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# ¿Nuevos números; nuevo mundo?

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La ponencia es un comentario sobre 'El Informe mundial preliminar del Programa de Comparación Internacional 2005' (publicado 2007), Este informe provisiona nuevas estimaciones de la renta relativa de 146 países y así dibuja un nuevo cuadro del mundo. Explora las novedades sugeridas por las nuevas cifras en cuanto al poder relativa de las naciones, el bienestar relativo entre países, la distribución global de la renta y la
naturaleza de los problemas ecológicas del mundo y su solución.
¿Constituye el equivalente economico del genoma humano o una nueva fuente
de datos económicos controvertidos?

**New numbers – a new world?**
Bob Sutcliffe (March 2008)

***The world according to PPP***

In February 2008 the International Comparisons Programme (ICP) issued an 80 page document which consists of 11 tables of numbers. These are fundamentally a comparison between the price levels of 146 countries – in simple terms an estimate of how much one dollar will buy in, say, Albania, when it is converted at the going exchange rate compared with how much it will buy in the USA. It is not simply 146 bilateral comparisons (each country with the USA); it is designed to make price levels comparable between all the 146 countries. But the US is used as the base and so it is the only country whose prices do not change during the comparison. Tourists have known for a long time that some countries are 'cheap': the US tourists' money, say, buys more in

Albania, and less in Austria, than it would at home. For economists this means that if Albanian and Austrian economic aggregates such as the GDP are translated into dollars at the going exchange rate this underestimates the relative production level or living standard of Albania and overestimates that of Austria. To produce a realistic comparison the calculation should be made in whatever the exchange rate would have to be for the purchasing power of a dollar to be the same in the two countries. The ICP report calculates what would be the exchange rate if one dollar (or the equivalent in Albanian and Austrian currency) bought the same in the each of the countries. Hence the method is called 'purchasing power parity' or PPP.

PPP exchange rates are calculated by doing price surveys in all the countries compared. In this case the research took in 4,000 commodities. Not all of them, of course, are available in all the countries so the actual comparison is based on those commodities which are available in both the USA and in each of the countries compared. That might mean that the PPP exchange rate of one country compared with the USA is based on the prices of 100 commodities while that of another is based on 2,000. That is one of the inevitable weaknesses of the method. The estimates were first made at a regional level among countries with relatively similar structures of consumption and later made comparable between regions. It is a method which is in some ways the spatial equivalent of chain index to make comparisons of the real movements of a variable over time. This is not an error-proof method but it can this new ICP study is almost certainly the most exhaustive and reliable one which has yet been done. Its new 'exchange rates' can be used to compare economic aggregates in all the countries involved. So the GDP and the GDP per head of 148 countries can all be reduced to the same standard of comparison (international dollars). Albania, and many other countries, looks less poor than it did if the comparison was made with conventional exchange rates; and Austria looks less rich. The USA alone remains unchanged because it is used as the base country.

PPP estimates are nothing new. Several different versions of them have been appearing over recent years of both contemporary economic aggregates and historical ones. All of them show consistent differences between the results obtained by making comparisons using exchange rates. In general the gap between the GDP per head of rich and poor countries is wider using exchange rates than using PPP. But there are many detailed differences due to differences in method. The three basic sources of PPP figures for up to now for world level comparisons have been the Penn World Tables (showing information for some countries since 1950 and for most since 1960), the World Bank (showing information from 1975) and those produced by Angus Maddison (which daringly go back to the year 0 and produce relatively complete series for developed countries since 1820 and for all countries since 1950). But both the OECD and the IMF have produced their own estimates of PPP comparisons. Table 1 shows the differences

between methods when the GDP per head of China as a percentage of that of the USA since 1975.

Table 1: **GDP per head of China as a percentage of the USA**

| *Year* | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|
| *Conversion* Exchange rate | | 0.7 | 0.8 | 1.2 | 1.4 | 2.2 | 2.7 | 3.4 | 3.6 | 3.9 |

| Old PPP | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PWT 6.2 | 3.1 | 3.8 | 5.1 | 6.3 | 9.3 | 11.6 | 14.2 | 14.6 | 15.9 |
| World Bank | 3.1 | 3.4 | 4.8 | 5.8 | 9.1 | 11.4 | | 16.1 | |
| Maddison 2003 | 5.4 | 5.7 | 7.3 | 8.1 | 11.6 | 12.0 | 16.5 | | |
| New PPP | | | | | 9.8 | | | | |

Sources: World Bank 2008, ICP 2008, Maddison 2005, Heston et al. 2005

This comparison between the USA and China is one among 10,585 but its result is highly typical of other comparisons: comparisons using PPP show less difference between the richer and poorer countries than comparisons with exchange rates; and comparisons using new PPPs show more difference between the richer and poorer countries than comparisons using old PPPs. At present the new PPPs are for one year only, 2005; but figures for previous years, based on the 2005 data as a baseline, are expected to be published soon.

The rest of this paper will briefly look at a number of questions about which perceptions will be changed by using the new PPPs in place of either exchange rates or old PPPs. For many purposes economists have for some time used the old PPPs in international comparisons; so in this case the new PPPs will change earlier conclusions. But also, in many cases, either economists have been inconsistent in whether they use PPP or exchange rate conversions; here the new PPPs will produce double surprises; and finally many comparisons (especially in the media) continue to use exchange rates, in which case the use of new PPPs will change their conclusions, but not as greatly as the use of old PPPs.

The differences between the new PPP figures and exchange rate comparisons is still remarkable. The range is from Iceland whose PPP GDP per head is reduced to 65 percent of its exchange rate level and Tajikistan whose GDP per head increases by 319 percent in PPP terms over its conventionally calculated figure. There seems to be something systematic in this range. In

Figures 1a and 1b each dot represents the GDP per head of one country calculated conventionally in US$ on the horizontal axis (or the logarithm of this number in Figure 1b) and the ratio of the PPP calculated figure to the conventional one on the vertical axis.

Figure 1a: **The ratio between PPP and conventional measures of GDP, compared with the conventionally calculated level of GDP**.

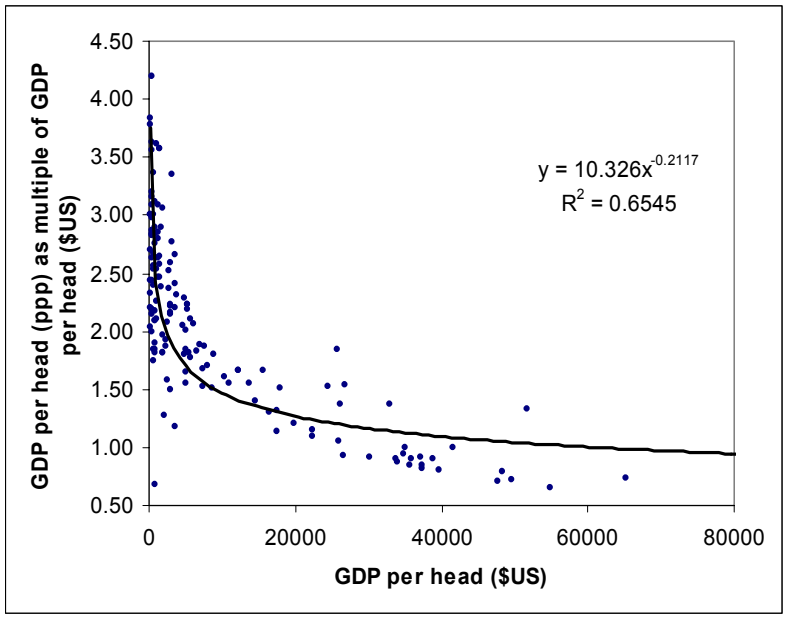
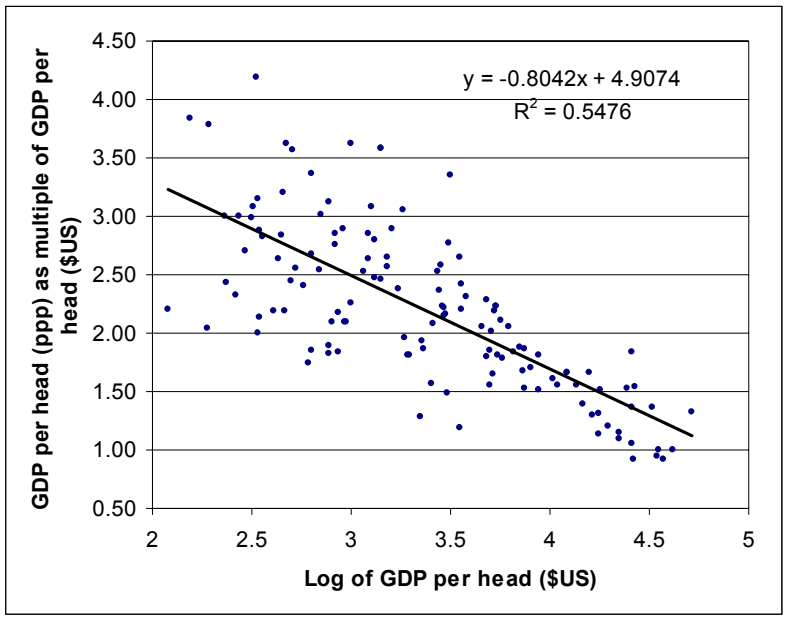


Figure 1b: **The ratio between PPP and conventional measures of GDP, compared with the logarithm of the conventionally calculated level of GDP**.




Source of data: ICP 2008.

What is obvious from both these ways of looking at the results is that there is a strong tendency for the ratio of the PPP figure to the conventional figure to be higher the poorer is the country. So poor countries tend to have their GDPs revised upwards and richer countries downwards.

The PPP procedure raises the world's total GDP by 24 percent as can be seen in Table 1, along with the average change for different groups of countries. These summary statistics imply that PPP closes some of the gap between the richer and the poorer countries.

Table 2: **Percentage change in GDP per head as a result of using PPP conversion**

| | Number of countries | Average percentage change in GDP per head |
|---|---|---|
| World | | +24 |
| Country average | 148 | +104 |
| <$3,000 | 76 | +154 |
| >$3,000 | 72 | +27 |
| <$1,000 | 45 | +162 |
| >$35,000 | 14 | –13 |

Source: ICP 2008.

While the actual values of economic aggreagates of countries can change considerably when converted by the different methods, the order changes very little. Only 13 countries out of 146 change their position in the order by more than 10 places; and the rank correlation coefficient between the two orders is very high – 0.986. So, while the advocates of PPP reject the characterisation that the difference is no more than the difference between stating temperatures in Fahrenheit or Celsius, that analogy, though wrong in theory, is less wrong in practice than PPP defenders admit.

The calculation of PPP values is closely analagous to the use of index numbers to correct a series of economic figures for price changes over time. A series of annual GDP figures for one country tells us nothing unless we reduce it to real terms by measuring in constant prices (or applying an index of prices). Once that is done then the figures in each year become comparable with each other. PPP values apply the same principle across space rather than over time: national figures (converted at the exchange rate into one currency) are made comparable by applying an index of prices between countries. This can be illustrated with the example of China and the USA in the two years 2000 and 2006

Table 3: **From incomparability to comparability: example of China and USA 2000 and 2006**

| A. Current local currency | China | USA |
|---|---|---|
| 2000 | 7858 | 34599 |
| 2006 | 15963 | 44154 |
| B. Constant local currency | | |
| 2000 | 7858 | 34599 |
| 2006 | 13204 | 38165 |
| C. Constant 2000 $ | | |
| 2000 | 949 | 34599 |
| 2006 | 1595 | 38165 |
| D. Constant 2000 $ PPP | | |
| 2000 | 3940 | 34599 |
| 2006 | 6621 | 38165 |
| E. Constant 2005 $ new PPP | | |
| 2005 | 4091 | 41674 |

Sources: World Bank 2008; ICP 2008.

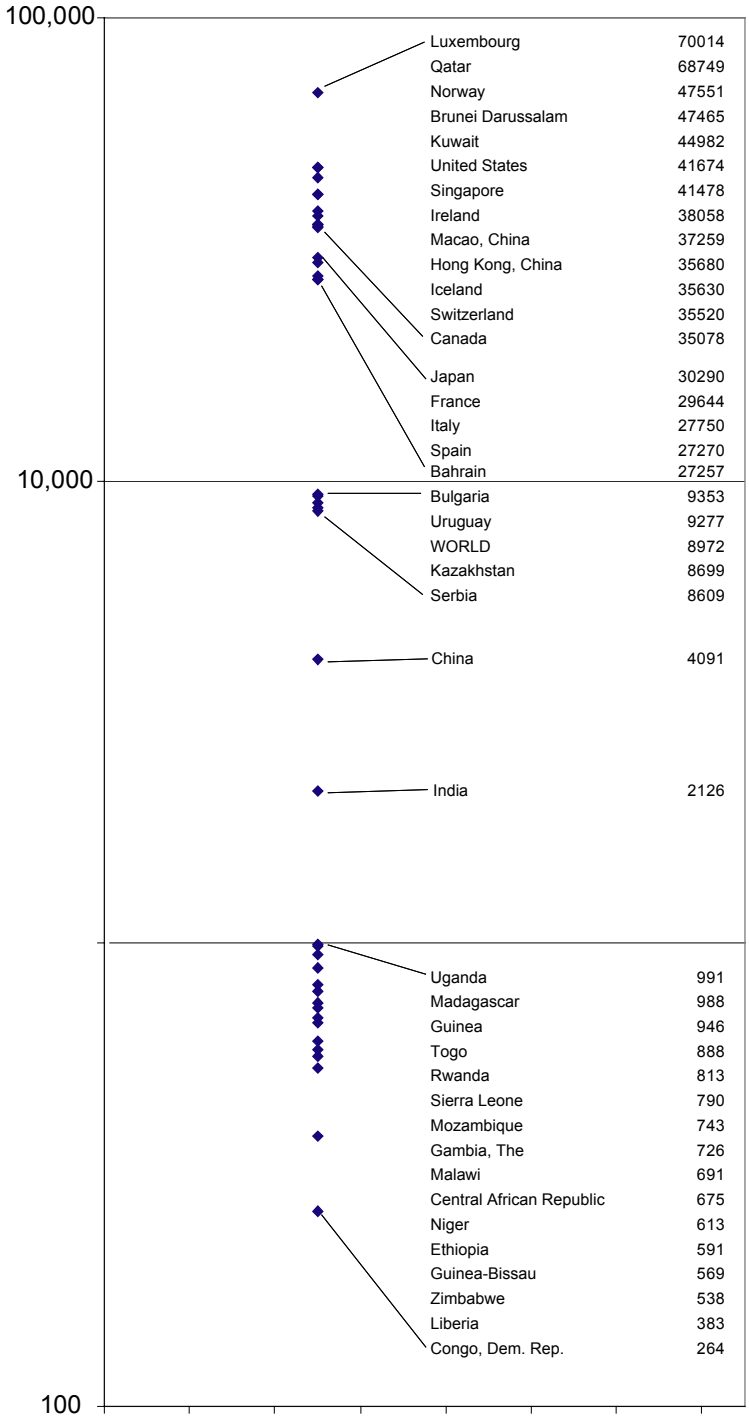
In section A. of this table the figures for the GDP per head of the two countries in the two years are in local currency (yuan and dollar) and are not corrected for inflation. None of the four numbers is comparable with any of the others. In section B the numbers are still in local currency but in both countries they have been adjusted for inflation and so the two numbers for China are comparable, as are those for the USA, but the numbers for one country are incomparable with those for the other. This technique, adjusting for inflation, has been common since the late 19th century although in the media the comparison of non-adjusted figures is still extremely common. This is implicit in the fact that economic figures are often claimed to have reached completely spurious 'record' levels. In section 3 the numbers have all been converted at the going exchange rate to US dollars (hence the Chinese numbers change and the US ones stay the same). The proponents of PPP say that the numbers of C are indeed compared, but really they are uncomparable because price differences between the two countries are not correctly reflected in the exchange rate. The purchasing power of one dollar converted at the exchange rate into yuan is greater in China than the purchasing power of the dollar in the USA, so the exchange rate converted figures cannot be used for comparisons of welfare or production between the two countries.

So, it is still meaningful to compare the figures in the colums but not across the rows. If we now apply an inter-country price index to convert the figures to purchasing power parity then we obtain D. Now in principle all the four figures can be compared meaningfully with each other. So it becomes meaningful to say, for instance, that the GDP per head of China in 2000 was about 10.3

percent of the GDP per head of the USA in 2006. Making real international comparisons in this way is a giant leap forward in economic statistics – equal to the development of price indexation over time. It has something of the aura of the decoding of the human genome.

Before enthusism goes beyond bounds, however, it is necessary to introduce some words of caution. The comparisons which inflation adjustment and PPP permit are not perfect for many reasons. The most banal is that the observation of figures is not perfect; its quality depends on the resources which are put into it. And producing PPP comparisons is not usually considered of very high social priority, being mostly of interest to economists and state bureaucrats. Second, there are a series of well known problems about price indices over time which used to be a major part of the study of economics, though they have now been mostly forgotten. All known indices are systematically faulty and the 'ideal indices' which have been devised usually substitute new deficiencies for old. One particular deficiency is that goods change their relative availability and relative prices over time which means that you get different results according to whether indices are base year (Laspeyres) or current year (Paasche) weighted. Over long periods of time the comparison might become completely invalidated. This problem has an almost exact analogy in the compiling of PPP estimates. Goods and services available in one country may not be available, or are very different, in others. So the country used as the base for the weighting will make a difference to the index (just as the choice of base year or current year weighting did to index numbers). The 'solution' used by the ICP is to compare countries in groups which have a similar structure of production and perhaps relative prices and then try to produce the best conversion rates between groups. This is quite analagous to the use of chain price indices in construction real time series. In that case period II is compared to period I and then III to II and so on. The PPP analogy is that country A is compared to country B and then country B to country C, where A and C are regarded as being further apart in consumption patterns than A and B, or B and C. A further problem is that relative prices between countries change over time but it is extremely expensive to keep the PPP estimates up to date. What happens is that studies are done every ten years of so (the new one applies to 2005 while the previous large scale one was for 1993). So if ppp figures are used in time series it is effectively assumed that the relative prices between countries is constant until a new survey shows that they are not and so (as has happened with this new study) all the figures suddenly change. These are both practical and theoretical problems but none of them are likely to be resolved in the foreseeable future.

Figure 2: **ICP estimates of GDP per head in international (PPP) dollars**



***GDP per head: the average level of living***

The variables shown in the ICP report are for total GDP, GDP per head and the composition of national expenditure. A summary of major results for GDP per head is shown in Figure 2 which shows selected results for five categories of country. At the top are the group from Luxembourg to Canada which are all of the countries with the highest GDPs per capita, on average the 'super-rich' countries. Next come Japan to Bahrain which are a group of not quite so rich countries chosen to include Spain. Since the Basque Country GDP per capita is about 36 percent higher than the Spanish average (INE 2007), this means – what will be surprising to some – that the CAPV is about on the same level, according to the ICP, as the super-rich group, higher than Switzerland and Hong Kong, 22 percent higher than Japan, and only about 12 percent lower than the USA. These, of course, are national averages and so say nothing about the income level of different social groups, which I will come to later in the paper.

The third group in Figure 3 are the four countries which span the world average. These are Bulgaria and Uruguay, slightly above the average, and Kazakhstan and Serbia, slightly below. These countries are all at about one quarter of the level of the CAPV. The fourth group consists only of China and India, because they are large and important. Finally the fifth group of countries are the very poorest: all those with GDP per head of less than $1,000 ppp. All of these are sub-Saharan African countries. This group may in fact contain a few other countries which did not participate in the ICP study and for which no figures are available.

***GDP: the size of economies***

The GDP per capita is used as a measure of relative levels of economic welfare between countries (though it is not a very good one). The total GDP, however, is used to indicate the overall economic importance of a country, and perhaps also of its political and military importance. Every day the press habitually writes about the world's largest, or second largest economies, and so on down the scale. Almost always this is based on GDP compared using exchange rates not PPPs. By that measure the USA is the world's largest economy, Japan is second and Germany is third.

Comparison using PPPs give a different picture as shown in Table 3: while the USA remains the number one economy in terms of total GDP, it is followed by China (second), while India is fifth instead of twelfth. Even the PPP figures, however, show that the US economy is more than twice as large in total as that of China, and, of course, its income per head is 12 times as high as China (see Figure 1). This might lead some people to suppose that China at present does not constitute much of a threat to the economic, let alone political or military power of the USA. I think that argument is wrong. In the first place, while total US GDP is more than twice that of

China this is a point in a rapidly changing situation. The new PPP figures so far provide information for a single year (2005) but there is no reason to think that this will affect previous or expected rates of growth. We can use recent rates of growth to project the 2005 figures into the future. China's real total GDP between 2000 and 2006 grew by an average of 7.2 percent and that of the USA by 2.2 percent. If we project those on from 2005 then the result is that by 2010 China's GDP would be 55 percent of the USA's and would overtake it in about 2020, and at present there seems more likelihood that the US rate of growth will fall rather than the Chinese rate of growth. A long time before 2020, and probably already, the major stories in international economic relations concern the conflict for economic power between what are the two largest economies in the world by some considerable margin. This conflict is visible in the struggle for raw material supplies, the trade in manufactured goods, in foreign investment and in monetary relations. In some cases the relative size of the economies continues to influence the outcome. But long before China returns to the place it held 200 years ago as the world's largest economy, it already rivals or has passed the USA in the production of many major manufactures, it is about to overtake the USA in the value of exports (Germany being still slightly ahead of both countries) and, perhaps most important of all, is the world's largest creditor while the USA is the world's largest debtor, and a significant proportion of the debit on the one hand and the credit on the other is made up of direct debts of the US Treasury held by the Chinese state bank as part of its foreign reserves.

Table 4: **Size of economies by two methods of comparison ($ billions)**

| *Exchange rates* | | *PPP* | |
|---|---|---|---|
| United States | 12,376 | United States | 12,376 |
| Japan | 4,549 | China | 5,333 |
| Germany | 2,791 | Japan | 3,870 |
| United Kingdom | 2,244 | Germany | 2,515 |
| China | 2,244 | India | 2,341 |
| France | 2,136 | United Kingdom | 1,902 |
| Italy | 1,769 | France | 1,862 |
| Canada | 1,134 | Russian Federation | 1,698 |
| Spain | 1,130 | Italy | 1,626 |
| Brazil | 883 | Brazil | 1,585 |
| Korea, Rep. | 791 | Spain | 1,184 |
| India | 779 | Mexico | 1,175 |

Source: ICP 2008

***Military spending***

Relative military spending is an obvious determinant of the relative power of nations. Here, too, PPP estimates makes a difference to conventional perspectives. In terms of dollars converted at the exchange rate, the USA spends annually about 16 times more than China on the military (4

percent of the GDP compared with 2 percent of the GDP). But the real value of this spending is also influenced by the basis of the comparison. To get a better comparison, military spending should also be compared using PPPs. This has already been done during the last few years by SIPRI, using the PPP figures then available. They concluded that in 2006 US military spending was 10.6 times Chinese in terms of exchange rate comparison but only 2.8 times the Chinese in a comparison using old PPPs (that figure may rise to as high as 5 times using the new PPPs). But China has recently announced a sharp 17 percent increase in its already planned level of military spending and the size of its military personnel (which still counts as the US experience in Iraq has shown) is more than double that of the USA. Even so, the use of PPPs cannot controvert the fact that China must still be a long way from seriously challenging US overall military superiority, but is undoubtedly already a major headache for the US military.

***Global inequality***

When PPP estimates of national income first became available a few years ago it was clear that on principle they should be used in preference to exchange rate comparisons to gain a truer picture of world inequality. Since the now infamous World Development Report of 1992, which calculated inequalities using exchange rate conversions and was sharply criticised by the UN Statistical Commission for doing so, virtually all the large literature on world inequality has been written using PPP figures (although there remains a great deal of loose talk outside the professional economics world about inequality in which exchange rate calculations are used). The new PPP benchmarks, as already mentioned, increase the differences between rich and poor countries in comparison with old PPP figures based on earlier benchmarks. This means that indicators of inequality using the new benchmarks show it to be greater than recent calculations have suggested. Branko Milanovic has made a comparison of the old PPP and new PPPP calculations of three types of world inequality – Type 1 (inequality between countries not weighted by population), Type 2 (inequality between countries weighed by population) and Type 3 (inequality between all income groups of all countries weighted by population, otherwise known as global inequality). His results are in Table 5.

Table 5: **Changes in world Gini coefficients and 10/10 ratios**

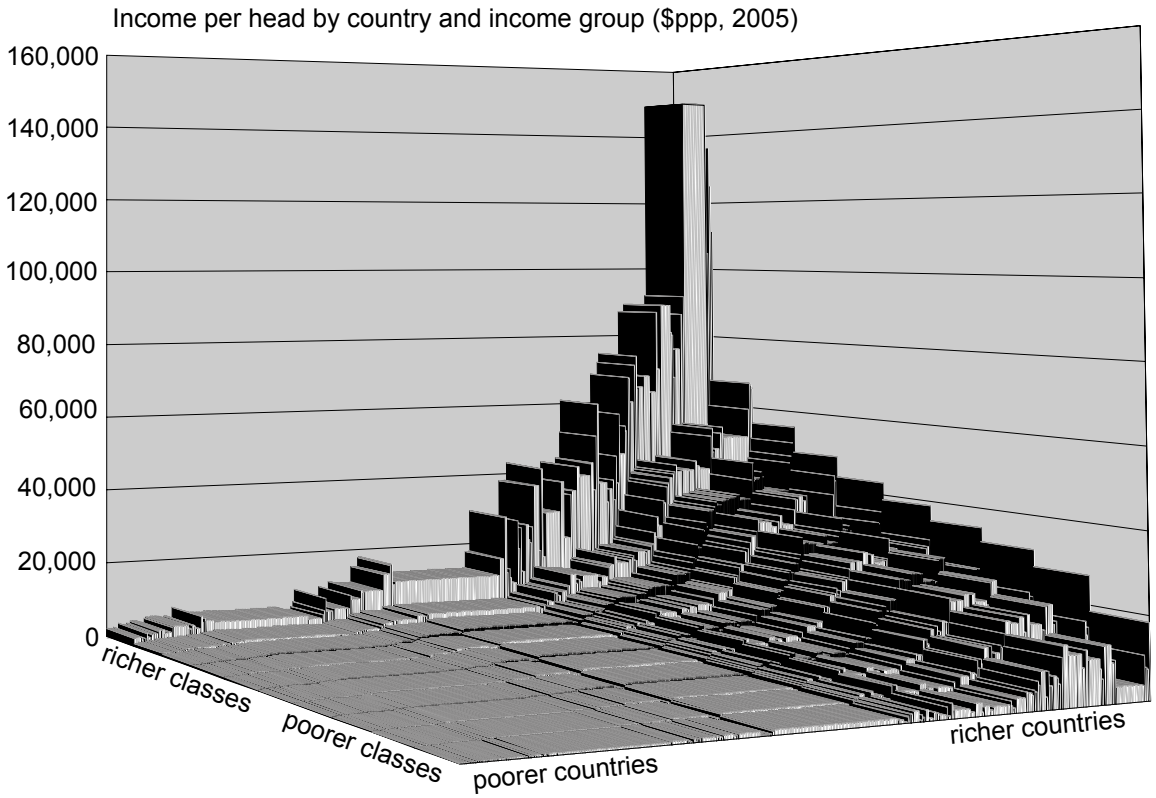
| | old PPP | new PPP |
|---|---|---|
| Type of inequality | | |
| Concept 1 | 55.0 | 57.6 |
| Concept 2 | 51.6 | 57.8 |
| (without China) | 55.6 | 59.2 |
| 10/10 ratio | 32.3 | 38.7 |
| Concept 3 | 65.7 | 69.9 |
| 10/10 ratio | 61.4 | 124.3 |

Source: Branko Milanovic 2008; Concept 3 10/10 ratio calculated by author.

The Gini coefficient for the world rises for all concepts of inequality and for Concept 3 reaches 69.9. There is only one component country of the world which has a higher Gini coefficient than this, namely Namibia, a country with a strong legacy of the inequalities of *apartheid*. More than ever, it seems, it is appropriate to use *apartheid* to describe the world as a whole.

A visual impression of Concept 3 world inequality, using the new PPPs, can be seen in Figure 5.

Figure 5: **The distribution of world income by country and decile group**




Source: ICP 2008; World Bank Povcalnet 2008.

***The environment: catch up and emissions***

The measurement of national income has entered into the world debate about climate change. The assessment of the dimensions of this problem has been made in a way which is closely allied with estimates of national income. The recent Fourth Assessment Report of the IPCC (known as 4AR) was preceded by the drawing up of a set of Special Reports on Emission Scenarios (SRES) which attempted to calculate the expected increase in greenhouse gas (GHG) emissions during the 21st century. These are based on expectations about a number of

variables, including population growth, economic growth and changes in energy use. The SRES was premissed on the assumption that during the 21st century the poor countries would catch up with the rich ones in terms of national income per head. Given a certain relationship between total world income and total emissions of carbon and other greenhouse gases, this estimate of economic growth was one of the factors entering into predictions of overall GHG emissions and so into expected climate change. The IPCC has been strongly criticised for not using PPP estimates in this calculation but exchange rate based ones. As a result the amount of economic growth needed to fulfill their premise (of the economic catching up of poor countries) was exaggerated. Using PPP figures produces a lower estimate of needed growth. This criticism of the IPCC has been made by Henderson and Ian Castles and David Henderson (2003) but has been somewhat contemptuously rejected as irrelevant by environmentalists. The criticism is a valid one and the critics have shown up some serious deficiencies in the analyis of the IPCC, especially on economic questions, which still have to be rectified. The IPCC tends to speak with a kind of papal authority on all questions related to the environment. Nonetheless, the specific criticism of the IPCC for not using PPP estimates of national income has been shown not to have much effect on the long term estimates of GHG emissions. This is partly because, if it is assumed that national income per head levels will be levelled up, then all countries can be assumed to have a similar relationship between emissions and population, in which case the predicted level of emissions need have nothing to do with the measurement of national income but is entirely dependent on estimated population and the expected emission levels per person (to which I shall return in a moment). But the debate shows up an important interpretation of the 4AR which is not well known – that it is not a prediction of what will actually happen so much as a prediction of what would happen if, among other things, developing countries grow to become economically more or less equal with developed countries. There is no discussion in 4AR or the SRES of whether this is likely to happen. In fact, for many reasons, and confirmed by recent experience, it seems very unlikely to happen. Assuming it, however, means that the 4AR is more a warning than a prediction. It is saying implicitly that, if something derirable (the development of the developing countries) occurs, then the consequence would be an intolerable level of emissions, which (they do not add) would be very likely to lead at some point to widespread economic decline. The world, therefore, is on a contradictory path. There is confusion in the IPCC's reports between actual prediction and dependent prediction and this means that, as far as the economic future is concerned, they are oversimplified and insufficiently dialectical.

In any case, the specific debate about whether or not to use PPPs has declined in importance since the publication of the new PPP figures since they show lower levels of GDP per head for developing countries that those in use when Henderson and Castles made their critique. In addition, the IPCC says in AR4 that it has developed post-SRES scenarios which slightly adjust downwards both its figures for population growth and for economic growth in the developing countries, although it does not publish the details of this. And Henderson (2005) himself now

recognised that the disagreement will not greatly affect the level of predicted global emissions figures in the long run (also see Holtsmark 2005).

***The environment: who is most to blame?***

The environmental significance of PPP figures, however, is not only related to predicting the future; it has a more immediate relevance to the international political struggle around who is most reponsible for the problem of climate change and who, therefore, should curb emission most and first. To the charge made by developing nations that the problem is largely one which must be solve by changes in behaviour in the developed countries because their per capital emission levels are much higher, the developed countries have replied that a relevant index is also emissions as compared with national income – in other words, the 'carbon efficiency' of national income. The national income figures used to calculate this have usually been exchange rate compared ones. But these paint a picture of much lower 'carbon efficiency' in the developing countries than PPP figures (with their higher estimates of national income levels) do. So the choice of which national income figures to use is a highly political one. Table 5 shows some examples of different comparisons of 'carbon efficiency'.

Table 5: , Carbon efficiency 2002

| Country | $CO_2$ per capita | Energy use (kg.oil eq. p.c. | GDP per cap (ex) | GDP per cap (ppp) | Carbon efficiency (exch.) | Carbon efficiency (ppp) |
|---|---|---|---|---|---|---|
| USA | 20.23 | 7936 | 41674 | 41674 | 2060 | 2060 |
| Japan | 9.43 | 4093 | 35604 | 30920 | 3776 | 3279 |
| Germany | 10.3 | 4184 | 33849 | 30496 | 3286 | 2961 |
| Spain | 7.37 | 3186 | 26031 | 27270 | 3532 | 3700 |
| China | 2.74 | 947 | 1721 | 4091 | 628 | 1493 |
| India | 1.16 | 509 | 707 | 2126 | 609 | 1833 |
| S. Africa | 7.6 | 2511 | 5162 | 8477 | 679 | 1115 |
| Brazil | 1.75 | 1070 | 4791 | 8606 | 2738 | 4918 |
| Nigeria | 0.42 | 728 | 868 | 1892 | 2067 | 4505 |
| Morocco | 1.53 | 373 | 1952 | 3547 | 1276 | 2318 |
| Mozambique | 0.08 | 432 | 347 | 743 | 4338 | 9288 |
| Iran | 5.49 | 1988 | 3190 | 10612 | 581 | 1933 |

Sources: World Bank WDI 2008; ICP 2007

The last two columns show carbon efficiency (GDP per capita divided by CO2 emission per capita) valued at exchange rates (Column (4)) and in PPPs (Column (5)). Not surprisingly the developed countries like to compare GDP to emissions using exchange rates to compare

GDPs; when they do this the the USA and other developed countries are seen to have much higher efficiency (that is, they produce more GDP per unit of emissions). When the comparison is done in PPPs some developed countries improve and others worsen their GDP efficiency in comparison with the USA; but all the developing countries improve considerably in relation to the developed countries. Ironically the United States, which shows such public concern about Iran's and other countries excessive use of energy is shown to be have almost exactly the same level of carbon efficiency as Iran. Brasil, Nigeria and Mozambique all produce their GDP far more efficiently (that is they emit less GHG per unit of GDP) than the USA. The conversion using PPPs, therefore, is a body blow to the argument increasingly produced by the developed countries that the developing ones should shoulder a much greater degree of responsibility for reducing GHG emission during the period which follows Kyoto, from 2012 onwards. This potentially very explosive argument will have to be carefully watched by observers since both sides will have an incentive to obfuscate the issue by not clarifying what kind of conversion (exchange rates or PPPs) they are using. Right, however, is clearly on the side of the developing countries who argue the developed countries are those which are in the key position to reduce global GHGs. Developing countries would perhaps be wisest to negotiate not in terms of carbon efficiency at all but by comparing emissions per head of the population. If it assumed that to avert seriously damaging climate change then emissions will have to be reduced by 80 percent from their present levels by 2050, and if the population is assumed to be 9 billions by that date, the the implied level of emissions per head would have to be around 0.5 tons per head. Only some countries of Southern Africa, where more development is desperately needed, are near to or within that level today. If the share of the burden of emissions reduction is to be fairly shared then countries like the USA, the UK and Spain will have to reduce their emissions to those levels, and they will want to do so without descending to African levels of poverty. That is quite a task!

***PPP and poverty estimates***

Another important question affected by the new PPP figures is that of world poverty. The most quoted poverty figures existing are those, published by the World Bank, which calculated the number and proportion of people living on $1 and $2 a day. In this case the dollar is that of 1993, converted at purchasing power parity and calculated for each currect year. This means the number of people said in 2007, say, to be living on $1 a day actually means the number living on the 2007 equivalent of what $1 could buy in 1993, so it in fact means rather more than $1 in 2007 prices.

These estimates of poverty have been criticised on grounds which are analagous to the criticism of economic figures over time and space not adjusted for price changes. Here the absence of adjustment concerns not year or place but social class. All the published figures are published as national aggregates; the prices used are implicitly national averages. And when

national surveys of income distribution are made they are converted to international dollars using PPP exchange rates, but using the same PPP exchange rate for each social group. But what if prices differ according to social class so that a basic set of commodities cost more to the poor than to the rich in a given country? Much research has been done which suggests that that is the norm – that 'the poor pay more'. If that is the true, then using the same average PPP exchange rates for all will underestimate the extent of poverty. The compilers of the poverty figures are well aware of this problem and are working on the production of poverty-adjusted PPPs, but it is some time before these can be available in a significant group of countries.

***PPP and migration***

The appropriate rate at which to convert economic figures between one country and another has considerable relevance to the question of migration. It affects both the economic incentive to migrate or stay at home and the benefits of remittances. Well-informed migrants, like canny tourists, knew about PPP long before economists and are likely to be highly aware of the relationship between the exchange rate and relative prices. This may help to explain why such a large amount of migration is not to the richest coutries (which have overvalued exchange rates). And migration might have special attractions for the inhabitants of countries where there is a large difference between PPPs and exchange rates. Remittances will have extra value in those countries since they have undervalued exchange rates in relation to PPP. Remittances when converted at the going exchange rate will have higher purchasing power in the migrant's country of origin than in the country of destination from which the remittances are sent. On the other hand, in the countries with overvalued exchange rates in relation to purchasing power the living expenses of the migrant are high and may reduce her/his ability to send remittances. While these effects my offset each other, the value of remittances in any case will be greater than they appear to be when measured in dollars and compared with the national income of the country of origin. The total value of remittances in 2007 was estimated by the World Bank to be about $318 billion, $240 billion of that to developing countries. Its purchasing power, however, is likely to be at least double that of the same amount of money in the developed countries from which most of it comes from. And, as was demonstrated in the early part of the paper, the poorer the country the greater in general is likely to be the enhanced purchasing power of the remitted dollars or euros. Most remittances, however, go to middle income and not low income countries.

***Should we throw away the old PPP figures?***

The ICP's new study gives estimates of GDP and GDP per capita for 140 countries for a single year 2005. This means that its uses are quite limited. First a lot of countries are missing. Participation in the international price study was voluntary and a significant number of countries did not participate. In particular, figures for all of Central America and the Caribbean are missing, so are virtually all small island nations. So, to include the missing countries in

aggregates, estimates from other sources will have to be used. Other PPP estimates might be suitably adjusted for this purpose. The limitation to a single year is at present an even more serious one. The World Bank is soon to publish figures for earlier and subsequent years based on the new 2005 benchmark, though it is not yet known whether these will be more that a simply application of previous real national growth figures to the new benchmark year. In any case they are not likely to take the figures back more than a couple of decades (the World Bank's previous PPP series started in 1975). The Penn World Tables, however, go back to 1960 for most countries and 1950 for some. Maddison's PPP series starts for most developed countries in 1820, for most underdeveloped countries in 1950 and he even dares to produce some limited estimates back to the year one AD. Controversial as it may be, it is a fascinating and thought-stimulating exercise. Finally, Maddison, the ICP and the World Bank publish figures only for GDP and GDP per head. The Penn World Tables, however, estimate at PPP values about a dozen different macroeconomic indicators. All this means that, despite deficiencies, the existing PPP estimates are by no means made redundant by the new ICP study, even though the new figures are set to become a new standard of reference. Whether the Maddison and PWT datasets will be completely overhauled after the ICP's 2005 exercise is not known to the author.

***PPP: a good, a bad and a two-edged weapon***

For many purposes (for example, for comparing GDPs and GDPs per capita, for assessing the relative economic, and possibly military, power of countries, for assessing energy efficiency) the logic of using PPP as opposed to exchange rates for national comparisons is as compelling as adjusting time series for price changes. No serious-minded economist would think of doing anything else.

For some purposes, however, the logic of using PPPs is less or non-existent, for example, in comparing trade statistics, an area where actual prices are already international prices.

For another purpose, comparing different social classes (rather than country averages) internationally (counting the poor, for instance) present PPPs are not adequate, but the answer is to extend the principle of PPP to other fields like price differences according to income class, or regions.

While the merits of PPP are great in theory, there is still the question of practice. To be really accurate, PPP estimates require a constant and enormous stream of data about prices and incomes from the whole world. What happens is woefully less that this and as a result PPP estimates must be deficient. We use them because they are there and they make more sense than the alternatives. But we must be aware that to base important conclusions on them is often

involves a risk. The risk is exposed by the way in which the new estimates have led to some considerable readjustments of previously reached conclusions.

Debates about the validity of PPP, however, will continue to rage, not because of any honest doubts about the practical quality of the estimates but because idologically and politically they are double-edged weapons. People choose to use PPP or not according to the position they occupy in an argument or conflict of interest. So those who wish to maximise the extent of poverty and world inequality (to promote more aid, for example), or to suggest that China has little economic power, may choose to base their arguments on exchange rate conversions. But then they will have to cope with the fact that their numbers imply that poor countries are (as rich countries often complain) less efficient that rich ones in their use of energy and therefore more of a danger to the world's environment. Those who want to make out that world poverty is not so bad is it is sometimes made out, and that perhaps poor countries need less aid than they say, will embrace PPPs. But they they will have to acknowledge that poorer countries tend to be much more energy efficient than many richer ones and this will increase the pressure on the richer countries to control their carbon emissions.

This politically contradictory feature of the conclusions about the world derived from the two methods of conversion, as well as plain ignorance, means that we shall continue to see wildly contradictory economic 'facts' presented as a matter of course.

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