CPI research agenda

The first guidance developed on compiling CPIs was drafted and issued by the ILO in 1987; however, countries required concrete guidance on how to address compilation issues. Without clear guidance, countries developed different methodologies. In 2004, the first comprehensive manual on CPI concepts and methods was published by the IWGPS with the ILO as lead agency. While the 2004 manual attempted to clarify and standardize several methodological issues, it was not possible to arrive at a consensus on the best methods for the treatment of several compilation issues. Since the 2004 manual new issues have arisen because of rapidly evolving technology and the availability of new data sources.

The purpose of this research agenda is two-fold. First, to address those outstanding compilation issues to develop and present more concrete guidance. Second, to address advancements in technology and data sources.

Below lists key topics that require further research and discussion not only to develop clear guidance for CPI compilation, but also to enhance the relevance of the CPI to data users. Each of the listed topics should guide future agenda items for upcoming meetings of the UNECE/ILO Meeting of CPI Experts and meetings of the Ottawa Group. The IWGPS members have agreed to take the lead to ensure these issues are addressed by the Meeting of CPI Experts and the Ottawa Group.

To begin, below are listed the key priority research areas defined for the System of National Accounts and a short overview of how CPI measurement could be enhanced.

Digitalization

The paper, *Measuring Consumer Inflation in a Digital Economy* (Reinsdorf and Schreyer, 2017), discusses in detail the problems in measuring the welfare effects of the digital economy, including the effects of services provided for free (or at least without any direct payment) on the internet. There is significant need to identify how CPIs can better reflect and incorporate digital goods and services. Work is needed to clarify the conceptual issues and develop methods that better measure the gig economy in the CPI. Issues include, but are not limited to, defining and identifying the goods and services (including different types of web-purchases, services for free, and shared economy services).

Economic well-being and sustainability

Measures of well-being attract much interest from policy makers, media and the public at large. The integration of time use with the CPI is an issue that needs to be addressed. Ongoing research has focused on how time allocation information is needed in order to better measure household welfare change.

Stiglitz, Sen and Fitoussi report on the measurement of economic performance and social progress (2009). The Reinsdorf and Schreyer paper focuses on the welfare effects of the digital economy, but also outlines key problems in using the CPI in measuring well-being in general. The paper identifies three reasons why the CPI will overestimate the cost-of-living and hence underestimate progress in real welfare: 1) insufficient adjustment for quality changes; 2) inclusion of truly new products; and 3) disregarding the appearance and use of free products. Solving these issues involves addressing both conceptual and practical measurement issues. In a COLI context the theoretically correct way of including truly new products and products offered for free would be the use of estimated “reservation” or “shadow” prices. This can be done in theory and in research studies. However, for the regular production of the monthly CPI, this is usually not feasible and other approaches must be implemented. According to Reinsdorf & Schreyer the welfare effects would be very uncertain and difficult to measure, and established measures of GDP and CPI should not be extended to include estimates of welfare effects. They conclude that if the aim is to measure welfare, it would be better to develop special measures for this purpose. The issue of a CPI for measuring well-being is not restricted to the effects of digitalisation, but could also include discussion of the coverage of the CPI and treatment of all types of goods and services.

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services provided for free, perhaps also public goods such as education, health, safety, parks, etc. The issue relates to the discussion of COGIs vs COLIs and conditional/unconditional COLIs, where additional experiences and guidance would be useful. It may be useful to invite experts from other areas of official statistics to discuss measuring welfare and well-being.

**Globalisation**

In the discussions about the problems in measuring globalisation the issue of having suitable price indices (PPIs, XMPIs or CPIs) for the deflation of international flows of goods and services is often mentioned as a major challenge. Work could include conceptual clarifications as well as practical studies and development of guidelines on measurement. There will be need to coordinate and align with the SNA/BoP standards, for instance on whether to classify different types of purchases on the web as goods or services.

Below are listed the key priority research topics for CPI compilation:

**Data sources**

1) **Use of scanner data for producing CPIs**

Scanner data may lead to more and better official price statistics, efficiency gains, and reduced response burden. Scanner data can complement and, in some instances, replace traditional approaches to collecting data for compiling the CPI. The use of scanner data challenges traditional interpretations/applications of concepts, and raises both methodological and practical issues related to CPI production. Areas where more work is needed include: improving calculation methods for price indices based on scanner data; combining scanner data and data compiled through traditional methods; aggregating scanner data into higher-level indices; using scanner data for sampling purposes and estimating weights; classifying scanner data; dealing with quality changes (e.g. implicit versus explicit quality adjustments); and comparing price indices based on scanner data with price indices based on traditional sources. A growing number of countries have implemented scanner data in the routine production of their CPI, and the practical experience gained can be used to assist those countries who want to begin using scanner data. Practical experience can be shared on assessing the quality of scanner data, IT and software issues, costs and benefits of using scanner data, and organizational and legal issues (access to data, cooperation with scanner data providers, etc.). Research and testing on expanding the use of scanner data to include other products, such as electronics and other items with high model turnover. There is a need for developing methodologies and frameworks around scanner data, for instance to ensure consistency in coverage or in the treatment of replacements. There is also no generally agreed quality assurance framework developed particularly for scanner data. Scanner data offer opportunities to both countries with developed statistical systems and countries with less developed statistical systems.

2) **Web prices**

Internet shopping continues to grow in importance. Traditional outlets have established an online presence and there is a growing number of internet-based outlets. There is need to expand price collection and the outlet sample to include these new types of outlets in the CPI. First, for those outlets that have both an online and physical presence, there is need to determine whether the prices charges are the same or different. Second, there is need to identify the web-based outlets and the goods and services available. Experiences with the collection of data from internet-based outlets should be shared to help develop guidance.

3) **Web scraping**

Web scraping has huge potential for CPI compilation in terms of real time access to a large and growing amount of information, but also raises methodological and technical challenges. The drivers for the change towards web scraping includes competition from other providers of alternative measures of price changes, the possibility of producing timelier and more frequent CPIs, more efficient production and reduction of costs. There is a need for exchanging practical, technical and software experiences
associated with web-scraping and other methods for collecting or harvesting data, calculation formulas for the regular CPI and/or for compiling superlative indices, analysis of the performance of web-scraped price indices over time and comparing with indices based on traditional sources, how to maintain the sample, treatment of replacements and quality changes. There have been discussions around using weighting various data sources. Obtaining expenditure weights for web scraped prices continue to be a challenge, and there is no obvious way of obtaining this information. More research and practical experience in this area would be useful. Countries may develop in-house software or buy this from a provider of software for web scraping. Both ways have their advantages and disadvantages that countries must consider. Practical/legal issues concerning access to web scraped data; how to ensure good cooperation with the owners of the data; vulnerability - becoming too depend on one or a few owners of data, and ways to deal with this and reduce possible risks.

4) Administrative data
In addition to scanner data and web prices, future work on data sources should also address the use of administrative data sources. Depending on national circumstances, data on different goods and services may be available from administrative sources, for example in the areas of transport, housing, social protection, health, or education.

5) Synergies between CPIs and PPPs
CPIs and PPPs serve different purposes. CPIs measure price changes over time, generally month-to-month, primarily at a national level. PPPs, on the other hand, measure price differences across space, generally countries, at a given point in time. The temporal and spatial focus of CPIs and PPPs has resulted in different production infrastructures for the two indices. However, there are important synergies to be captured through the integration of data collection and other processing activities. Both CPIs and PPPs require basic price data for household goods and services, so economies of scale may be realized through a joint data collection process, as well as common data processing and quality assurance procedures. Examples of relevant topics include, but are not limited to, the following: country experiences with establishing synergies between PPP and CPI data collection activities; harmonization of classification schemes for PPPs and CPIs; establishing overlap in PPP and CPI product lists; establishing common data processing and quality assurance processes; and applications in sub-national price comparisons.

Index calculation methods

6) Formula for calculating higher-level price indices
Arithmetic aggregation is used by almost all countries for calculation of higher-level price indices. Is this the best solution? What are the alternatives, in terms of geometric aggregation or aggregation by other types of averages or by use of indices that apply explicit estimates of substitution elasticities (such as the CES/Lloyd-Moulton price index)?

7) The use of target price indices for the CPI
It is useful to have a measurable target index for the CPI. The target index can be used as guidance for deciding calculation methods and practices for the regular CPI and for measuring potential bias. Empirical research can address issues including identifying potential target indices (Walsh, Fisher, Törnqvist, CES, etc.) and how to apply these formulas in practice.

8) Retrospective calculations of superlative price indices
Retrospective calculations of superlative price indices are very useful for analytical purposes and to serve as a benchmark to assess the quality of the CPI and quantify potential bias. A limited number of countries have begun to compile superlative price indices. A sharing of experience can be used to develop best practices.

9) The use of long-term and short-term links
The long-term/short-term link approach has been used in Sweden for many years and has now been adopted by the US. This method facilitates calculating the long-term links of the CPI by use of superlative index number formulas (Sweden uses Walsh and the US a CES index). The use of long-term and short-term links was mentioned by Erwin Diewart\(^2\) at the 2018 CPI expert group meeting as the best way to get around the problem of dated weighting information. A growing number of countries will begin to explore this approach. Research, discussion, and practical experiences can be shared to identify the advantages and disadvantages of this method.

Weights

10) **Price-updating of expenditure weights**

It is left to countries to decide whether to price-update the expenditure weights or not. Since price updating may have significant influence on the overall CPI this is a source of international incomparability of CPIs. It would be useful to discuss empirical studies that assess the magnitude of the effect of price-updating and to identify whether clearer guidance could be developed.

Services

The measurement of services in the CPI continues to be an issue of great importance. Any work on services should be coordinate with the Voorburg Group on Service Statistics.

11) **Measuring services in the CPI**

Defining and pricing services continues to create issues for CPI compilers. Additional research and sharing of practical experiences on how to define and price different services are needed to better define best practices and develop guidance. One key issue of note is how to adjust for changes in the quality of services. Shared economy services (Uber, Airbnb, etc) also have grown significantly and should be incorporated into the CPI. Timeliness is also an issue. Shared economy services have emerged quickly and often NSOs incorporate these services into the CPI with a considerable delay. The issue of bundled telecommunication services and their treatment in the CPI continues to create issues for compilers. All these issues raise user concerns that the CPI becomes less representative and reliable.

12) **Insurance and financial services**

Insurance and financial services (FISIM) continue to pose measurement issues for the CPI. With the new COICOP, insurance and financial services now have a separate division (Division 12). The net versus gross approaches have not been fully reconciled. There are also problems of choosing appropriate deflators for premium payments. More discussion and research is needed to guide compilers on the appropriate measurement of these services.

As economies move away from cash transactions, it may be possible in the future to access household transaction records from banks, credit card companies, or mobile money providers. For this information to be tremendously useful for statistical purposes, each transaction would need to have an identifying product code associated with it. At present, only rough descriptions of the purchases are available but this more limited information would still be useful in order to construct household expenditures by major category of expenditure. This is a very promising future source for household data on purchases.

Housing

13) **Owner occupied housing**

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The measurement of OOH continues to present several issues and challenges that require discussion to formulate clearer guidance. OOH tends to account for a larger share of CPI weights and remains a very challenging area. Country-specific circumstances can create problems with different approaches for the measurement of OOH (e.g. small and concentrated rental markets, etc). Informal housing is another issue. While the updated manual does try to expand on these issues, some further empirical work representing a wide range of countries with different housing market types would be very beneficial.

**Dissemination**

14) **CPIs for different population groups, income groups and geographic areas**
The use of CPI data for different purposes was the reason why the Conference of European Statisticians Bureau established a CPI Steering Group to investigate how to meet different user needs and maximize the resources used to produce CPIs. Work could include compilation of CPIs for specific income and population groups and geographic areas. Issues include sources and methods for developing weights, collecting prices, defining index scope, etc. Discussions should also address communication and dissemination issues as well as user relations: How to identify and meet user needs, and how to deal with reactions from users?

**Other Issues**

15) **Quality adjustment**
Quality adjustment challenges is a cross cutting issue that continues to pose challenges. Quality adjustment issues have been noted above, but there is a general need to provide better guidance on the treatment of quality changes. In particular, countries continue to struggle with measuring quality changes for clothing, cars, telecommunication equipment, multi-purpose IT devices, computers and, in general, products with high churn. Sharing of practical experiences implementing methods and best practices are needed.

16) **Seasonal products**
The treatment of seasonal products continues to confound compilers. There is need for research and discussion to improve how seasonal items are treated in the CPI.

17) **COICOP 2018**
The update of COICOIP will have significant implications for compilers. Guidance on how to proceed with implementing the new version of COICOP while preserving a historic time series of data.