

2nd Meeting of the Task Force on Country Operational Guidelines

**Background Paper on Sub-National PPPs
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Preface

The paper has been prepared taking into account the contributions of the research papers published in scientific journals and international scientific conferences and the contributions included in books published by the international organizations such as the World Bank, OECD, Eurostat and others.

In particular, we have considered the papers appeared in the 2016 Special Issue of the Social Indicators Research review, devoted to “Income, Poverty and Prices: Comparisons at National and Sub-national level”. Moreover, papers presented at the last two ISI World Congress (2015 and 2017) in the Sessions devoted to the ICP Programs developments and to the computation of Sub-national PPPs have been considered. We have taken into account documents presented at the TAG meetings of the 2011 ICP Round and to the books published under ICP Programs, as well as to the papers, documents and publications of the World Bank Development Research Group on Poverty and Inequality.

Our first aim is to start with a general discussion during the 2nd meeting of the Task Force. Therefore, the first sections of the paper devoted to the computation of Sub-national PPPs already carried out and to their uses have been prepared in a complete version. Whereas, the sections devoted to the conceptual and methodological frameworks and the compilation of the Sub-national PPPs are presented in summary way just to indicate the topics that we seek to address in the next version of the paper and that should be deepened and discussed in future meetings. This also because the development of the topics on practical compilation depends on the decisions that the Task force will take on the general conceptual and methodological aspects.

1. Introduction

The International Comparison Program (ICP) - started more than four decades ago - has expanded significantly and the program is now truly a global program, which included 146 countries in its 2005 round and 199 countries in the 2011 round. The ICP is undoubtedly the most reliable source of data on internationally comparable economic aggregates such as the purchasing power parities (PPPs) of currencies gross domestic product (GDP), per capita consumption expenditure and investment. International comparison data generated by the ICP are used for many purposes including comparative assessment of economic performance of countries and regions; measurement of regional and global inequality and poverty; and for the purpose of cross-country comparisons of prices and living standards. A comprehensive account of the framework for the ICP and its implementation, with details on the methods of collection of data and methodologies followed for the computation of the PPP, can be found in World Bank (2013) which is often referred to as the *ICP Book*. The most recent set of results for the year 2011 can be found in World Bank (2015).

The growth in the production of international statistics from the ICP and the increasing use of these results in economic and social policy development have led, during the last decades, much debate about the need for the construction of Purchasing Power Parities (PPPs) at sub-national level (SN-PPPs).

The issue of sub-national PPPs has been discussed extensively in the literature¹ and the importance of constructing sub-national PPPs has been acknowledged for over two decades (Kokoski, 1991; Moulton, 1995; Kokoski et al. 1999, Aten, 1999). The estimation of sub-national PPPs is surely important for large countries as China, India, and so on, and, in any case, for all the countries where the territorial areas (regions or provinces) have different levels of development and cost of living and large differences in consumer preferences as well as in quality of products consumed by the households.

In these cases, the estimates of PPPs are crucial for conducting real term comparisons of regional income and for topics such as poverty, rural-urban and regional (local) differences and measuring inequality, and as a support for the economic and social policy decisions by local and national governments and institutions. Evidence of sub-national spatial differences in consumer price levels has been observed in large countries², such as Brazil, India, Australia, the United States, as well as in smaller countries³ like the United Kingdom, Germany, the Philippines, and Italy-

Nevertheless, within the development of ICP program, all the ICP rounds, up to the 2005 round, left unresolved the question of within-country differences in price levels (Deaton and Dupriez, 2011). However, during the 2011 ICP round, the Technical Advisory Group (TAG) devoted a specific agenda item of its 2nd meeting held in February 2010 to the Sub-national PPPs. In that occasion, two papers were presented and discussed: the first refers to a research proposal on the topic (Biggeri et al., 2010); and the second refers to a case study of the computation of PPPs in Asia and Pacific Region and in particular for the Philippines (McCarthy, 2010). This experiment, conducted with the participation of Dikhanov (Dikhanov et al, 2011), was surely successful. It paved the way for further experiments in the Asia and Pacific Region under the umbrella of the Asian Development Bank (ADB), which is responsible for coordinating the Asia-Pacific region's in the ICP rounds (Capilit and Dikhanov, 2015 and 2017).

Moreover, it is important to underline that Eurostat is implementing a program to modernize price statistics and to integrate temporal (Harmonized Index of Consumer Prices -HICP) and spatial (PPP) price statistics (Walschots, 2013) that is one of the pillar of its project "Multipurpose Price Statistics" (MPS), launched by the European Commission.

In the recent years, more and more academics are carrying out interesting experimental estimations of sub-national PPPs yet up to now few countries have produced official indexes of spatial prices or have carried out experiments to this aim. However, several countries, including China, India, Indonesia, Italy, the Philippines, South Africa, United Arab Emirates, and Vietnam have expressed interest in compiling PPPs for comparisons of prices and real incomes across

¹ The first official measure of inter-area differences in the cost of living was the standard budget of the Family Budgets program of the BLS of the US, developed in the 1940's.

² Some quotations of works on large countries are reported here: Brazil (Aten, 1999), India (Deaton, 2003; Coondoo et al., 2004; Majumder et al., 2015), Australia (Waschka et al., 2003; Mishra and Ray, 2014), the United States (Koo et al., 2000; Aten, 2005, 2006)

³ Some quotations of works on smaller countries are reported here: as well as in smaller countries like the United Kingdom (Fenwick and O'Donogue, 2003; Wingfield et al., 2005), Germany (Roos, 2006), the Philippines (McCarthy, 2010, Dikhanov et al., 2011), and Italy (Biggeri et al., 2008; Biggeri et al., 2016; Istat, 2008, 2010).

regions within these countries. Recognizing the surge in interest in this field, one of the Research Agenda items for ICP 2017 Round is devoted to the CPI-ICP Synergies and Sub-National PPPs, for which the “Task Force on Country Operational Guidelines and Procedures” has been established.

The Governance Bodies of the ICP have identified the following research topics for Sub-national PPPs:

- Examine the Asian and African experience with sub-national PPPs and formulate guidelines on the use of the CPI product lists and prices to compute sub-national PPPs;
- Analyze temporal consistency of CPI and sub-national PPPs; and
- Expand work on sub-national PPPs to more countries.

The Task Force in its first meeting, held in October 2017 - after the discussion based on the documents presented - agreed on a set of initial tasks. For Sub-National PPPs the initial tasks are: “Write up on subnational *consumption* PPPs. This should provide a broad introduction to the topic and focus on how to better sell the idea of ICP PPPs. The text should summarize actual and potential uses of sub-national PPPs. It should also include information on ‘big ticket’ items like housing, and provide example of uses, e.g. for poverty analysis”.

2. Evidence from the review of literature and experiments on Sub-National PPPs

Biggeri et al. (2016) presented a review of various studies conducted by national and international statistical organizations and by individual researchers. In surveying international practice, it can be seen that only few countries produce official indexes of spatial prices, without any international framework for comparison. In order to meet the growing demand for official estimates of PPPs at a sub-national level, different countries have undertaken preliminary experimental exercises⁴.

With reference to the use of CPI data to compute Sub-National PPPs, two ways are followed. In some countries, the computation is based on data taken directly from the consumer prices collected from retail outlets throughout the country for the compilation of the Consumer Price Indices (CPI). In other cases additional data are collected through purpose-designed regional price level surveys for items of expenditure where suitable CPI data were not available (mainly clothing, furniture, electrical goods and travel).

The Bureau of Economic Analysis is producing annual Regional Price Parities (RPPS) for the purpose of making price comparisons across different metropolitan areas in the United States of America and computing the price-adjusted estimates of regional personal income (Aten, 2016). RPPS are computed for 50 States and the District of Columbia and 366 Metropolitan areas. These estimations were computed by using detailed CPI price data as the principal source supplemented with data on rents. The item level price data are aggregated using both Gini-Elteto-Koves-Szulc

⁴ It is important to note, that Statistics New Zealand (SNZ) has been looking in the possibility of carrying out spatial comparisons of prices since 2005 and it has appointed two experts to develop a methodology for constructing Spatial Cost of Living Indexes. The experts’ report (Melser and Hill, 2005) deals with all the issues and offers advice on constructing sub-national PPPs, in particular on the use of CPD methods, thus providing a reference text for implementing PPPs in other countries. However, SNZ has never disseminated data on sub-national PPPs to the authors’ knowledge.

formula (GEKS) and various Country-Product-Dummy (CPD) models including a modified version of the weighted CPD method enhanced by the inclusion of various hedonic characteristics to account for quality differences that might be reflected in the observed price data. For higher levels of aggregation (several expenditure categories), above the elementary index level, the Geary-Khamis method is used, mainly due to the additive consistency property of the index.

An example of the use of CPI data and the data collected by ad-hoc surveys is provided by two experiments conducted by the Italian Statistical Office (Istat) in 2008 and 2010 to compute Sub-National PPPs for 20 Italian regional chief towns (Biggeri et al., 2016). The ad-hoc surveys were designed and carried out for the product groups “Clothing and Footwear” and “Furniture”. The computation of the Sub-National PPPs were obtained by means of the GEKS formula. In the second experiment, spatial comparisons of actual rents was carried out using CPD model and Household Budget Survey (HBS) data that includes some detailed information about the characteristics of the dwellings. This experience of conducting ad-hoc surveys is useful for countries where the CPI data do not adequately cover all the products and services consumed by the households, however is costly.

Also for this reason, Istat is now building up a database suitable for constructing sub-national PPPs on a regular base, taking into account the possibilities coming from the Multipurpose Price Statistics (MPS) Eurostat project. Two of the pillars of the project are the integration of the spatial and temporal dimensions of price statistics and the modernization of data collection by widening the use of electronic devices and scanner and web data (scraped by automatic procedures and robots).

As mentioned in the introduction, the biggest experiments under the ICP framework is the work by the Asian Development Bank (Capilit and Dikhanov, 2015 and 2017). The first completed experiment was carried out in the Philippine (McCarthy, 2010; Dikhanov et al, 2011), aimed at analyzing the plausibility of integrating the ICP with the Philippine CPIs by computing sub-national PPPs using regional prices and expenditure weights from the CPI. The purpose of the research study was to establish whether the prices collected for the CPI could be used to provide reliable estimates of price levels for a range of products in each region and to verify if the results are consistent with the information obtained from the ICP process. The CPD method was used in elementary aggregation. The quoted documents describe all the necessary phases for constructing regional PPPs underlining the main issues and solutions for overcoming them, both concerning data preparation and methods of index computation and aggregation. This experiment is surely a point of reference for formulate guidelines on the use of the CPI product lists and prices to compute sub-national PPPs. In fact, as showed during the first meeting of the Task Force, more recent experiments on the integration of PPP and CPI works and computation of Sub-National PPPs carried out by United Nations Economic and Social commission for Western Asia (Skaini and Samara, 2017) and by Statistic South Africa (Kelly and Ranoto, 2016), followed a similar strategy.

Actually, in order to estimate consumer Sub-National PPPs alternative approaches have been proposed which are based on the Engel’s Curve and/or a demand system model applied to data collected with sample surveys on household consumption expenditure. Instead of price data, this approach make use of specific unit values obtained by the above-mentioned surveys. To the

authors' knowledge, this approach was used for the first time by Coondoo et al (2004) who reported results obtained for India. The authors explained that their procedure follows the CPD methodology in a generic sense as price equations essentially share the hedonic feature. Majumder, Ray and Sinha have continued to work on this approach in order to compute regional PPPs for India, Indonesia and Vietnam, with the aim of proposing a unified framework for estimating intra and inter-country PPPs, and obtained interesting results (Majumder et al, 2013a, 2013b and 2014; Mishra and Ray, 2014, and Majumder and Ray, 2016). In the last paper, the authors go beyond the usual regression based CPD approach and compute PPPs based on the concept of True Cost of Living Index. The parametric approach, where a particular parametric specification used for the demand system, in the paper is anchored on the Quadratic Almost Ideal Demand System (QAIDS). The methodology used in the paper is then related to some of the known variants of CPD system. The paper reports spatial price indices also for the rural and urban areas. The empirical contribution includes a systematic comparison between the spatial price indices from alternative models, and the analysis of sensitivity of the spatial price indices to the choice of commodities and estimates of rural-urban differentials in spatial price indices. However, much of their work focuses purely on food price index numbers as the household expenditure surveys provide reliable unit value measures for food items.

This approach is surely of interest for the topic of sub-national PPPs estimations and should be extended to other countries to check its validity and to compare the results with the findings obtained with other methods of computation. However, wishing to use it in the framework of ICP, we have to bear in mind that the results here are based on unit value prices from household surveys and not on prices collected for the CPI. Moreover, the HBS carried out in many countries very frequently do not collect data for both expenditures and quantity necessary to compute the unit value and in this cases the estimation of the unit value is possible only applying models that have some problems of estimation.

Based on the work in this area to date, it is evident that the conceptual framework provided by the ICP can be used to produce spatial price indexes and the sub-national PPPs. That is, the theory underlying international comparisons can be used directly in producing sub-national PPPs and the most promising approach is to compute *Sub-national household consumption PPPs* (HC-SN-PPPs) using the data collected by the National Statistical Offices (NSOs) for compiling CPI and the use of Country Product Dummy (CPD) methods.

On the other hand, many advantages can be obtained by using CPIs data and CPD methods for computing sub-national PPPs:

- i) The National Statistical Offices (NSOs) can satisfy requests for sub-national spatial price indexes, which are important analytical inputs for national and local policy makers, economists, academics and international organizations.
- ii) The computation of sub-national PPPs within the process of CPI collection of price data will increase the awareness of ICP at the country level. In fact, for the time being, the uses of PPP at the national level are less clear and are currently somewhat limited. Providing familiarity with ICP methods and processes, without compromising or disrupting regular statistical priority programs of NSOs will convince them also on the importance of the computation of the National PPP for ICP.

- iii) The ICP and the NSOs can save money and time. In the first phase of the implementation, significant work could be needed to prepare the price database for CPI, Sub-national PPPs and National PPP for ICP. It may be that the CPI price data are collected in a manner that makes it difficult for estimating spatial price differences. However, in the following rounds, the ICP surveys could reduce the heavily collection of specific data for the purpose of the ICP in the countries that participate to the Program, because no or few additional price data collection is required beyond CPI data.
- iv) The integration of price data activity will increase the synergies between CPIs, Sub-national PPPs and ICP PPP, and will allow their simultaneous computation under a unified framework. In this way, the ICP PPP could be computed frequently, may be annually, that is a strategic long run objective of the Program.
- v) The unified framework could allow the construction of dynamic Sub-national PPP consistent with CPI movement in time domain and consistent with ICP comparison in spatial domain.
- vi) The integration of the CPI and ICP activities will also enhance their application for additional uses at the national and sub-national levels.

3. The current and potential uses of Sub-national PPPs

ICP Research Agenda states that it is difficult to prepare a document outlining the uses of ICP results and demonstrate their relevance and usefulness at the national level (quoting only a paper by Ward dated 2009). Hamadeh, in a paper published one year ago (Hamadeh et al., 2017) provided a summary information on the institutional uses and research uses of ICP PPP, with more extended information on the uses of Eurostat-OECD data.

The potential uses can be roughly identified following the uses of PPP mentioned in the ICP documents and in Hamadeh et al. paper. The national and sub national policy makers could be interested to use the sub-national PPPs for development and competitiveness analysis, that is for cross sub-national area comparisons of economic data computing the real per capita GDP, Consumption by households and by government, investment and so on (that is for all the Sub-National Accounts components). The SN-PPPs inform on the price levels of the different areas and can be useful for spatial price level analysis (to verify the market structures and eventual price distortions) and for inequality and poverty analyses, allowing to assess the real material well-being of people in the different territorial areas and to measure the real economic poverty indicators. The national policy makers could use the SN-PPPs also for operational purposes i.e. to decide the allocation of financial funds to support the development of the sub-national areas and/or to reduce economic disparities, the poverty situation and the number of poor. Moreover, they could be interested in the computation and comparisons among the different sub-areas (including urban rural areas) of real disposal income of the households, earnings, labor costs, productivity, health education, etc.). Economists and individual researchers are interested in using the sub-national PPPs for development, inequality and poverty analyses that involve spatial comparisons for which the different level of prices are important.

Considering, the different uses of sub-national PPPs above-mentioned, it is evident that to be satisfied them it should be necessary to compute not only the *Sub-national household consumption PPPs* through the CPI data, but also Sub-national PPPs for the GDP and for each

component of GDP. However, now days, because not many countries have national accounts at sub-national level, we cannot propose to do it at this stage.

The US BEA stated clearly the purpose of the computed RPPS. In fact, In April 2014, the RPPs and the price-adjusted estimates of regional personal income became official statistics of the United States Bureau of Economic Analysis (BEA), and will be published annually on a regular basis (Aten and Figueroa 2015). The RPPS are computed for several expenditure categories to highlight the real per capita income growth and levels. Various US institutions used RPPS to assess poverty levels and income inequality indicators within the country to be used for family assistance programs. Many researchers used the RPPS to analyze the territorial distribution of the personal income in US (see for example Jollitte, 2006). Frequently, the researchers used in conjunction both the RPPS and the spatial price index computed by using a rent spatial index as a measure of the differences in the cost of housing (Renwick et al., 2014).

Researchers have extensively used PPPs computed by Istat for the capital cities of the Italian regions. Firstly to verify if the spatial price indices reshuffle the Italian income distribution (Pittau et al., 2011) and, recently to do “real” comparison of the estimates at local level in Italy of the household consumption expenditure (Secondi and Marchetti, 2017) and of poverty indicators (Giusti et al., 2017; Biggeri and Pratesi, 2017). The interest of these last researches is on the fact that the sub-national PPPs are used within the more and more frequent estimations of the household consumption, income and poverty indicators (and poverty lines) at local level by using the Small Area Estimation (SAE) methods conducted to satisfy the needs of the policy makers.

The importance of these researches, carried out by adjusting [the estimates for spatial differences in price levels by](#) using regional Purchasing Power Parities, is evident by one of the results obtained for the Italian provinces in the year 2012⁵, highlighted in the figures (cartograms) below reported.

The researches point out two main issues for the use of available Sub-national PPPs at local level. The first is due to the lack of sub-national PPPs estimates at detailed territorial level, the researchers do the estimations at sub-regional level using different spatial indices based computed on the base of the cost of housing (regional median monthly rent per households (RMRHs), which showed large differences at the territorial level in Italy in 2012. We can see from figure 2 that the adjustments of the HCR with RMRHs indices reshuffle largely the Italian poverty indicators at regional level.

Obviously, the differences in the cost of rent for housing are lager at the provincial level. In fact, the summary results of the spatial variability of the median monthly rent per household (RMRHs) at provincial level, normalized to Italy =1, are max =1.67; min = 0.32; C.V. = 0.3.

⁵ The two figures, 1 and 2, reported in the text refer to the year 2012 because is the year used in the mentioned papers for which sub-national PPPs were available. We will up-date the Fig. 2 at the 2015 as soon as possible.

Fig. 1. The estimations of HCR at provincial level in Italy and their adjustment by regional PPPs – Year 2012

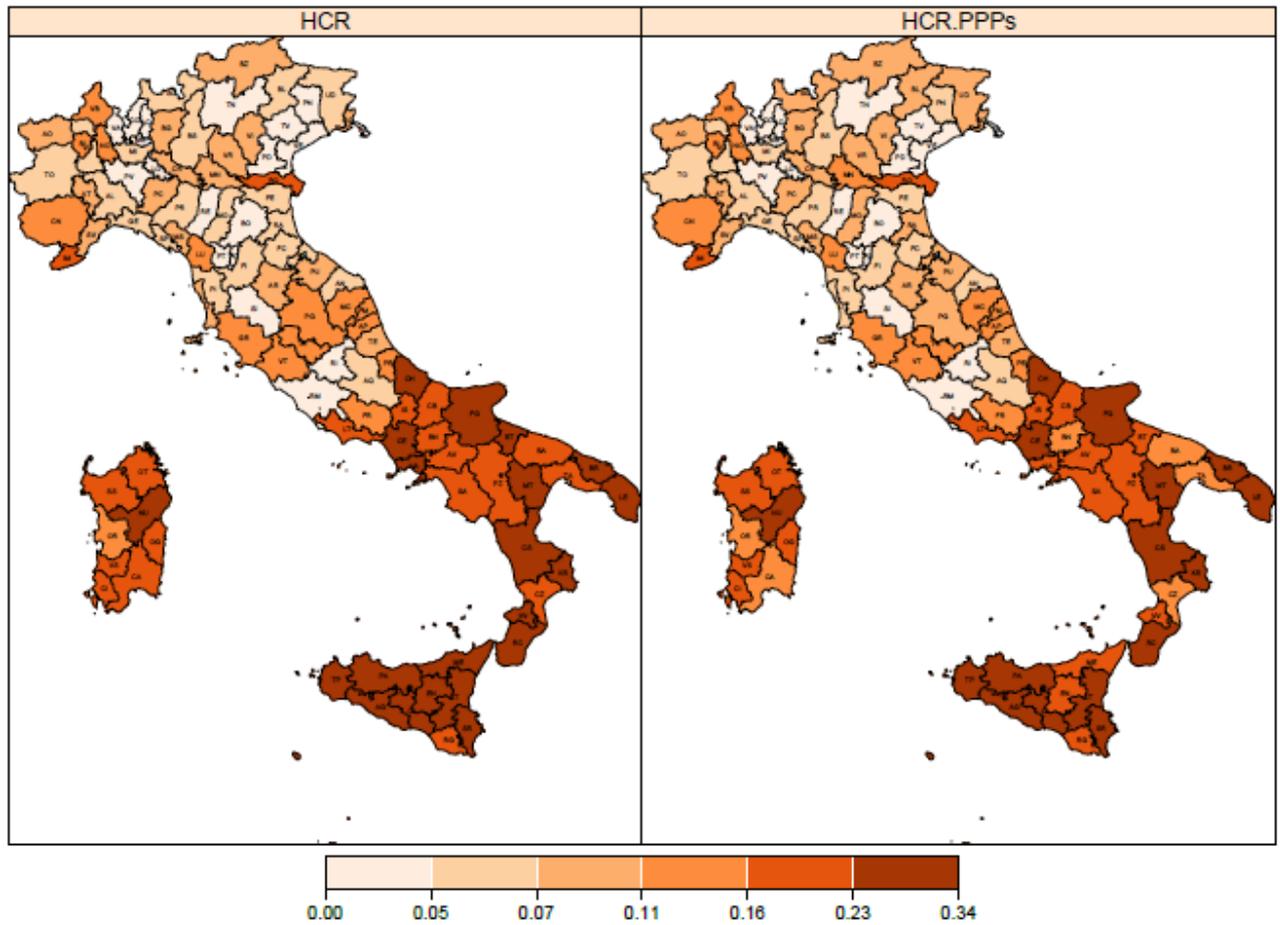
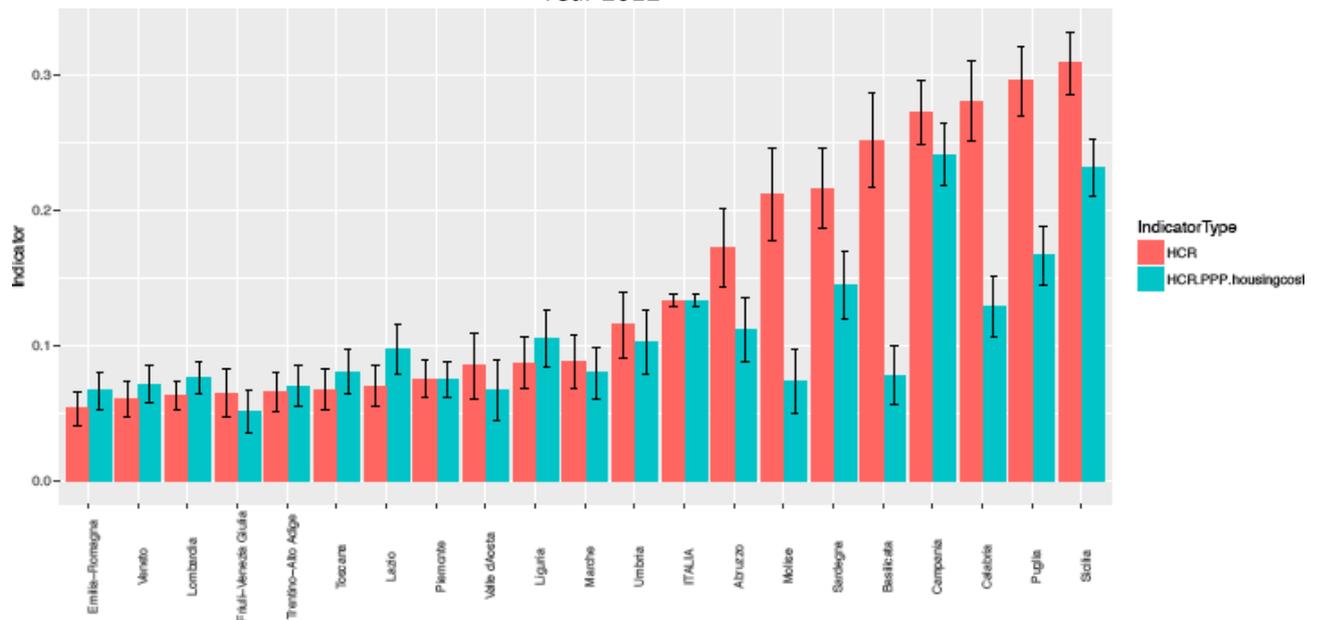


Fig. 2 The poverty incidence computed using consumption data adjusted with regional RMRHs Year 2012



The second issue is linked to the need to estimate poverty-specific sub-national PPPs for the comparison of poverty indicators among the different areas. In fact, we have to consider that the consumption behavior of individuals and households change at the different levels of income. At the various percentiles of the income distribution, we find households purchasing different baskets of goods and who have different consumption patterns: the consumer behavior of households varies for quality of the commodities, channels of distributions, location of the markets and, obviously for prices paid.

For these reasons, the authors suggest that Istat arranges experiments to compute: i) estimates of sub-national PPPs for some quintiles of the mentioned distributions; ii) estimates of poverty-specific sub-national PPPs following the research roadmap already established at international level and discussed in the ICP. The experiments could be conducted taking into account also the data that Istat is obtaining by tracing the markets where the households purchase the goods and services in the Household Budget Survey data collection process.

Besides the World Bank and the EU Commission, strengthen the importance to estimate the income and poverty indicators at local level. In fact, in conjunction with the statistical agencies of EU member states, a Project to produce by Small Area Estimation methods Poverty Maps at very detailed territorial level within some European countries in order to identifying the poor accurately (Simler, 2016). As written in the report at page 29 of Simler (2016), during the next phase of the project, new estimates of poverty in small sub-national geographical areas are also to be provided, and refinements to the risk of poverty methodology that take into account sub-national variations in the cost of living across these areas and countries are to be investigated. Actually, to our knowledge, a first spatial and small area approach to adjust for sub-national cost of living has been proposed and conducted in Romania (De Azevedo and Rodas, 2018). The proposal to use Paasche index that prices the household's consumed bundle using fixed prices and yields at constant price total, and rent data, with application to Romania.

It is evident that in preparing the guidelines for the preparation of the CPI data-base, we need to take into account of the mentioned works and of their proposals.

4. Conceptual framework of Sub-National PPPs

In the framework of CPI and using only data collected within the process of compiling CPI, only *Sub-national household consumption PPPs* (HC-SN-PPPs) can be computed.

The National Accounts should be considered as the base of reference and the component of GDP of our interest, on the expenditure side, is the "Individual consumption expenditure by households". This component is defined as the final consumption expenditure incurred for products and services that households purchase to satisfy their individual needs. It does not include the provision of individual services, particularly health and education services, to households by government and Non-Profit Institutions serving Households (NPISHs).

For the compilation of the HC-SN-PPPs, that could attract the interest of the NSOs, it is necessary to define their structure, usually done through a pyramid approach, to building up PPPs at various levels, starting from the list of products and services for which the process of CPIs production collects

prices and estimates the system of expenditure weights. Obviously, this would be based on the practices of the NSOs. Traditionally, most of the NSOs mainly use probability or non-probability sampling in the production of the CPI which often can be better viewed as composed of separate surveys, each covering different aspects of the index (outlets, products, prices, quantities and weights). Taking into account the objectives of the CPI, the characteristics of the variability of the prices' movements and the operational and administrative reasons, the framework for the construction of the CPI refers to a kind of ideal *multistage stratified sampling design*.

The *elementary item* of population is a given product or service purchased for consumption by the households in a given outlet for which prices are collected, which is also the elementary expenditure aggregate. These data are used in computing the elementary price index. For computations at higher levels, it is necessary to know the relative importance of the items in terms of expenditure for consumption made by households.

The population of items is considered as structured by different hierarchical levels. For operational and administrative reasons, the territory of the country may be partitioned into *geographical areas*, as regions and provinces, and into *local areas* - i.e. municipalities- which may be grouped into different geographic regions and constitute the first stage of hierarchical structure of the population, while the *outlets* are the elements of the second level of the hierarchical structure. In the product dimension, the elementary aggregates (considered as product strata in the ideal sampling) are aggregates at different levels, following the COICOP hierarchical classification. In general terms, the Laspeyres based overall CPI may be obtained by successive aggregations of the elementary indices following different 'paths'.

The list of products to compute the SN PPPs should be as large as possible considering the detail of CPI data collected. The products and services should be representative of different groups of products and services for which it is important to compute the average level of price, because they satisfy different consumption needs. The list of products and services and the groups can be those used for the compilation of the CPI or those used in the compilation of the PPP-ICP.

Two important requirements that have to be satisfied to compute the SN PPPs for each product and service are the *representativeness* and *comparability*. Though the issues of comparability, representativeness and importance of the products are likely to be less serious issues in the context of sub-national PPPs in comparison to the computation of the PPP ICP, they need to be considered carefully in making use of the CPI data. For the compilation of the HC-SN-PPPs, it seems more important to consider the representativeness and the importance of the expenditures for each item, a principle generally followed by the NSOs.

Computational schemes below and above the BH levels must be specified preparing the list of minimum information that is necessary to collect that could affect the level of prices (kind of areas: territorial administrative areas, urban and rural areas; characteristics and quality of product and services; types of market and outlet; and so on). These schemes or frameworks will be very useful for organizing the surveys of data, whether NSOs are using probabilistic sampling methods or not.

To make multilateral price comparisons, the Sub National PPPs should satisfy the property of *transitivity*. Usually in the ICP context the transitivity of the PPPs is satisfied applying the GEKS formula. However, other methods could be follow (Rao et al., 2017). In any case, it is a sound

practice to publish direct bilateral PPP comparisons, because they are of considerable interest for the users and practitioners. To satisfy the needs of national and local policy makers that want to use the SN PPPs, three items are important:

- Consider the areas as small as possible (local areas).
- Compile the PPPs separately for urban and for rural areas.
- Collect data on prices and expenditures in order to compile also the poverty specific PPPs.

5. Compilation of Sub-National PPPs – data requirements

In the previous sections, we stated that the objective of this project is to construct HC-SN-PPPs by using CPI and related expenditures data and, at least conceptually, using methods identical to those used for the computation of PPPs in the ICP. Therefore, the first and most important step (phase) in constructing the HC-SN-PPPs is the data preparation based on CPI data and other existing data at country level.

In order to identify an efficient way and methodology that allow effectively use of the existing data, a lot of specific information on the available data and related database in the countries must be obtained by the NSOs, depending also on the objective of the PPPs computation for the region-to-region and/or rural-urban comparisons. The nature of the data available is likely to dictate the choice of the methods to be used for the aggregation of the collected prices.

The information on the structure of CPI and the collection of prices should be, in summary, the following:

- Coverage of the CPI by territorial area (including the classification between urban and rural areas)
- List(s) of products and services adopted (“basket of products”); the list may be only one, that is the same for all the areas or may be not identical in different areas; it is necessary to specify the products included in each elementary aggregate or basic heading.
- Product code and key identifiers, that is description of the characteristics that identify each product and service to be priced in terms of technical features, brand, model, packaging and other aesthetics features
- Classification of the products and services for type of expenditures (COICOP or other classification)
- Classification of point of sale by type of market (open markets?) and type of outlets where the price are collected
- Sampling design to select the points of sale or outlets (probability sample or non-probability/purposive sample)
- Period and frequency of price collection
- Method of collecting prices for each product. This aspect is quite important because multiple types of survey are frequently used by NSOs and may be that this affect the aggregation methods of the collected prices. For example, the prices of products and services can be collected at local level and/or at centralized level. Specific questions can raise when the prices are collected at local level: are the price collectors constrained to find the specific product described by country’s NSO or they have the option of selecting the actual product to be priced within a set of broad parameters? In the latest case, is the description of the priced products registered with a new product code?

The information on the estimation of the system of expenditure weights should be, in summary, the following:

- Source(s) of data used: Households Expenditure or Budget Surveys; Surveys for National and Regional Account compilation; Retail Surveys and so on
- Methods of estimation of the weights
- Level of disaggregation: availability of weights for each product and/or elementary aggregates by type of outlets and/or by territorial area and or at higher level
- Periodicity and method of updating the system of weights.

The main objective of the data preparation is to examine the extent to which CPI price data could be used to compare price levels between areas within the country and thus organize data for the phase of computation of the HC-SN-PPPs.

As for the methodology followed by ICP, the CPI database must be carefully examined, by using also the previous requested information on the collection of prices, with two objectives: i) to evaluate the nature and extent of overlaps of products to identify those products that could be compared directly across territorial areas; ii) to verify the availability of prices for each product of the aggregation used (and for Structured Product Description of products within the Basic Heading (BH) level used for the implementation of the ICP in the country). This use of “diagnostics” of price data should assure that products that appeared to be the same are actually identical in practice and their prices not unduly influenced by differences in key characteristics. Moreover, analyses of the consistency of variability of territorial area price levels and of the relationships between product prices across product groups should be carry out.

At the end of the data preparation phase, two matrixes of data must be prepare. A matrix of prices by products and territorial area must be prepared, at the most detailed level. The classification of products must be as much as possible comparable with that used at level of the ICP Basic Heading. To achieve this objective it may be necessary to carry out specific data collection for some groups of products.

A matrix of expenditure weights, or other kind of weights, at detailed level by product groups or basic headings and territorial areas used for the compilation of CPIs is needed. Also, in this case it is necessary to verify the correspondence of the system of weights both with the national accounts household data and the expenditure weights used for the aggregation above the BH level in the ICP exercise.

It is worth nothing that some issues may be encountered in the preparation of the data. In fact, many NSOs do not collect data for rural areas and may be none of them collect information on prices paid by the poor. Another issue that arises in the case of estimation of the system of expenditure weights used for the CPI which may be not split by territorial areas. In fact, not all the NSOs produce Regional Accounts and Household Expenditure or Budget Survey (HES), and in any case they do the estimation of the system of expenditure weights which are revised once in five years, since these weights are used in the compilation of fixed base CPI index.

Finally, two further items to be studied must be pointed out. First, a proposal should be suggested for the treatment of dwelling cost for effective rent and or imputed rents and for the rate of the mortgage loan for the purchased dwellings. A specific task force has been appointed within the ICP

to discuss the problems of estimating PPPs for housing. There may be some suggestions that could be used for subnational PPPs. In Italy, there has been some experience in the treatment of rents for dwelling costs at sub-national level. A summary of these experiences can be presented at the next meeting of the task force if there is interest on them. See papers presented at the first task force meeting. Second, we have to discuss to the possible use of scanner data, clarifying which are their main features and how they may improve CPIs and Sub-National PPPs computation.

6. Compilation of Sub-national PPPs – methods for aggregation of price data and PPPs Basic

Headings data

Multilateral methods used in aggregating price data from item level to the basic headings and from basic headings to higher levels of aggregation are well canvassed and there is no need to repeat these methods. The use of CPD and its variants for aggregation at the basic heading level and the use of GEKS, Geary-Khamis and weighted CPD methods may be used for aggregation above the basic heading level.

However, if there are attempts to make use of scanner of point-of-sale data, then it may be necessary to conduct further research on how scanner data could be used for comparisons of prices across different regions. This is an area of research still in its infancy.

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