

Reshaping the world: the 2005 round of the International Comparison Program

**Angus Deaton,
Research Program in Development Studies
Princeton University**

January 2011

I am grateful to Shaida Badiie, Misha Belkindas, Ann Harrison, Scott Kostyshak, Prasada Rao, Fred Vogel and especially Alan Heston for comments on an earlier draft

Reshaping the world: the 2005 round of the International Comparison Program

ABSTRACT

I provide a brief and non-technical introduction to the 2005 round of the International Price Comparison Program. I explain why it is necessary to collect prices around the world, and why the 2005 round is better than its predecessors. It covers more countries, so that fewer country results are imputed, it collects prices in a systematic way that was tightly controlled from a central office, the prices comparisons are much closer to “like with like” than in previous rounds, and the linking of the regions---which is key to generating a single set of global comparisons---was carefully thought out in advance and systematically applied. The new numbers “reshape” the world and in particular, poor countries are now typically estimated to be poorer relative to rich countries than was previously thought to be the case. In consequence, estimates of world income inequality are markedly higher using the new ICP. The relative PPP exchange rates between poor countries change by much less so that, judged by poor world standards (e.g. relative to a poverty line held fixed in Indian rupees), there is little change to measures of global poverty from the ICP revision.

The rounds of the International Comparison Project are like successive Olympic Games. Like the Olympics, they do not happen every year, and in the first modern games only a few countries sent competitors, there were only a few events, and standards of competition were relatively low. The participants were amateurs with day jobs, and while they were great natural athletes, they didn't take their training very seriously. Yet the first modern Olympics was a watershed, which eventually grew into the record-breaking, professional event that it is today, in which almost all of the nations of the world come together in a truly global competition. The ICP began in the late 1960s and early 1970s with Irving Kravis, Alan Heston, and Robert Summers from the University of Pennsylvania, and Zoltan Kennessy from the United Nations. The first round in 1967 had only six countries with four more added in 1970, and prices were collected for only a small range of goods and services. Since then, each round has become bigger and better (and more expensive), with more countries represented, with the involvement of more and more professional statisticians and economists, and with lots of preparatory training in the form of expert workshops, theoretical papers, and figuring out how to deal with problems that could not be solved in the previous round. The 2005 round was by far the most professional, the biggest, the most thoroughly researched, and the most international—with 146 countries. It was the first round to be organized by a global office housed in the World Bank. Its findings changed the economic map of the world.

ICP 2005 revealed a world that is much more unequal than we had thought. Not quite like discovering water on the moon, perhaps, but like discovering that the craters are deeper, or that the planets are further from the sun than we had always thought. And when the World Bank came to rework the global poverty counts using the new data, they also found a world that was much poorer than they had previously thought.

The gaps between rich countries and poor countries—which we long knew were enormous—are even larger than previously measured. The average gap in per capita GDP in 2005 between two randomly selected countries in the world is about five percent larger as a result of the new data. For some individual pairs of countries, particularly a pair in which one is rich and the other is small, the reshaping is much larger. The ratio of Chinese per capita income to American per capita income is 40 percent smaller than it was based on earlier data. Much the same is true for India. And for many of the countries in sub-Saharan Africa, the widening of the gap is larger still. What is true for countries is also true of individuals, and the average difference between the rich and the poor of the world has been newly enlarged. In consequence, the world has many more poor people below any global line that is fixed in rich country currency although, as we shall see, this is not the only way of setting the line.

Comparing countries

What is the ICP good for? Why do we need it, and how did the world manage before it began? When it works well and the ideas match the measures, the ICP allows us to make sound comparisons of living standards between countries and between widely separated periods of time. The ICP collects prices of thousands of items in each country, and averages them to calculate price indexes, for GDP, for consumption, and for its components. These indexes allow us to make international comparisons of the price of rice, or the price of food, or the price of all consumption items. The national accounts of each country tell us how much its citizens spend on rice, on food, or on all consumption, so that the price indexes from the ICP allow us to convert these money amounts, measured in local currency units, to “real” amounts expressed in a common unit, which is nearly always the US dollar. The dollar amounts, such as Kenyan per

capita GDP in US dollars, is per capita GDP in Kenyan shillings (calculated by the Kenyan statistical office) divided by the price index of Kenyan GDP in shillings per dollar.

These comparisons in common units tell us about the relative sizes of different economies, they tell us not just that one country is richer than another, but by how much. Without the price indexes it is impossible to calculate differences in living standards between countries, or people's well being in different countries, or to measure global inequality. Without them it is also impossible to convert a global poverty line into its local equivalent, which is the number we need to calculate the number of globally poor in each country, and thence in the world. The World Bank's global poverty line is constructed from an average of the poverty lines of the poorest countries in the world, and these local lines must be converted into international dollars before they can be compared and averaged.

Since World War II, we have had a uniform set of principles for measuring national income. The principles evolved by Richard Stone, James Meade and Maynard Keynes in wartime Britain were codified under UN auspices after the war under the guidance of Stone; these principles have evolved into successive versions of the UN's System of National Accounts, or SNA, the latest in 2008. By following this system, each country provides estimates of national income in its own local currency and these, at least in principle, are done in the same way everywhere.

When we try to compare across countries, the obvious method is to use market exchange rates to convert everything into a common currency—such as the US dollar—but conversion using exchange rates doesn't do a very good job. Many factors—movements of speculative capital for example—affect the exchange rate in the short run, so that the rupee to dollar exchange rate may fluctuate from day to day, even though neither Indian nor American living

standards are changing. The recent (2010) fall in the euro relative to the dollar has everything to do with expectations about the future, and nothing to do with current levels of income in Europe or the US.

If all goods and services were freely traded between countries, traders would iron out these fluctuations, at least in the long run. But there are many goods that are not traded at all—housing, many government and private services, the law courts, police, haircuts, waiting table, or babysitting—and there is nothing to bring the prices of these items into line. In poorer countries, where labor is cheap, these non-exportable goods and services tend to be relatively cheaper than traded goods (wheat, gasoline, cameras, or machine tools) so that if we use common international units to value these non-traded goods, poor countries look less poor relative to rich countries than if we use domestic prices converted at market exchange rates.

All of this is just what every traveler knows. If an American gets off a plane in Delhi, or an Italian in Addis Ababa, and changes dollars into rupees or euros into birr, the amount of local currency received will go much further than the original dollar in Washington or the euro in Rome. In effect, the price level in poorer countries is lower than in richer countries. People in Delhi and Addis are poorer than Americans indeed but, because of the lower price levels that they face, the difference is not nearly as large as it appears to be at market exchange rates. The alternative exchange rate that converts dollars and Euros into rupees and birr in a way that preserves comparable purchasing power, is called the purchasing power parity (PPP) exchange rate, and it is these PPPs that are measured by the ICP. In essence, PPPs are the price indexes that are computed from the hundreds of thousands of prices collected by the ICP. The differences between market and PPP exchange rates are large and important. For poor countries, GDP per capita at international prices can be three (India) or four (Ethiopia) times

larger than GDP per capita in domestic prices converted at exchange rates. But the ratio of market exchange rates to purchasing power parity exchange rates is not constant over time, nor is it the same for all countries with the same level of per capita income. So there is no choice but to actually collect the prices, and to do so, if not every year, at least on a regular basis.

Key findings: inequality

How did the ICP 2005 reshape our view of the world? The headline numbers came from India and China, whose economies “shrank” under the new estimates. The international dollar value of Chinese per capita GDP in 2005 fell from \$6,757 in the 2007 *World Development Indicators* to \$4,088 in the 2008 *World Development Indicators*. For India, the same comparison shows a reduction from \$3,453 to \$2,222. All of these numbers are for a single year 2005, and because they come from converting the same local currency values but at different PPPs, another way of putting the change is that the PPP for China rose by a factor of 1.65, while the PPP for India rose for a factor of 1.55. Recall that GDP in international dollars is obtained by dividing the country’s own GDP by the PPP measured by the ICP, so that higher PPPs translate into lower estimates of GDP. The reduction in Chinese and Indian GDP comes from the fact that the price index for China relative to the US was 1.65 times higher than previously estimated, and that for India relative to the US was 1.55 times higher.

Because international comparisons are done in international dollars, and because we are all familiar with US dollars, the obvious first interpretation of these data is that the Chinese and Indian economies are smaller than we previously thought. But if the ICP had used, not the US dollar, but (say) the Indian rupee as its unit of account, the change would have been that the

American economy was *much larger* than previously thought, and that the Chinese economy *slightly smaller* than previously thought. All of these international comparisons are essentially relative; the ICP does not measure quantities, so that the ICP cannot tell us whether or not the absolute values of Chinese or Indian per capita incomes were previously overestimated.

All of this may seem like hairsplitting, but it points to an important fact, which is that the ICP widened the gap between India and China on the one hand, and the US on the other hand. Neither India nor China is any smaller or poorer (or indeed richer) than it was, although both are estimated to be smaller and poorer relative to the United States. In the data in the 2007 *World Development Indicators*, per capita income in the US in 2005 was more than six times per capita income in China, and more than ten times per capita income in India. In the light of ICP 2005, as reported in the 2008 *World Development Indicators*, these ratios increased to twelve times and nearly nineteen times.

India and China are only two of the countries that were moved further apart from the US in ICP 2005. Indeed, the effect was quite widespread, with many of the world's poorest countries shrinking relative to the US. There was relatively little change among the world's richest countries—many of whom calculate PPPs every year, so that there is little opportunity for revision—so that ICP 2005 caused a general widening of the dispersion of per capita incomes around the world.

Figure 1 is a plot of the ratios of the “old” PPPs to the “new” PPPs against the logarithm of per capita GDP, where every point is a country, and the ratio is the ratio of the PPP reported in the 2007 *World Development Indicators* to the PPP reported in the 2008 *World Development Indicators*. If the ratio is greater than one, measured per capita income has decreased relative to the US, if it is less than one, per capita income has increased relative to the US.

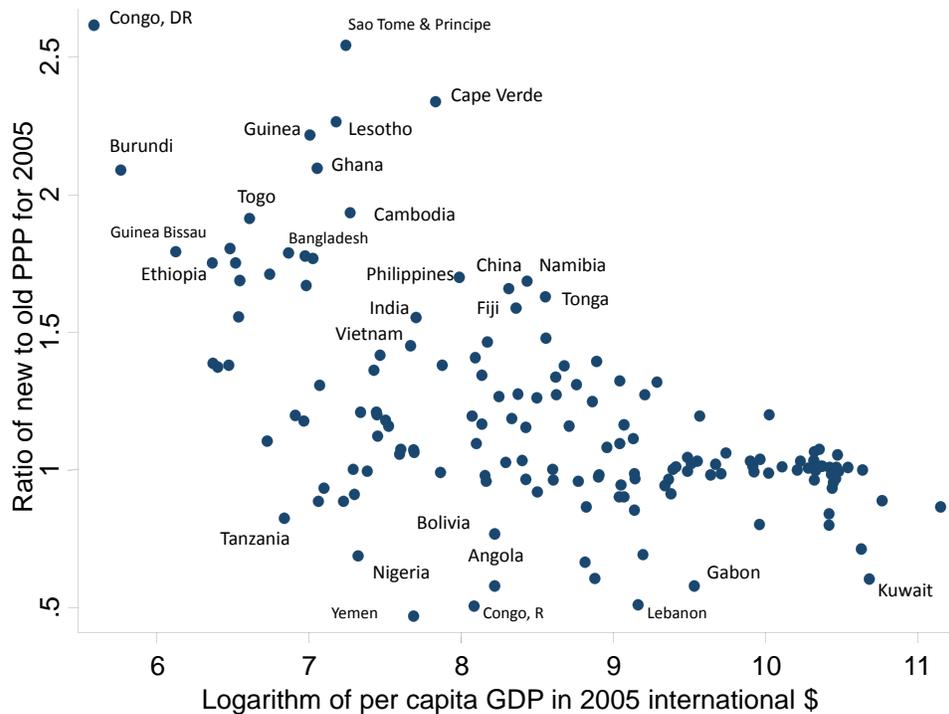


Figure 1 shows a strong downward slope which means that the revisions of the 2005 PPP were generally larger for poorer countries. In consequence, many of the poorer countries are poorer relative to the US, while the richer countries stay about where they were, so that inequality between countries is larger under ICP 2005. The upward revaluation of the PPPs for India and China turns out to be quite common, with many other countries in Africa, and some in Asia, experiencing similar or larger upward revisions. Indeed, the top left of the figure shows that a number of African countries had much larger upward revisions than India and China. A number of these had never previously been benchmarked in an ICP, so that the previous PPPs were little more than imputations or educated guesses.

Branko Milanovic has calculated the Gini coefficient for income inequality among all the citizens of the world; this number is much bigger than the Gini coefficients for even the most unequal of individual countries because world inequality is dominated by differences *between*

countries rather than by differences *within* them. According to his calculations, the world Gini coefficient in 2002 rose about 5 percentage points because of the revisions in ICP 2005, from 66 percent to 71 percent. Even if we ignore inequality within countries, and compute the world Gini coefficient on the (counterfactual) assumption that everyone in each country has the same income, there is a similar increase of 5 to 6 percentage points, just from the ICP revision.

Key findings: poverty

If ICP made the poor world poorer relative to the US, did it increase global poverty? Not necessarily, because it depends on whether we look at it from a rich country or a poor country standard.

For the rich country perspective, we take the global line to be a dollar a day and hold it fixed in real dollars. The global line in use prior to the 2005 revision was not precisely a dollar, but \$1.08 in 1993 prices. By 2005, consumer prices in the US had risen by 35 percent, so that the dollar-a-day line was \$1.46 in 2005 prices. When that global line was used *with the old PPPs* to calculate global poverty, the global poverty count was 931 million people. If we take the same global line, \$1.46 at 2005 prices, and use it *with the new PPPs*, the global poverty count increases to 1.76 billion, almost twice as many as before. Because we are holding the global line fixed in US dollars, and because the PPPs of poor countries have increased, the local equivalents of the global line have increased, and there are many more poor people beneath them. Relative to the US, the poor world is poorer than we thought, and there are many more poor people.

But this rich country perspective is not the only way of making the calculation. In 2005, at the old PPP of 11.3 rupees to the dollar, \$1.46 was worth 16.5 rupees in India. (This lies between the two Indian domestic poverty lines of 17.7 rupees for urban India and 12.0 rupees for

rural India.) So, using the old PPPs, at a global poverty line of 16.5 rupees per person per day, there were 931 million poor people in the world; this is just a restatement of the old dollar calculation. However, if we now hold the global line fixed, not in dollars at \$1.46, but at rupees at 16.5 rupees, and use the new PPP exchange rates, the new global poverty estimate is 943 million people, close to the number we started from. Relative to India, the world is neither poorer nor richer than we thought; the ICP revision has had very little effect.

One feature of this second calculation is worth noting. At the new, higher PPP for India, the global line of 16.5 rupees is now worth only \$1.04 in 2005 US dollars. This number is not only lower than the global poverty line in 2005 dollars (which it must be because of the increase in the PPP) but it is actually lower than the global line in 1993 dollars! But this is just a consequence of the happenstance that the proportional increase in the Indian PPP was larger than the US rate of inflation from 1993 to 2005.

Which of these two approaches is right, and why did the World Bank get yet a third answer? Taking the second question first, the World Bank uses (a version of) the poor country perspective, and calculates its global line, not as the Indian line, but as the average of the poverty lines of the poorest countries in the world. In principle, this should give something like the Indian-based calculation above. Yet the Bank calculations using the new PPPs show 1.37 billion in poverty, a substantial increase over the original estimate. This happens because the Bank made other changes at the same time as implementing the ICP revision. In particular, they took the opportunity to update the group of countries whose poverty lines were used to calculate the global line, and it turns out that, on average, the new reference group has higher poverty lines than the old reference group. Much of this is accounted for by one country alone. India, which has one of the lowest poverty lines in the world, but is no longer one of the poorest countries in

the world, was dropped from the group, so that the global poverty line went up. As the Indian example shows, it is this change in the global line, not the ICP revision, which was responsible for increasing the global poverty count.

Of course, there is no *right* answer here. A good case can be made for holding the line fixed in dollars; the international community understands rich world currencies, are justifiably appalled by the number of people living on an unimaginably small, but comprehensible amount, and are confused by a standard that appears to be denominated in dollars, but is actually denominated in poor country currencies. The case in favor of the poor country standard comes from the reasonable belief that the poverty lines of the poorest countries in the world are likely to give us a good idea about the absolute minimal standard of living anywhere in the world. (But note that the Bank's new line of \$1.25 at 2005 prices is substantially *above* India's rural poverty line, beneath which live nearly a quarter of a billion people.) Likewise, there is certainly a case for revising the line from time to time, and there is no compelling reason to always use the poverty lines of the same set of countries. Even so, the combination of a revision of the line and a revision of the PPPs at the same time is certainly confusing, and has made the whole process—which has always been hard to explain—even less than usually transparent.

More countries in 2005, fewer imputations

What did the 2005 round of the ICP do differently? Do these changes make the new results more or less credible than the earlier numbers?

The most obvious improvement in 2005 was the increase in the number of participating countries. ICP 2005 collected prices for 146 countries in all regions of the world including 48 countries in Africa, a continent that is often underrepresented in international statistical

compilations. China was a full participant for the first time. India participated for the first time since 1985. The only major gaps in 2005 were in Central America, the Caribbean, and a number of small island economies.

The very first ICP, run jointly by the University of Pennsylvania and the United Nations Statistical Office, collected prices in only six economies, Hungary, India, Japan, Kenya, the United Kingdom, and the United States. Four other countries, Colombia, France, Germany, and Italy, collected data for 1970, and were included in the first ICP set of PPPs published in 1975. The number of countries was gradually increased with successive rounds, reaching 60 in the 1980 round, 64 in 1985, and 118 in the 1993 round, the last round before ICP 2005.

For most academic economists who use them, the results of the ICP are accessed through the Penn World Table (PWT), Mark I of which appeared in 1980. Mark 5, based on the 1985 round, contained results for 139 countries, and covered the time period from 1950 through 1988, though not with all years for all countries. PWT5, described by Robert Summers and Alan Heston in an important paper in *The Quarterly Journal of Economics* in 1991, was responsible for reigniting an academic interest in the empirical study of economic growth, and there is now a huge literature using these data, as well as the later versions of PWT6 based on the 1993 round. Mark 7, using ICP 2005, is currently (end 2010) in preparation.

For countries that are not covered by the ICP, PPP exchange rates are “filled in” by estimating the price level based on each country’s level of development. For example, in the examples above, the price level for India is 0.33, and that for Ethiopia is 0.25 so that, for a country, with per capita incomes between the two, the price level would be somewhere around 0.30, and the PPP would be thirty percent of the market exchange rate. In practice, the prediction of the price level can be improved by taking into account factors in addition to per capita GDP.

However, each country is special in some way, and the predictions of a regression are never as good as using actual data.

In past rounds, when a country missed an ICP round, such as India in 1993, a guess could also be made by taking a previous PPP exchange rate, from the 1985 benchmark, and “updating” it from the relative rates of inflation in the US and India. But the basket of goods in each country’s consumer price index (CPI) is not the same as the international baskets used in the ICP. Nor are domestic CPIs always constructed to the same principles. So this too is only a rough and ready substitute for collecting the data.

One of the great strengths of ICP 2005 is that very few imputations and updates are required.

Better linking of the world in 2005

An important improvement in ICP 2005 was the way the price collection was organized. In the early days, with only a few countries, the ICP was done centrally, for example at the University of Pennsylvania, but as the number of countries grew over time, price collection was regionally dispersed. Each region calculated its own set of regional PPPs relative to a regional base country, with PPPs for the world calculated at a final ‘linking’ stage.

By ICP 1993, the dispersal had gone to the point where the central organization had become very weak. This caused many problems, and one of the main aims of the 2005 round was to remedy this and to develop a coherent global structure for the ICP. It was at this point too that the World Bank was brought into the ICP, and became, not only a major funder, but the home of the global office which was responsible for the overall design of the project, and for combining the regional estimates into a set of global PPPs. Each of five regions had its own office, its own

data collection machinery, and calculated its own set of PPPs for the region. The Eurostat/OECD conducted its own regular process of calculating PPP exchange rates for its countries, but in coordination with the ICP regions. For other regions, such as Africa, the ICP 2005 was a new regional effort that would not have taken place otherwise.

At the center of the regions was the global office in the World Bank, which was responsible for coordination and for the final linking stage in which a global set of purchasing power parity exchange rates were calculated from the information submitted by the regions. The Global Office worked under the auspices of an Executive Board formed by the UN Statistics Commission and was provided with technical advice by a panel of experts in the Technical Advisory Group. Overall, the World Bank furnished the organizational and technical skills to make the whole enormous operation work.

What were the payoffs to this reorganization? What had gone wrong in the 1993 round, and how did the new structure help to remedy it?

The 1993 round was not centrally coordinated or controlled, and in the face of underfunding at the center, became a set of regional exercises, carried out at different times, each of which collected data and calculated regional PPPs. A UN report in 1997 under the chairmanship of Jacob Rytén, argued that the estimates from ICP 1993 were not credible and concluded, with faint praise, “ICP is a programme worth keeping but that its current condition, if little is done about it in terms of credibility, quality of output, and survival prospects, is poor.”

One credibility problem came from the way that the global PPPs were constructed. Without adequate central coordination, not all of the planned links could be carried out, so that the global PPPs were calculated by linking the regions *ex post*. This linking was done by using countries that were included in more than one region as bridges. This is conceptually similar to

linking an old and a new time series from a price index through its value in a bridge year for which both price indexes are available. But spatial price indexes cover many countries simultaneously, and do not have the natural ordering that comes in time series. This difference means that the results of linking two regions through a common country will depend on which country is used, a choice that needs to be made on principle, not by happenstance as was the case in 1993. One particular concern is if the linking country is special in some way, for example if it has patterns of consumption and relative prices that are somehow unusual, something that is often thought of Japan, which was one of the linking countries in 1993.

The results also depend on just how the linking is done; for example, one possibility is to use the PPP exchange rates between Japan and India, both in the Asian region, and Japan and the US, both in the OECD region, to derive a PPP exchange rate between the US and India. A more detailed exercise can be done to convert the price of individual goods and services in India—rice, clothing, automobiles—from rupees into dollars using the price of each good in Japan as a bridge. As with the choice of bridge countries, the level of disaggregation will affect the final answer. The spirit of the ICP dictates that the linking should be done at the finest level that is possible, but without central coordination, this too was dictated by happenstance, and from the uncoordinated choices of each region.

China actively participated in 1993, at least to the extent of making a number of comparisons between cities in China and elsewhere, but those were never fully incorporated into ICP 1993. As a result, the PPPs for China in 1993 were based on data that were collected in 1986 to make a bilateral comparison with the US, then extrapolated forward to 1993.

In ICP 2005, the linking of the regions was centrally planned and implemented. Instead of relying on a few countries that happened to be in more than one region, a group of eighteen “ring” countries were selected in advance, with two or more countries in each region. Each ring country carried out a second round of price collection, pricing a common special list of more than 1,000 items. The ring can be thought of as a separate self-contained mini-ICP, although “mini” is relative, because the number of countries in the ring is larger than the number of countries in the first round of the ICP. It generates a set of ring PPPs, and beyond that a set of ring prices—in common ring currency—for each of the goods and services in the ICP. These prices, appropriately averaged, are then used to “glue” the regions together into a global set of accounts, in which there is a purchasing power parity exchange rate for each country (relative to the US dollar which is the numeraire), but also a set of prices—in US dollars—for each of the 155 goods and services (“basic headings”) covered by the ICP.

The linking of the regions in the ICP 2005 was not without its problems. The most serious of these are not failings of the ICP itself, but come from the conceptual difficulties of all exercises of this kind, particularly when making comparisons between countries whose patterns of consumption and relative prices are radically different from one another. It is one thing to make PPP comparisons of France and Germany, or of Kenya and Tanzania, but we are on altogether shakier ground when we come to compare Canada with Cameroon, Japan with Senegal, or Bolivia with Tajikistan. Such comparisons are difficult in theory, and subject to a wide margin of uncertainty in practice, and this is something that should always be kept in mind when using the results of the ICP.

That the linking procedures in ICP 2005 are well-documented and well thought out, even if not unchallengeable and certainly not the final word, makes the 2005 round much more credible, reliable, and safer than any of its predecessors.

More precise definitions of goods and services in 2005

With its better coordination, it was possible for the global office in ICP 2005 to provide technical support to countries to help each country collect prices in a coherent way, and to check and edit the results for credibility and correctness. Such advances attract little attention from the outside, and any description is soporific both to write and to read, but their importance is hard to exaggerate. One of the criticisms in the 1997 Ryten report was that the ICP was very strong on the theory of the index numbers underlying the PPPs, but much weaker on giving precise instructions to statistical offices about how to collect prices. That weakness was remedied in 2005.

In ICP 2005, each region developed its own list of prices—something that makes sense when countries are more similar within regions than across them—with the ring list put together centrally by the global office, based on inputs from each region. This list is crucial in the linking of the world and plays a central role in determining the distance between poor and rich countries, and the extent of world inequality. The 2005 ring included countries as disparate as Senegal and Cameroon in Africa, Japan and Estonia in the OECD, Jordan and Oman in Western Asia, and Malaysia and the Philippines in Asia.

Any list that runs across such countries has to satisfy two criteria that are often at odds. One criterion, to validate the international comparisons, is to make sure that the goods being priced are the same in all countries. This calls for precise definition of goods in the list. If the

definitions are too vague, for example a “shirt,” or a “family car,” we run the risk of pricing lower quality items in the poorer countries, so that we are not comparing like with like, and underestimating (overestimating) price levels in poorer (richer) places.

The second criterion is that the goods in the list be widely consumed in each country, so that the goods in the list are genuinely representative of what people buy.

The 1997 Ryten report noted the difficulty of satisfying both of these criteria at the same time, as well as the consequences for the credibility of the ICP, but did not propose any solution. In the event, the ICP 2005 dealt with the issue by developing very precise lists, especially for the ring. For example, instead of wine, or even red wine, the item is “Bordeaux *supérieur*, with state certification of origin and quality, alcohol content 11–13 percent, vintage 2003 or 2004, with region and wine farmer listed.” This level of detail clearly does very well by the first criterion, of pricing the same item everywhere. The second criterion was dealt with by asking enumerators to report whether the item was representative of local consumption, with the aim of down-weighting non-representative products. For a number of reasons, including the difficulty of defining “representative,” the reporting did not work in some of the regions. In the meantime, it is clear that the ICP 2005 is a huge improvement on one of the two criteria, if not on both. Making both criteria work remains an active research area, and there will undoubtedly be further refinements in ICP 2011.

Continuing progress on other issues

The ICP has long had a list of problem children, referred to in the jargon as “comparison resistant” goods and services. Many of these are services, where it is traditionally difficult to define quantities—how do we compare a hip replacement or brain surgery in Nairobi, Tokyo,

and Buenos Aires?—and many relate to government activities, the provision of education, of defense, or administrative services by civil servants. These are all areas where there are long-standing problems of measurement even for domestic national accounts, and these problems tend to be more difficult still in cross-country comparisons. The handling of these issues occupies a large fraction of the time of the technical committees that support the ICP. None of them are definitively solved, and none of the current solutions are above criticism. But there is also no doubt that progress is being made, and that better methods and better data collection are constantly being brought on line.

The ICP relies heavily on data that it does *not* collect, namely the national accounts of the participating countries. Recall that the ICP collects data on *prices*, not on expenditures or quantities. So when the ICP reports levels of real income in international dollars in different countries, it is relying on local estimates of income in local currency, and then converting them to international dollars by dividing by the price indexes from the ICP. Indeed, even the construction of the price indexes from the prices of individual goods and services relies on the local national accounts to provide the weights that indicate the relative importance of each category. So the ICP comparisons are only as good as the national accounts that go into them, over which the ICP has no direct control.

Put more positively, the ICP itself is an opportunity for the global office to help countries improve their national accounts. A good deal of this was done in 2005, and more is being done now in preparation for ICP 2011. The ICP, like the Olympic Games, can leave a lasting legacy of better local infrastructure.

Credibility of the ICP revisions

Figure 1 shows that there are few revisions among the richer countries, and that most of the exceptions are oil producers. (The price of oil was high in 2005, which makes oil producing countries richer—which shows up as lower PPPs—than when the price of oil is low.) In fact, there were essentially no revisions among the OECD countries. These countries have their own PPP program, run by the EU and OECD statistical offices, which calculates PPPs on an annual basis, and which was incorporated into ICP 2005. For those countries, with annual monitoring, there is no possibility of the large revisions that can happen when a country has not been benchmarked for a dozen years or more. The large number of rich countries without revision illustrates the benefits of calculating PPPs at a higher frequency than is the case for much of the rest of the world.

Are the revisions elsewhere credible? Are the new PPPs more reliable than the old? Are the higher inequality measures better than the old ones?

The answer to all of these questions is certainly in the affirmative. As documented in the Ryten report, ICP 1993 was in some disarray, and had lost much of its credibility. This was particularly a problem in the way the regions were linked, and it is the linking that is responsible for establishing the PPPs in Africa and Asia relative to the US and the other OECD countries. The linking in ICP 2005 through the ring countries was well thought out in advance, and centrally and systematically implemented.

In addition to the linking, there were many more countries to be linked. Most of the African countries had never previously been benchmarked, nor had China, and the Indian benchmark was more than twenty years out of date. Even if there had been no linking, and the

ICP 2005 had produced only a set of unconnected regional accounts, it would have been a huge advance in the supply of credible price information from the countries of the world.

Of course, it is always good to keep in mind that international comparisons are difficult, especially between countries that are very different in their consumption patterns and in the structure of relative prices. No matter how accurate, detailed, and careful is price collection by the ICP, comparisons of (say) Senegal and Japan, Brazil and Bangladesh, or the US and Tajikistan, are going to be rough and ready at best. Indeed, a good starting point for anyone using the ICP results is to treat such comparisons with a large grain of salt.

One central issue, also identified in the Ryten report, is how to resolve the conflict between, on the one hand, wanting to measure the same goods in different places, and on the other, to make sure that the goods whose prices are being measured are representative of consumption in each country. In ICP 2005, this conflict was resolved in favor of ensuring that the items were closely comparable. If the list of such items contains many items that are common in rich countries, but rare and expensive in poor countries, it is possible that linking through the ring will exaggerate the difference in prices between poor and rich countries, and this would contribute to an overstatement of global inequality.

However, in work published in 2010 in the *American Economic Review*, I was unable to find much evidence for this effect in the details of the ring comparison in ICP 2005, or at least that it contributed very much to the widening of the gap between rich and poor countries. Instead, the main source of uncertainty is a more fundamental one, that with different relative prices and different weights, there is a wide range of reasonable ways of calculating PPPs. That is an issue that cannot be resolved by better measurement, although research can certainly build on what has been done so far in order to suggest new measurement. In the meantime,

transparency about methods and about data is of the greatest importance. To aid this, the Global Office has provided data sets to researchers that allow methodologies to be compared; and this analysis will surely guide further improvements in ICP 2011 and beyond.