

International Comparisons of Productivity: a technical note on revisions and interpretation

23 February 2005

Summary

After the periodic major benchmarking exercise of prices across all OECD countries, the UK's productivity performance continues to be lower than France and the USA.

UK productivity in 2003, as measured by GDP per worker, was 11 per cent below that of the average of all other G7 countries. Before this revision, UK productivity was 13 per cent lower. UK GDP per worker remains similar to that of Germany, above that of Japan, but still below that of France and the USA.

Revisions in this release largely reflect new estimates of purchasing power parities (PPPs). The impact is to lower the productivity levels of all other countries relative to the UK for the latest years. The US's performance relative to the UK was revised most significantly in this release, from 129 to 125 for 2003, with UK=100.

This technical note provides further detail about the international comparisons of productivity methodology, the compilation process and use of purchasing power parities. It also provides a detailed analysis of past and present revisions to the international comparisons of productivity estimates since their first publication in October 2001.

Eunice Lau

Office for National Statistics

Gavin Wallis

Office for National Statistics

Introduction

The Office for National Statistics has been publishing International Comparisons of Productivity (ICP) since October 2001 based on data provided by the OECD. Annual relative comparisons of levels of productivity are made for France, Germany, Japan and the USA, with the UK being the base country set equal to 100 each year. We also publish aggregates for G7, and G7 excluding the UK.

Cross-country level comparisons are made on two productivity measures – Gross Domestic Product (GDP) per worker and GDP per hour worked. The former has been assessed to meet the quality of a National Statistic. However, the latter is released as an experimental statistic to reflect the inherent measurement difficulties in making hours worked estimates comparable across countries.¹

ICP is published twice yearly, usually in September and February. They are two types of releases, reflecting the publication and revisions cycles of our four component data series from the OECD. In February, the series are updated mainly to take on board the annual revisions to the purchasing power parities (PPPs). Revisions to countries' GDP, if any, will also be included at the same time. However data are not available to extend the ICP series by an additional year. In September, an additional year of data becomes available and the series are extended. Revisions to the back series are also included to reflect any changes in the underlying data of the individual countries, i.e. GDP, employment and average hours worked.

Contact details

Email

Eunice.Lau@ons.gsi.gov.uk

Telephone

020 7533 5959

¹ The experimental statistics status of ICP based on GDP per hour worked is due to be reviewed, following improvements that the OECD (the source of our data) has made to their average hours worked series over the years.

In the February release, revisions to ICP tend to be of more general nature, i.e. affecting all countries. The pattern of revisions is determined by that of the purchasing power parities. Therefore, ICP revisions are not always in one direction, and could be more significant for some countries than the others. But generally larger revisions are expected for the latest years than the earlier years for the individual countries.

Revisions to ICP tend to be country-specific in September and their magnitude is relatively marginal, usually by less than 0.5 index points in absolute terms. The exceptions are when the UK (the base country) revises its numbers or when there are major revisions to the underlying data for any one country. The September 2003 release, which incorporated the UK 2001 Census revisions for the first time, was a case in point. Productivity comparisons for all countries were affected and revisions were significant but all in the same direction.

This paper looks closely at the sources and extent of ICP revisions over the years. The aim is to inform users of the quality of ICP numbers in each type of release. Given the significant role of the purchasing power parities in international comparisons, the implications of the recent change in its methodology following the Eurostat's major PPP revision programme for 1995-2000 are considered. This in turn provides the context in which ONS ICP numbers are to be interpreted.

Methodology

ONS's ICP numbers are based on two productivity measures – GDP per worker and GDP per hour worked. They are constructed from four component data series for each country. Comparable productivity levels for each country are first calculated before they are expressed as an index relative to the UK (UK=100):

$$\text{GDP per worker for country } i = \frac{GDP_i / PPP_i}{Employment_i}$$

GDP per hour worked

$$\text{for country } i = \frac{GDP_i / PPP_i}{Employment_i \times Hours_i}$$

The four required component data series for each country are therefore:

GDP = current GDP at market prices in country's own currency,

PPP = current purchasing power parities relative to the US (US=1),

Employment = number of people in employment, and

Hours = actual average hours worked per person per year.

The use of the PPPs is to convert countries' GDP into comparable volume measures for international level

comparisons at a point in time. OECD's current PPPs use the US as the base country. These ratios for each year show how much a representative basket, worth US\$1 in the US, costs in different countries in their domestic currencies. Thereby, PPPs give the relative price levels across countries.

For international comparisons of productivity, PPPs are preferred to the market exchange rates which fluctuate for reasons other than countries' relative price movements, such as interest-rate differentials and currency speculations.

In addition, market exchange rates at best only reflect the relative price movements of the traded sector. In contrast, PPPs are constructed to cover the entire range of *final* goods and services, which make up the whole of GDP (expenditure) including many items, such as construction and government services, which are not traded internationally. Due to its comprehensive coverage, PPPs are therefore more appropriate than the market exchange rates in converting GDP into cross-country comparable volume measures. Furthermore, because PPPs are aggregated up to GDP expenditure, GDP at market prices, as opposed to at basic prices, are chosen for ICP.

Data sources and ICP publication cycle

All four component data series are sourced to various OECD publications, which have been identified to be most comparable. They are:

- GDP from the OECD Main Economic Indicators (MEI), published monthly;
- PPP from the OECD PPP website at <http://www.oecd.org/std/ppp>, which is updated on a continuous basis to give the latest estimates;
- Employment from OECD Annual Labour Force Statistics, published in August; and
- Hours from OECD Employment Outlook, published annually in June/July.

The components for the numerator of the productivity ratio, GDP and PPP, are relatively timely whereas the components for the denominator are only published annually in the summer months of June / July and August. Therefore September is the earliest possible time to extend the ICP series with an additional year of data. The ICP series are then revised in February mainly to take on board of the annual revisions to the PPP, released at the beginning of January. Data on Employment and Hours are the same as in the September release, while GDP numbers are taken from the latest MEI, i.e. the January edition.

In choosing the data sources for ICP, a balance has to be struck between maintaining cross-country comparability and transparency on the one hand and timeliness on the other hand. While we have managed to improve the timeliness of sources for the numerator over the years, more timely sources of sufficient quality for the denominator cannot be identified. This is partly due to the diversity in countries' statistics on employment and average hours worked. While we could use alternative sources of hours worked numbers, we would not benefit from the OECD's work to improve cross-country comparability.

The lack of timeliness in the denominator does not usually cause problems as big revisions to countries' Labour Force Surveys tend to happen only once in five or ten years depending on the intervals of their Census. In face of significant revisions, however, the untimely data sources could become more costly.

The UK 2001 population Census was a case in point. To incorporate the Census results in a more timely fashion, the UK employment to is sourced to ONS and OECD average hours worked for the UK is adjusted by a Census factor.² This took effect in the September 2003 release with the understanding of reverting to the OECD data sources once they have been updated with UK Census results. But this did not happen in summer 2004 as expected.³ As a result, the same source and method of adjustment applied to the UK denominator runs through in the ICP October 2004 and February 2005 releases.

Sources of ICP revisions

Changes to any one of the underlying component series will impact on ICP on both measures, except the hours series which only affects the GDP per hour worked measure. Table 1 lists the main sources of revisions to comparisons of GDP per worker for each previous release. These are automatically fed through to comparisons of GDP per hour worked. Additional revisions specific to the second measure are listed in Table 2. These should be read alongside the revisions triangles for each country on both measures provided in tables R1 to R12 in the Appendix.

Table 1: Sources of revisions to ICP on GDP per worker

ICP Release	Sources of revisions
Oct 2001	The launch of the ICP series.
Mar 2002	Significant revisions to PPP caused by the 1999 benchmark results.
Sep 2002	Country-specific revisions to GDP and employment; in particular noticeable revisions to French employment numbers. The minor effects of shifting from legacy currencies to Euro for member states' GDP were also included.
Feb 2003	PPP annual revisions outside the

² For further details see Barnes and Asogbon (2004).

³ The 2001 Population Census results were integrated into ONS LFS figures in various phases. Interim Census adjustment to LFS estimates of employment and hours worked at the aggregate level were first published in October 2002, but a full set of Census-adjusted microdata (including employment and hours) was not released until March 2004. ONS supplies data to the OECD in March every year to be included in their *Annual Labour Force Statistics* and *Employment Outlook*. OECD requires a large range of consistent disaggregated data (microdata) from the LFS, which was not available by the deadline of data submission in 2004. Consequently, the 2004 OECD annual publications contained no Census or other population adjustments. These adjustments should feed into the OECD publications in the 2005 editions.

	triennial benchmark years.
Sep 2003	Significant downward revisions to UK employment caused by UK Census results.
Feb 2004	Major revisions caused by the Eurostat PPP programme for 1995-2000, coupled with small revisions from GDP numbers by changing to the more up-to-date data source, i.e. OECD <i>Main Economic Indicators</i> .
Oct 2004	Country-specific revisions to GDP and employment; in particular noticeable downward revisions to French employment numbers.
Feb 2005	Significant revisions to PPP caused by the 2002 benchmark results.

Table 2: Additional sources of revisions to ICP on GDP per hour worked

ICP Release	Sources of revisions
Oct 2001	The launch of the ICP series.
Mar 2002	None.
Feb 2003	None.
Sep 2003	Adjustments to UK average hours worked to reflect the UK Census results. There were small revisions to all other countries with more significant downward revisions for Germany.
Feb 2004	Revisions to French average hours worked, supplied by the French statistical office, INSEE and published in a corrigendum to OECD <i>Employment Outlook</i> .
Oct 2004	Downward revisions to hours worked for Canada, US and Italy. Minor revisions to UK hours worked.
Feb 2005	None.

Revision impact on ICP

ONS's ICP numbers have been subject to ongoing revisions, which have largely reflected changes in the four underlying component data series. Each goes through its own regular as well as one-off revisions, but their timing seldom coincides for the four input series. As a result, these impact on ICP at different times, contributing to its overall volatility. ICP revisions are predictable only as far as revisions to the component data are predictable. Total revisions since the first release in October 2001 are large but they are cumulative over the last seven releases with a few significant one-off revisions to respective component data series, as seen in Tables 1 and 2 above.

The impact of revisions to the underlying component data series on ICP depends on their frequency and magnitude. They are detailed as follow:

GDP

Countries' GDP are subject to their regular annual revision cycles in the national accounts. But they impact more on their volume rather than current GDP, the latter of which is used in the calculation of ICP. Since countries' revision cycles do not always coincide and may vary from year to year, some minor country-specific ICP revisions originated from this source, mostly affecting the latest years, are expected in each release. The impact on the back series, if any, is often negligible.

Countries' national accounts are also subject to major revisions arising from methodological or definitional changes. Some of these are country-specific while others could apply to all countries, for example the implementation of the *System of National Accounts 93*. These tend to happen in the medium to long term at irregular and infrequent intervals, bringing different impact on countries' GDP levels. In turn, their impact on ICP tends to be one-off in nature but is harder to predict.

PPP

The OECD-Eurostat PPP programme has been subject to major revisions and methodological changes in recent years, which have, to some extent, superseded its regular revision cycles. ICP numbers are highly sensitive to changes in PPPs. In turn, PPPs have been the one source that causes most instability in the ICP series.

The OECD and Eurostat share the responsibility for compiling the PPPs. Details of their joint programme are provided in Box 1. The implications for the revision pattern to PPPs and in turn ICP are summarised below.

1. The major revision programme for 1995-2000 PPP data, together with the three-year rolling annual benchmarking method, has meant that from 1995 onwards, there exhibits higher stability in PPPs within the European group than between the European countries as a group and the non-European countries. Consequently, relatively larger revisions in ICP for the non-European countries (i.e. the US and Japan) are likely following the release of the triennial benchmark results for PPPs. This is certainly the case in the February 2005 release (see Box 2).
2. PPPs are provisional when they are subject to their regular revision cycles. For the European countries, PPP estimates are provisional for the latest year. But for the non-European countries, they are provisional from the last benchmark year. Since the triennial benchmark results are normally released 24 months after the end of the reference period, this could mean that up to the last four years are provisional for the non-European countries. The same thus applies to the ICP.
3. PPPs pre-1995 for the EU countries and pre-1999 for the non-EU countries will be revised in each release if countries' relative implicit GDP deflators are changed.
4. PPPs are also subject to revisions outside the normal cycle. Generally, thorough and systematic revisions will remain infrequent events, accommodating only major future changes in the national accounts compilation system and in the underlying PPP

methodology. The next revision of SNA93 and ESA95 could be such an event.

Employment

The input series on employment are only updated in the September release and are rolled over to the February release. Between the two releases there should not be ICP revisions caused by changes to the underlying employment data.

However in the September 2003 release, the revisions to the UK employment to reflect the interim Census 2001 results led to significant revisions to the ICP numbers for all countries. These had the same proportionate effect on all countries – around 1 per cent for earlier years increasing to around 2 per cent in the latest year (i.e. 2002). This pattern reflected how the impact of the Census 2001 was tapered back in time in the UK employment statistics. The effect on the ICP was to improve UK's relative productivity performance against all other countries (i.e. with lower ICP numbers), but by the same proportion across countries.

Other than these revisions, the employment series are relatively stable. France is the only country which seems to revise their numbers more frequently than other countries – noticeable revisions were recorded in the September 2002 and October 2004 releases.

Hours

Like employment, input data on hours are updated only in the September release and rolled over to the February release. The only exception was in the February 2004 release, when OECD published a corrigendum to its 2003 Employment Outlook incorporating the revisions to the French data provided by its statistical office INSEE. Unlike the other component series, revisions to hours only affect ICP GDP per hours worked, but not GDP per worker.

Compared to employment, the data set on hours is subject to higher frequency of methodological revisions. This reflects the inherent difficulties in measuring hours and in ensuring cross-country comparability. GDP per hour worked has been released as an experimental statistic because of the OECD's work programme to improve the methodology for estimating hours.

While each country has its own official measure on hours, the OECD makes adjustments to countries' data to improve cross-country comparability if judged necessary. In order to improve the timeliness for some countries (e.g. Italy), the OECD also exploits new data source, for example, the European Labour Force Survey, to produce provisional estimates. The fine-tuning of the methodology and hours estimates is therefore a collaboration between the national statistical offices and the OECD. Instability of the hours series stems from work and revisions carried out at the national level as well as by the OECD as detailed in Table 2.

Box 1: The OECD-Eurostat PPP programme

PPPs are compiled using three types of data: price survey results, GDP weights (for expenditure shares) and other input data (e.g. salaries in government and rents).

An overview of the shared programme between OECD and Eurostat for calculating PPPs is provided in Figure 1. For the non-European countries, it has been a triennial exercise to provide the benchmarks which are then extrapolated backward and forward, and the series are smoothed between the two benchmarks. The last two benchmark years are 1999 and 2002.

Since 1990, Eurostat has been calculating PPPs for the 31 European countries that it coordinates, using a three-year rolling annual benchmarking method. That is, about one third of the consumer goods are surveyed every year and for the other two-thirds suitable consumer price indices are used for interpolation in the intervening years. Rents, salaries in the government sector and GDP weights are collected annually whereas capital goods and construction surveys are now undertaken every two years. Of these component data, GDP weights are subject to regular revisions in line with National Accounts production processes. Hence, Eurostat PPPs are final only 24 months after the reference period. Annual results are released towards the end of each year. For example in 2004, final 2002 estimates and provisional 2003 estimates are released.






In order to take advantage of the most up-to-date information, the OECD has made the decision to integrate the annual benchmarking results from Eurostat for the European countries into their programme for all the OECD countries with the US as the base country. This entails fixing the relative price ratio between the European and the non-European groups, allowing the relatives to change only within groups.

In November 2003, Eurostat released revised PPP data for 1995-2000. These reflected the results of a significant effort made to correct the inconsistencies arising from countries moving towards the *European System of Accounts 1995* at a different pace. The impact on ICP, incorporated in the February 2004 release, was large. For full details, see Barnes and Asogbon (2004).

As illustrated in Figure 1, the exercise conducted by Eurostat to ensure consistency and continuity in PPPs only applied to the European countries and for 1995-2000. They are extrapolated backward from 1995 using implicit GDP deflators to provide a consistent back series. Such an extensive and intensive exercise was not repeated for the countries coordinated by the OECD. When integrating the improved PPP estimates for the European countries into the broader OECD results, it was decided to use 1999 as the linked benchmark year, which was judged to be most consistent with the new data. The back series for the non-European group are extrapolations from the 1999 benchmarks, superseding the previous benchmark results.

Figure 1: The Eurostat-OECD PPP programme

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Non EU Countries	Extrapolated using the relative rates of inflation between countries as measured by their implicit price deflators for GDP									1999 Benchmark PPPs	OECD estimates		2002 Benchmark PPPs	Provisional
EU Countries	Extrapolated using the relative rates of inflation between countries as measured by their implicit price deflators for GDP					Annual benchmark results provided by Eurostat				1999 Benchmark PPPs	Annual benchmark results provided by Eurostat		2002 Benchmark PPPs	Provisional

-  For non EU countries PPPs prior to 1999 are calculated using extrapolation. For EU countries extrapolation is used to calculate PPPs prior to 1995. Extrapolation is described in more detail below. As changes in PPPs depend directly on relative rates of inflation in different countries, this method produces robust estimates provided they are not too remote from the base year and there have been no significant changes in price or expenditure structures within countries. For the extrapolation the base year for non EU countries is 1999 whilst for EU countries it is 1995.
-  From 1995 onwards PPPs for EU countries are annual benchmark results provided by Eurostat. In 2002 Eurostat undertook a thorough revision of its PPPs. The revisions concerned PPPs for the years 1995-2000 and corrected the inconsistencies arising from countries moving towards the European System of Accounts 1995 at different points in time. The results were published in November 2003.
-  For non-EU countries the PPPs for 2000 and 2001 are the geometric averages of the extrapolated results using the 1999 benchmark as the base year and the extrapolated results using the 2002 benchmark as the base year.
-  PPPs for all countries are triennial benchmark results calculated jointly by the OECD and Eurostat.
-  For EU countries these are preliminary annual benchmark results provided by Eurostat. PPPs for non EU countries are OECD estimates based on extrapolation. These estimates and preliminary results should be interpreted with caution as they are subject to revision.

Extrapolation: When estimating PPPs using extrapolation the PPPs for the base year are carried forward (or backwards) by the relative rates of inflation in different countries as measured by implicit price deflators for GDP. Specifically a county's PPP for year t+n (or t-n) is obtained by multiplying its PPP for the base year t by its implicit price deflator for GDP for year t+n (or t-n) and then dividing by the implicit GDP deflator for year t+n (or t-n) for the reference country. The choice of reference country does not influence the final result and in practice the OECD uses the United States. Note also that PPPs that have been extrapolated backwards are sometimes referred to as backdated PPPs.

Box 2: Revisions in the ICP February 2005 release

The table below shows revisions to the comparisons of GDP per worker in the ICP February 2005 release. They largely reflect revisions to PPPs rather than to countries' GDP, which are very minor, if any. The revisions to ICP after 1999 are mostly caused by the 2002 PPP triennial benchmark results. Revisions to the estimates for 1999 are very small, reflecting small revisions to countries' GDP with PPPs fixed by the 1999 benchmark.

For the period before 1999, revisions mainly affect comparison with the non-European countries. The source of these revisions represent adjustments made to the price levels of the non-European countries rather than revisions to the UK.

PPP revisions in the latest years are largely in the direction of reducing the UK productivity gap against all countries. That is, the price of the same basket of goods in the UK is revised down relative to other countries. This has not always been the case in the past (see the revision triangles for all countries in Appendix).

The 2002 benchmark results for the non-European countries suggest that the price levels in other countries compared to the UK are higher than those projected by their implicit GDP deflators. Based on setting the UK PPP equal to one, the PPP for 2002 has been revised up by 3.3 per cent for the US and 2 per cent for Japan. The OECD judges that the size of these revisions is usual with the triennial benchmark results. However, it would be helpful if future OECD work were to identify to what extent these revisions are due to changes in the weights and composition of the basket between the two benchmark years, or inconsistency (e.g. arising from sampling error or conceptual changes).

Revisions from October 2004 release, in index points

Year	France	Germany	Japan	USA	G7	G7 exc. UK
1990	0.2	-	0.3	-0.9	-	-
1991	0.1	0.1	0.3	-0.7	-0.1	-0.2
1992	0.1	0.1	0.3	-0.6	-0.1	-0.1
1993	0.0	0.0	0.2	-0.5	-0.1	-0.2
1994	0.0	0.0	0.2	-0.6	-0.2	-0.2
1995	0.0	0.0	0.2	-0.4	-0.1	-0.1
1996	0.0	0.0	0.1	-0.4	-0.2	-0.2
1997	0.0	0.0	0.2	-0.1	0.0	0.0
1998	0.0	0.0	0.1	0.0	0.1	0.1
1999	0.0	0.0	0.1	0.0	0.0	0.1
2000	0.0	0.0	-0.5	-1.6	-0.9	-1.0
2001	0.1	0.0	-0.6	-1.4	-0.9	-1.0
2002	-2.1	-0.5	-1.9	-4.0	-2.6	-2.8
2003	-3.2	-0.2	-1.6	-3.8	-2.6	-2.8

Source: Office for National Statistics

Interpretation of ONS's ICP numbers

ONS's ICP is constructed using *current* PPPs. It is intended to give "snapshot" comparisons based on current international prices. This approach allows cross-country prices and price structures to vary over time. Movements in ICP over time therefore incorporate several effects: changes in relative prices between countries, relative volume changes and possibly changes in methodologies and definitions. This is why countries' relative volume productivity growth cannot fully account for the changes in ICP over time. At times, the change in the relative price structures could be large enough to shift ICP in the opposite direction to that implied by the relative volume growth.

Due to the statistical uncertainties surrounding the estimation of PPPs and international comparability of the other component data series, small differences between countries (of a few percentage points) will obviously fall within the margin of error⁴. That is, small differences between countries and across time are not statistically or economically significant.

It must be stressed that ICP series are constructed for comparisons at a point in time. They should not be treated as a time series in the sense that volume growth over time could be derived from them. However the ICP

⁴ As noted in Schreyer and Koechlin (2002a) when looking at volume comparisons of GDP "a 5 percentage point error margin is sometimes quoted" to account for these uncertainties.

series could be seen as indicative of broad trends over a long period of time across countries.

It should be noted that the *current* approach used in ONS's ICP is different from the *constant* approach adopted by the US Bureau of Labor Statistics (BLS) and the OECD for comparisons over time⁵. The latter approach is based on *constant* PPPs which are derived from extrapolation of the base year's current PPPs using countries' relative implicit GDP deflators.

The advantage of this approach is that it replicates exactly the relative movements of volume growth and in turn facilitates the interpretation of how countries compare over time. However, it does share the main drawbacks of indices that use a fixed base. The results are dependent on the choice of base year. The assumption of no change to the price structures over time means moving away from economic reality the further away from the base year. It is also more sensitive to cross-country differences in methods and definitions employed in national accounts and deflation.

The impact of revisions could be summarised in the following additional guidelines for interpreting ONS's ICP numbers:

1. Latest year for the EU countries and years after the latest benchmark for the non-EU countries should be treated as provisional. That is, they are revised within the normal production cycle, mirroring that of the PPPs.
2. Following Eurostat's revision programme to 1995-2000 PPPs, we judge that the quality of PPPs, and in turn ICP, is better now than previously, and better post-1995 than pre-1995.
3. ICP will always be susceptible to the one-off infrequent and irregular revisions to the respective component series. These revisions could be country-specific or general, i.e. affecting all countries in ICP. That the timing of these changes is unpredictable and seldom aligns with each other contributes to the instability of the ICP series.
4. ICP GDP per hour worked is less stable than ICP GDP per worker, because the former has the added uncertainties from revisions to average hours worked.

References

Barnes, M. & Asogbon, G (2004) "International Comparisons of Productivity: better data improve UK productivity position", ONS website, 16 February. <http://www.statistics.gov.uk/cci/article.asp?ID=737>

BLS (2004) "Comparative Real Gross Domestic Product Per Capita and Per Person Employed: 14 countries, 1960-2003". <http://www.bls.gov/fls/flsgdp.pdf>

OECD (2001) "Problem areas in calculating time series of PPPs", February, presented at Joint World Bank-OECD seminar on purchasing power parities. <http://www.oecd.org/dataoecd/23/39/2425075.pdf>

OECD (2005) "Purchasing Power Parities and Real Expenditures: 2002 Results", (Forthcoming).

ONS (2003), "UK Census 2001 results incorporated into International Comparisons of Productivity: Methodology and Impact", September.

http://www.statistics.gov.uk/downloads/theme_economy/ICP_Census_Adjustment_Commentary_Sep03.pdf

Schreyer, P., and Koechlin, F., (2002a) "Purchasing Power Parities 1999 Benchmark Results", OECD. <http://www.oecd.org/dataoecd/3/58/2084361.pdf>

Schreyer, P., and Koechlin, F., (2002b), "Purchasing power parities- measurement and uses", OECD Statistics Brief, March 2002, No. 3, OECD, Paris. <http://www.oecd.org/dataoecd/32/34/2078177.pdf>

Stapel, S., and Pasanen, J., (2003), "Purchasing Power Parities and related economic indicators for EU, Acceding and Candidate Countries and EFTA: Revised 1995 – 2000, final 2001 and preliminary 2002 results", Eurostat Statistics in focus. http://epp.eurostat.cec.eu.int/cache/ITY_OFFPUB/KS-NJ-03-064/EN/KS-NJ-03-064-EN.PDF

Stapel, S., Pasanen, J., and Reinecke (2004), "Purchasing Power Parities and related economic indicators for EU, Candidate Countries and EFTA: final results 2002 and preliminary results 2003", Eurostat Statistics in focus. http://epp.eurostat.cec.eu.int/cache/ITY_PUBLIC/KS-NJ-04-053/EN/KS-NJ-04-053-EN.PDF

⁵ OECD also publishes international comparisons of productivity levels on a GDP per hour worked basis for the latest year available, currently 2003. The discrepancies between the ONS and OECD series are not large, considering the margin of uncertainty. They can be explained by the different sources used for the component data. In particular, OECD recently decided to move to the national accounts as the main source of employment data for most countries whereas ONS employment data is based on countries' Labour Force Surveys. Future work is planned in co-operation with the OECD to further understand the differences between the ONS and OECD estimates of productivity levels.

Appendix

Table 1: ICP February 2005: GDP per worker

Year	France	Germany	Japan	UK	USA	G7	G7 exc. UK
1990	130.2	-	105.4	100.0	136.0	-	-
1991	130.3	111.5	106.1	100.0	136.0	121.9	123.9
1992	129.9	112.8	103.5	100.0	136.5	121.6	123.6
1993	125.7	108.9	99.8	100.0	133.4	118.8	120.5
1994	123.6	108.2	97.3	100.0	130.9	117.1	118.6
1995	122.3	108.2	97.3	100.0	130.0	116.8	118.3
1996	120.9	107.6	97.8	100.0	129.8	116.5	118.0
1997	120.3	105.2	95.5	100.0	128.6	115.0	116.4
1998	120.0	103.4	93.0	100.0	129.2	114.7	116.0
1999	119.6	104.4	93.1	100.0	131.9	116.0	117.5
2000	117.2	103.1	93.3	100.0	129.0	114.4	115.7
2001	116.0	100.5	91.8	100.0	126.6	112.3	113.4
2002	111.8	98.3	88.7	100.0	123.2	109.1	110.0
2003	109.7	98.4	90.3	100.0	124.7	109.7	110.6

Note: index, UK = 100. Data for all years and all countries have been subject to revision in this release. Data for 2003 are provisional and subject to revision.

Source: Office for National Statistics

Table 2: ICP February 2005: GDP per hour worked - EXPERIMENTAL

Year	France	Germany	Japan	UK	USA	G7	G7 exc. UK
1992	139.4	125.2	91.0	100.0	129.7	118.2	119.8
1993	135.5	121.9	90.2	100.0	125.7	115.9	117.3
1994	134.6	122.1	88.8	100.0	123.9	114.9	116.2
1995	135.4	123.4	89.6	100.0	122.7	114.9	116.2
1996	133.4	124.1	89.6	100.0	122.9	114.7	116.0
1997	133.1	121.8	88.7	100.0	120.9	113.2	114.4
1998	133.3	119.9	87.1	100.0	121.1	112.9	114.1
1999	132.5	120.9	88.1	100.0	122.9	114.0	115.3
2000	133.0	119.9	87.2	100.0	120.1	112.3	113.4
2001	133.8	118.1	86.5	100.0	119.4	111.4	112.5
2002	129.1	114.8	83.2	100.0	115.3	107.6	108.3
2003	125.7	113.3	83.5	100.0	115.8	107.3	107.9

Note: index, UK = 100. Interim population-adjusted figures for the UK are presently only available from 1992. Data for all years and all countries have been subject to revision in this release. Data for 2003 are provisional and subject to revision.

Source: Office for National Statistics

Table R1: Revisions triangle for France, by release date: GDP per worker

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1990	-0.3	-0.0	0.0	-1.3	2.2	0.3	0.2	1.1
1991	-0.4	0.0	-0.0	-1.7	-2.2	0.5	0.1	-3.7
1992	-0.5	0.1	0.0	-1.2	2.6	0.1	0.1	1.3
1993	-0.6	0.1	-0.0	-2.2	1.9	0.9	0.0	0.1
1994	-0.7	-0.1	0.0	-1.9	1.3	0.4	-0.0	-1.0
1995	-1.0	-0.3	-0.0	-2.8	-2.4	1.0	-0.0	-5.4
1996	-1.0	-0.4	0.0	-2.6	3.4	0.6	-0.0	0.1
1997	-0.8	-0.4	-0.0	-3.0	6.5	0.7	-0.0	3.1
1998	2.1	-0.3	0.2	-3.5	5.4	0.9	-0.0	4.8
1999	2.5	-0.5	0.4	-3.3	4.8	0.9	-0.0	4.7
2000	3.2	-1.4	2.0	-3.3	1.7	0.7	-0.0	2.8
2001	-	-	3.4	-4.3	0.7	0.8	0.0	0.6
2002	-	-	-	-	-0.8	0.9	-2.1	-2.0
2003	-	-	-	-	-	-	-3.2	-3.2

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics

Table R2: Revisions triangle for France, by release date: GDP per hour worked

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1992	-0.5	0.1	0.0	-1.4	5.9	0.2	0.1	4.3
1993	-0.7	0.1	-0.0	-2.6	5.7	1.1	0.0	3.7
1994	-0.7	-0.1	0.0	-2.3	5.3	0.5	-0.0	2.6
1995	-1.0	-0.3	-0.0	-3.4	1.4	1.1	-0.0	-2.3
1996	-1.1	-0.4	0.0	-3.2	6.8	0.6	-0.0	2.7
1997	-0.8	-0.5	-0.0	-3.6	10.4	0.8	-0.0	6.2
1998	2.3	-0.3	0.2	-4.2	10.0	0.9	-0.0	8.9
1999	2.7	-0.5	0.4	-4.0	9.3	0.9	-0.0	8.7
2000	-	-	2.1	-3.7	9.1	0.7	-0.0	8.2
2001	-	-	3.8	-7.9	8.2	0.8	0.0	4.9
2002	-	-	-	-	6.5	-0.2	-2.4	3.8
2003	-	-	-	-	-	-	-3.7	-3.7

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics

Table R3: Revisions triangle for Germany, by release date: GDP per worker

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1990	-	-	-	-	-	-	-	-
1991	-0.4	-0.0	-0.0	-0.9	5.1	-0.1	0.1	3.8
1992	-0.4	-0.0	-0.0	-1.0	5.8	0.1	0.1	4.6
1993	-0.5	-0.0	-0.0	-1.2	3.1	0.1	0.0	1.5
1994	-0.7	-0.0	-0.0	-1.5	-0.8	0.2	-0.0	-2.9
1995	-0.9	0.0	-0.0	-1.8	-4.5	0.2	0.0	-7.0
1996	-0.9	0.0	-0.0	-2.0	0.3	0.1	-0.0	-2.5
1997	-0.8	0.0	-0.0	-2.2	-2.1	0.1	-0.0	-5.0
1998	1.7	-0.1	0.1	-2.5	-3.0	0.2	0.0	-3.7
1999	1.4	0.1	0.2	-1.2	-3.5	0.1	0.0	-2.9
2000	2.1	1.0	0.3	-1.2	-5.7	0.1	0.0	-3.4
2001	-	-	-2.0	-2.1	-4.2	-0.0	0.0	-8.3
2002	-	-	-	-	-5.8	-0.1	-0.4	-6.3
2003	-	-	-	-	-	-	-0.2	-0.2

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics

Table R4: Revisions triangle for Germany, by release date: GDP per hour worked

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1992	-0.5	0.1	-0.0	0.2	6.5	0.2	0.1	6.6
1993	-0.6	0.3	-0.0	-0.2	3.5	0.2	0.0	3.3
1994	-0.8	-0.1	-0.0	-0.4	-0.9	0.2	-0.0	-2.1
1995	-1.0	-0.5	-0.0	-1.1	-5.1	0.1	0.0	-7.6
1996	-1.1	-0.7	-0.0	-1.3	0.4	0.1	-0.0	-2.5
1997	-1.0	-0.6	-0.0	-1.5	-2.3	0.1	-0.0	-5.3
1998	2.0	0.1	0.1	-1.8	-3.5	0.1	0.0	-3.0
1999	1.6	0.7	0.3	-0.4	-4.0	0.1	0.0	-1.8
2000	2.4	1.0	0.3	-0.3	-6.5	0.1	0.0	-3.1
2001	-	-	-2.3	-1.5	-4.9	-0.0	0.0	-8.8
2002	-	-	-	-	-6.7	-1.1	-0.5	-8.3
2003	-	-	-	-	-	-	-0.2	-0.2

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics

Table R5: Revisions triangle for Japan, by release date: GDP per worker

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1990	-0.3	0.0	0.0	-0.7	0.6	-0.1	0.3	-0.2
1991	-0.3	-0.0	-0.0	-0.7	-2.5	-0.1	0.3	-3.4
1992	-0.4	-0.0	-0.0	-0.8	0.4	0.1	0.3	-0.4
1993	-0.5	-0.0	0.0	-1.2	-2.8	0.1	0.2	-4.2
1994	-0.6	0.0	-0.0	-1.4	-4.4	0.1	0.2	-6.1
1995	-0.8	-0.0	-0.0	-1.4	-8.9	0.1	0.2	-10.8
1996	-0.9	0.0	0.0	-1.7	-6.5	0.1	0.1	-8.8
1997	-2.8	0.0	0.0	-1.8	-4.6	0.1	0.1	-9.0
1998	-3.7	0.0	-0.5	-2.0	-1.5	0.1	0.1	-7.5
1999	-3.9	-0.1	-0.1	-2.8	-1.0	0.1	0.0	-7.8
2000	-3.7	0.4	-0.8	-2.3	-0.7	0.1	-0.6	-7.6
2001	-	-	-0.5	-2.4	-1.1	-0.0	-0.6	-4.7
2002	-	-	-	-	-3.3	-0.1	-1.8	-5.1
2003	-	-	-	-	-	-	-1.6	-1.6

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics

Table R6: Revisions triangle for Japan, by release date: GDP per hour worked

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1992	-0.4	-0.0	-0.0	-0.8	0.4	0.1	0.2	-0.5
1993	-0.5	-0.0	0.0	-1.3	-2.5	0.2	0.2	-4.0
1994	-0.6	0.0	-0.0	-1.5	-4.0	0.1	0.2	-5.8
1995	-0.7	-0.0	-0.0	-1.6	-8.2	0.1	0.2	-10.2
1996	-0.8	0.0	0.0	-1.8	-5.9	0.1	0.1	-8.3
1997	-2.6	-0.1	0.0	-2.0	-4.3	0.1	0.1	-8.6
1998	-3.5	0.0	-0.5	-2.2	-1.4	0.1	0.1	-7.3
1999	-3.7	1.4	-0.1	-3.0	-0.9	0.1	0.0	-6.1
2000	-	-	-0.8	-2.5	-0.6	0.0	-0.5	-4.4
2001	-	-	-	-	-1.0	-0.1	-0.6	-1.7
2002	-	-	-	-	-	-	-1.7	-1.7
2003	-	-	-	-	-	-	-1.5	-1.5

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics

Table R7: Revisions triangle for United States, by release date: GDP per worker

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1990	-0.3	0.0	0.0	-1.0	-1.6	-0.1	-0.9	-3.9
1991	-0.5	-0.0	0.0	-1.1	-4.8	-0.2	-0.7	-7.3
1992	-0.6	0.0	0.0	-1.3	1.7	0.1	-0.6	-0.6
1993	-0.7	0.0	0.0	-1.6	-2.3	0.1	-0.5	-5.0
1994	-0.8	0.0	0.0	-1.9	-4.5	0.2	-0.6	-7.6
1995	-1.0	0.0	0.0	-2.2	-6.1	0.2	-0.4	-9.4
1996	-1.1	0.0	0.0	-2.4	-3.0	0.2	-0.4	-6.8
1997	-5.3	0.0	0.0	-2.7	-1.0	0.2	-0.1	-8.9
1998	-2.7	0.0	0.1	-3.1	-2.6	0.2	0.1	-8.0
1999	-3.1	0.0	0.0	-3.2	-1.1	0.2	0.1	-7.1
2000	-3.9	-0.3	-1.7	-4.6	-0.5	0.1	-1.7	-12.6
2001	-	-	-3.1	-5.6	-0.8	-0.0	-1.4	-10.9
2002	-	-	-	-	-3.4	-0.2	-4.0	-7.6
2003	-	-	-	-	-	-	-3.8	-3.8

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics

Table R8: Revisions triangle for United States, by release date: GDP per hour worked

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1992	-0.5	-2.1	0.0	-1.6	1.6	0.9	-0.5	-2.1
1993	-0.7	-1.6	0.0	-2.1	-2.2	1.2	-0.5	-5.8
1994	-0.8	-1.0	0.0	-2.1	-4.2	0.8	-0.5	-7.8
1995	-0.9	-0.6	0.0	-2.4	-5.6	0.8	-0.4	-9.1
1996	-1.0	0.1	0.0	-2.7	-2.8	0.5	-0.4	-6.2
1997	-5.0	0.0	0.0	-2.9	-0.9	0.6	-0.1	-8.2
1998	-2.5	1.0	0.1	-3.3	-2.4	0.7	0.1	-6.3
1999	-2.8	1.7	0.0	-3.5	-0.9	0.6	0.1	-4.8
2000	-3.5	2.6	-1.6	-4.7	-0.4	0.5	-1.6	-8.7
2001	-	-	-2.9	-5.7	-0.7	0.9	-1.3	-9.8
2002	-	-	-	-	-3.1	-0.3	-3.7	-7.2
2003	-	-	-	-	-	-	-3.5	-3.5

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics

Table R9: Revisions triangle for G7, by release date: GDP per worker

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1990	-	-	-	-	-	-	-	-
1991	-0.3	-0.0	-0.0	-0.9	-1.9	-0.1	-0.2	-3.4
1992	-0.4	0.0	-0.0	-1.0	2.2	0.1	-0.1	0.7
1993	-0.5	0.0	-0.0	-1.3	-0.6	0.2	-0.1	-2.5
1994	-0.7	-0.0	-0.0	-1.5	-2.7	0.2	-0.2	-4.9
1995	-0.8	-0.0	-0.0	-1.8	-5.5	0.2	-0.1	-8.1
1996	-0.9	-0.0	-0.0	-2.0	-2.5	0.2	-0.1	-5.4
1997	-3.1	-0.0	-0.0	-2.2	-1.2	0.2	0.0	-6.4
1998	-1.5	-0.0	-0.0	-2.5	-1.5	0.2	0.1	-5.3
1999	-1.7	-0.0	0.1	-2.5	-0.9	0.2	0.0	-4.9
2000	-2.0	-0.0	-0.8	-3.0	-1.0	0.2	-1.0	-7.6
2001	-	-	-1.4	-3.6	-1.3	0.0	-0.9	-7.2
2002	-	-	-	-	-3.4	-0.0	-2.6	-6.0
2003	-	-	-	-	-	-	-2.5	-2.5

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics

Table R10: Revisions triangle for G7, by release date: GDP per hour worked

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1992	-0.4	-0.8	-0.0	-1.0	2.3	0.6	-0.1	0.5
1993	-0.5	-0.6	-0.0	-1.5	-0.4	0.8	-0.1	-2.3
1994	-0.6	-0.4	-0.0	-1.6	-2.4	0.6	-0.2	-4.6
1995	-0.8	-0.3	-0.0	-1.9	-5.2	0.6	-0.1	-7.7
1996	-0.9	-0.0	-0.0	-2.1	-2.2	0.5	-0.1	-5.0
1997	-3.0	-0.1	-0.0	-2.4	-1.0	0.5	0.0	-5.9
1998	-1.5	0.4	-0.0	-2.8	-1.2	0.6	0.1	-4.4
1999	-1.7	1.1	0.1	-2.9	-0.5	0.5	0.0	-3.3
2000	-	-	-0.8	-3.2	-0.5	0.5	-0.9	-4.9
2001	-	-	-	-	-0.8	0.6	-0.9	-1.1
2002	-	-	-	-	-	-	-2.5	-2.5
2003	-	-	-	-	-	-	-2.5	-2.5

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics

Table R11: Revisions triangle for G7 excluding the UK, by release date: GDP per worker

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1990	-	-	-	-	-	-	-	-
1991	-0.4	-0.0	-0.0	-1.0	-2.1	-0.1	-0.2	-3.8
1992	-0.5	0.0	-0.0	-1.1	2.4	0.1	-0.1	0.8
1993	-0.6	0.0	-0.0	-1.5	-0.7	0.2	-0.1	-2.7
1994	-0.7	-0.0	-0.0	-1.7	-3.0	0.2	-0.2	-5.4
1995	-0.9	-0.0	-0.0	-2.0	-6.0	0.2	-0.1	-8.8
1996	-1.0	-0.0	-0.0	-2.2	-2.7	0.2	-0.1	-5.9
1997	-3.4	-0.0	-0.0	-2.4	-1.3	0.2	0.0	-7.0
1998	-1.6	-0.0	-0.0	-2.8	-1.6	0.2	0.1	-5.9
1999	-1.9	-0.1	0.1	-2.8	-0.9	0.2	0.0	-5.4
2000	-2.1	-0.1	-0.9	-3.3	-1.1	0.2	-1.0	-8.3
2001	-	-	-1.6	-4.0	-1.4	0.0	-1.0	-7.9
2002	-	-	-	-	-3.7	-0.0	-2.8	-6.5
2003	-	-	-	-	-	-	-2.8	-2.8

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics

Table R12: Revisions triangle for G7 excluding the UK, by release date: GDP per hour worked

Year	Mar 02	Sep 02	Feb 03	Sep 03	Feb 04	Oct 04	Feb 05	Total
1992	-0.4	-0.8	-0.0	-1.1	2.5	0.6	-0.1	0.6
1993	-0.6	-0.6	-0.0	-1.6	-0.4	0.9	-0.1	-2.5
1994	-0.7	-0.4	-0.0	-1.8	-2.6	0.7	-0.2	-5.1
1995	-0.9	-0.3	-0.0	-2.1	-5.6	0.7	-0.1	-8.4
1996	-1.0	-0.1	-0.0	-2.4	-2.4	0.5	-0.1	-5.4
1997	-3.3	-0.1	-0.0	-2.6	-1.0	0.6	0.0	-6.5
1998	-1.6	0.4	-0.0	-3.0	-1.3	0.7	0.1	-4.8
1999	-1.9	1.2	0.1	-3.2	-0.6	0.6	0.0	-3.6
2000	-	-	-0.9	-3.6	-0.5	0.6	-1.0	-5.4
2001	-	-	-	-	-0.8	0.6	-0.9	-1.2
2002	-	-	-	-	-	-	-2.8	-2.8
2003	-	-	-	-	-	-	-2.7	-2.7

Note: The first release of ICP was in October 2001. The last column gives the total revision since the first release of ICP.

Source: Office for National Statistics