93	70	90	87	114	83	175	120	75	323	109	100

a) Ratios of estimated PPPs for 1987 to average exchange rates January-May 1987.

VI. FUTURE WORK ON PPPs

The calculation of PPPs is now established as a regular part of OECD's work programme. Three new developments will take place in the course of the next three years. First, it is hoped that PPPs can be calculated for the two missing Member countries – Switzerland and Iceland; statistical offices in both countries have indicated their willingness to participate, and it is possible that some provisional estimates will become available before the end of 1988. Secondly, both OECD and EUROSTAT are intending to adopt more sophisticated procedures for extrapolating benchmark PPPs. This will mainly involve the use of relative price deflators at a much more detailed level than hitherto. Finally, OECD and EUROSTAT are planning to

stagger the collection of prices over a two-year period so as to avoid peak loads every five years. The next benchmark year is 1990 and price collection is provisionally scheduled to start mid-1988 and to finish mid-1990. Prices will be adjusted to 1990 using details from relevant price indices. Both Secretariats will also be organising a rigorous review of the methodology currently employed.

NOTES

1. EUROSTAT also arranged for the collection of price and expenditure data for Austria, which was involved in a separate comparison with a group of East European countries under the auspices of the United Nations Economic Commission for Europe.

2. For the twelve OECD countries covered by EUROSTAT, 340 basic headings were used. The EUROSTAT classification can be aggregated to match exactly the 239 basic headings used by OECD.

3. The detailed items include 850 pharmaceutical products, 2 500 other consumer goods and services, 30 occupations in government, education and health services, 240 types of machinery and equipment, and 20 buildings and construction projects. These last are defined by detailed bills of quantity specifying the material and factor inputs.

4. The EKS procedure was devised by two Czechoslovakian economists – Elteto and Koves – and at the same time, but independently, by Bodan Szulc who is now employed in Statistics Canada. The EKS procedure used for the OECD estimates involves a weighting system based on the "characteristicity" of the specified items in each country's final expenditures. This is done to ensure that the PPPs are based on goods and services that are commonly found in each country.

5. Changes in living standards over time are often assessed by reference to private consumption expenditure rather than total **GDP.** However, the former aggregate is not appropriate for comparing living standards between countries because in some countries health and education services are mainly provided on a market basis (and so appear in private consumption) while elsewhere they are mostly provided on a collective basis (and so appear in government consumption).

BIBLIOGRAPHY

Cassel, G. (1916), "The present situation of the foreign exchanges", *Economic Journal* (Vol. 26, No. 1, March) pp. 62-65.

EUROSTAT (1983), *Comparison in Real Values of the Aggregates of ESA, 1980* (Statistical Office of the European Communities, Luxembourg).

EUROSTAT (1985), *Comparison of Price Levels and Economic Aggregates: The Results for 75 African countries, 1980* (Statistical Office of the European Communities, Luxembourg).

Geary, R.C. (1958). "A note on comparisons of exchange rates and purchasing power between countries", *Journal of the Royal Statistical Society* (Series A, *Vol.* 121), pp. 97-99.

Gilbert, M., and I. Kravis (1954), *An International Comparison of National Products and Purchasing Power of Currencies: A Study of the United States, the United Kingdom, France, Germany and Italy,* (OEEC, Paris).

Hill, T.P. (1982), *Multilateral Measurements of Purchasing Power and* Real *GDP* (Statistical Office of the European Communities, Luxembourg).

Hill, T.P. (1986), "International price levels and purchasing power parities", *OECD Economic Studies, (No.* 6, Spring), pp. 133-159.

Khamis, S.H. (1984). "On aggregation methods for international comparisons", *The Review* of *Income and Wealth,* (Series *30, No.* 2, June), pp. 185-205.

Kravis, I.B., A. Heston and R. Summers (1982). *World Product and Income: International Comparisons of Real Gross Product* (published for the World Bank by John Hopkins University Press).

Krinjse-Locker, H. (1984), "On the estimation of purchasing power parities on the basic heading level", *The Review of Income and Wealth,* (Series 30, *No.* 2, June), pp. 135-152.

OECD (1986), *National Accounts,* Volume *1,* Main Aggregates, (OECD, Paris).

OECD (1987), *Economic Outlook 41,* (June 1987, OECD, Paris).

OECD (1987), *National* Accounts, Volume *1,* Main Aggregates, Purchasing Power Parities Supplement (OECD, Paris).

Officer, L.H. (1976), 'The purchasing power parity theory of exchange rates: a review article", *IMF Staff Papers, (Vol.* XXIII, No. 1, March), pp. 1-60.

Summers, R. and A. Heston (1984), "Improved international comparisons of real product and its composition, 1950-1980", *The Review of Income and Wealth,* (Series 30, *No.* 2, June), pp. 207-262.

Szilagy, G. (1984), "Updating procedures of international comparison results", *The Review of Income and Wealth*, (Series 30, No. 2, June), pp. 153-166.

United Nations and EUROSTAT, (1986), World Comparisons of Purchasing Power and Real Product for 1980, Phase IV of the International Comparison Project. Part One: Summary Results for 60 Countries (ST/ESA/STAT/SER.F/42, New York).

Ward, M. (1985), *Purchasing Power Parities and Real Expenditures in the OECD* (OECD, Paris).