

International Comparison Program

Note on the Fourth ICP Technical Advisory Group

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A. Overview

1. Several issues and questions have been raised following the TAG meeting that go beyond what was discussed. In addition, papers were provided to the TAG by Dikhanov and Hill at the time of the meeting. (Hill's paper was followed by another on October 27) Therefore, members did not have time to review them for the ensuing discussions.
2. In addition, Sergey Sergeev has raised several questions about points made by the TAG. Therefore, the purpose of this note is to review some of the key decisions that remain regarding linking and the global aggregation, to respond to Sergeyev's questions, and suggest a way forward.
3. The points below draw heavily on the 2005 ICP Handbook chapters 14 and 15.

B. Basic Heading PPPs within regions.

4. The TAG recommended that the CPD method should be used to obtain basic heading PPPs for countries within regions. This recommendation should be revised to reflect that the countries in the ICP regions will be classifying each item as important or less important. This provides a form of weighting in the CPD similar to that used by the Eurostat-OECD classification used for representativity. Perhaps this should be called the CPWD where the W stands for weights that can either be based on importance or representativity. A broader question is how to deal with the importance classification in linking basic headings across regions. More about that follows below in paragraph 7.

C. Linking basic headings across regions

5. The TAG considered two methods. The first was the 2005 ICP approach as suggested by Diewert. There, basic heading linking factors were obtained by converting the ring country prices in each region to those of a regional numeraire country using PPPs from the regional comparison. This resulted in a set of 5 regional prices. One region was chosen as the numeraire and between region PPPs were computed using the CPD. These between region PPPs multiplied times the within region PPPs converted each country to the global level and maintained within region fixity. Tables 1-3 in Chapter 14 provide a worked example.
6. The other method was that proposed by Robert Hill which Sergeyev claims is algebraically identical to the Eurostat-OECD method. The Eurostat-OECD method is described in chapter 14 of the ICP Handbook, paragraphs 31-37 which also contains a

worked example shown in table 5. This is a global approach which is used to preserve the fixity of a core set of countries when a larger number are added to the comparison. The main difference from the 2005 ICP approach is that it does not require the prices in different countries within the same region to be converted into a common numeraire currency; the original price data in national currencies are used. It should also be said that this method is used across countries that are mostly pricing the same overall regional list without the extreme diversity seen across the world.

7. The TAG recommended that the 2005 method should be used for linking the regions at the basic heading level with core prices replacing ring prices. This decision needs to be revisited. First, Sergeev raised a question about how the ring prices enter into the estimation of the between region PPPs. There are two choices described in chapter 14 of the ICP Handbook:
 - a) In 2005, ring country prices were converted to the price of a regional numeraire country. These individual country prices in the numeraire currency entered into the CPD calculations. Paragraphs 15-27 in Chapter 14 describe this method and provide a worked example. Sergeev pointed out that this method does not treat regions symmetrically because of the different numbers of countries in each (50+ in Africa vs 10 in two other regions).
 - b) An alternative procedure would be to compute the geo mean of the individual country prices (in the currency of the numeraire country) for each product. This method is described in chapter 14, paragraphs 42-53, again with a worked example shown in Table 8.
 - c) When there is only one regional average price for each product in a region, equal weight is given to each region in the estimation of between region PPPs. As stated in paragraph 52 in Chapter 14, this aggregation entails a loss of detail and degrees of freedom. Sergeev, however, argued in an October 17, 2010 email that the use of an average price was simpler, more transparent, and treated countries fully symmetrically. It is also pointed out in Chapter 14 that this aggregation may lead to the loss of information about **representativity or importance**.
 - d) When using individual country prices, the **importance** classification is carried forward for each item in each country even after it has been converted to the regional currency. This is critical because not every item will be important in every country. When the geo mean is used to estimate between region PPPs, it will be necessary to determine whether it is important (or representative). In the worked example shown in chapter 14, table 8, a product is representative for the region if it was classified as representative by at least half of the countries.
8. For these reasons, the decision about how to compute basic heading linking factors needs to be revisited. The 2005 method based on country prices vs regional average prices should be evaluated using the ring data set. Unfortunately, the quality of the representativity coding does not allow that to be factored into the analysis. However, the TAG needs to consider how to make the optimum use of the importance coding for the core prices for which ever method is used. The fact that the core list provides items comparable across the world means that many will not be important in every

country. Therefore, it is crucial that the importance classification be done well and its use optimized in the global calculations.

D. Linking between regions above the Basic Heading level.

9. Diewert (ICP book Chapter 8) and the 2005 ICP Handbook, Chapter 15, describe several methods for aggregation which can be divided into two categories—two stage and the global method.
10. **The two stage methods** start with a set of inter-regional basic heading PPPs (linking factors) and a set of basic heading weights for each region. The inter-regional basic heading PPPs and weights can be aggregated to higher levels and the GDP using any multilateral aggregation process. The problem is how to compute the basic heading weights which should be a summation of country expenditures to regional totals for each basic heading. Diewert (chapter 8) provides three options.
 - a) Convert country expenditures for each basic heading into a common currency using exchange rates. The problem is that the purpose of the ICP is to get away from exchange rates.
 - b) Convert country expenditures for each basic heading using the currency of the numeraire country. This is described in the 2005 Handbook, Chapter 15, paragraphs 22-39. This method is not base country invariant because the choice of numeraire changes the structure of the regional expenditure totals across basic headings.
 - c) Use the geometric average of the regional PPPs to convert national expenditures into a common currency. This method is invariant to choice of numeraire country.
 - d) All three methods, however, do not treat countries symmetrically because large countries affect the weighting across basic headings—which Diewert refers to as a form of additivity. In a previous note; Sergeev proposed computing average regional basic heading “shares” as the arithmetic average of the national shares belong to the region. All countries will be treated equally using average shares.
11. **Global methods.** Diewert, ICP Book, chapter 8 describes the Global GEKS Method. This is referred to as the universal method in the ICP Handbook, chapter 15, paragraph 40. The starting point for the global aggregation is the set of national basic heading PPPs calibrated to a global numeraire (a matrix of 150 countries x 155 basic headings) and a corresponding matrix of expenditure weights. Any form of multilateral aggregation can be used to directly aggregate the basic headings to higher levels and the GDP. The method proposed by Heston (CAR) is also a global or universal method as is the method proposed by Dikhanov. The Hill approach is a variant of the global approach and is mentioned in paragraph 44, and the Eurostat-OECD method is briefly described in paragraph 61 in the ICP 2005 Handbook.
12. Global methods do not preserve regional fixity. However, fixity can be restored by summing national volumes to regional totals which are then distributed within the

region to maintain regional fixity. Chapter 15, paragraphs 40-42, provides an overview of the basic differences between the global vs. two-stage methods with the GEKS/Fisher method is used.

- a) If there were 150 countries and 6 regions each with 25 countries, then the global aggregation would include 11,175 binary Fishers. In the two-stage method, the 1,800 within region Fishers would be calculated at the first stage, but at the second stage only 15 binary Fishers between the 6 regions.
 - b) The question is whether the thousands of binary Fishers between countries in different regions add information that results in aggregated PPPs with greater statistical reliability, or does the matrix become too sparse because many countries will not be able to price all of the items in the core list.
13. As pointed out by Heston in recommending the CAR method, it is much more transparent in comparisons between countries like China and India relative to large OECD countries. The relative positions of China and India to the rest of the world differed significantly between the global vs. two-stage methods. The PPPs between any two countries depend on the other countries included in the estimation. The PPP between China and the US will be different depending on whether the two-stage or global approach is used. It could be argued that the structure of the current regions with, for example, Mexico, Japan, and Korea in the OECD, is already a step towards a global aggregation and that the China/US PPP should be derived directly.

E. So, what is the way forward?

14. The use of the core list offers possibilities that have not been discussed. For example, the TAG has operated from the perspective that regional comparisons would be completed first. Heston suggested that for at least some basic headings, consideration be given to first doing the global aggregation and letting the regional aggregations come from that as well. In other words, the relative position of countries within each region would be based on the global comparison. This also makes sense from a data validation point of view where the variability of basic heading PPPs and the L-P spreads can be more directly reviewed in the global aggregation. However, this will require a re-think of the validation process.
15. There are many unknowns. First, it is not known whether the countries can consistently apply the “importance” classification. This has implications about the choice of method to compute global basic heading PPPs.
16. Another unknown is how much of the core list is actually priced. One would expect the within region matrix would be more complete than the global matrix, but we do not know the degree. A third unknown is the affect the core list will have on the regional results.
17. We will not know the answers to these questions until the data become available. Therefore, the TAG should concentrate on coming up with some evaluation tools that

to guide the process in making the final determination. These evaluation tools provide transparency about the determination of the final method to be used. The TAG should also recommend to the ICP Executive Board and the regions that individual regions **do not** publish regional results until the decisions about the global aggregation have been made.