

THE ROLE OF THE OTTAWA GROUP IN SUPPORTING THE DEVELOPMENT OF SOUND METHODOLOGIES IN THE CONSTRUCTION OF CONSUMER PRICE INDICES: A LOOK BACK AT THE PAST 30 YEARS AND A LOOK FORWARD TO THE FUTURE CHALLENGES IN MEASURING INFLATION AND THE IMPLICATIONS FOR THE RESEARCH AGENDA

A background note by David Fenwick

“Inflation is taxation without legislation” – Milton Friedman

“Inflation is as violent as a mugger, as frightening as an armed robber and as deadly as a hitman” – Ronald Reagan

1. INTRODUCTION

1. The Ottawa Group is a city group under the United Nations Statistical Commission. It is appropriate that the eighteenth meeting should take place in Ottawa. The first meeting took place in Ottawa 30 years ago.
2. The meetings have provided a useful forum for discussion on conceptual, methodological and practical issues in relation to price indices, mainly consumer price indices. There have been eighteen meetings in total with over 500 papers, on a wide variety of issues, presented by CPI compilers and researchers. Attendees have actively participated in the drafting of the international manuals on consumer price indices¹ and the work undertaken by the Ottawa Group has played a significant part in the drafting.
3. The meetings now alternate with the UNECE Expert Group on Consumer Price Indices.

2 TOPICS COVERED

4. Information relating to the papers presented is available on the Ottawa Group website <https://stats.unece.org/ottawagroup/> by author, title and meeting date². The available reports on the meetings indicate a lively exchange of views.
5. The topics discussed have been wide ranging, heavily influenced by matters of concern identified by users or researchers. In this regard it is pertinent to note that whilst the first meeting of the Ottawa Group took place before the publication in 1996 of the report of the

¹ “Consumer Price Index Manual: Concepts and Methods”, 2020. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/publication/wcms_761444.pdf. It is anticipated that the accompanying manual, by Erwin Diewert, on CPI Theory will be published electronically in April or May.

² Papers and presentations can be seen using the link <https://unece.org/meetings-expert-group-cpi>.

Boskin Commission³ on bias in the computation of the CPI by the US Bureau Of Labor Statistics, subsequent meetings were heavily influenced by the Commission's report.

6. The Commission concluded that inflation was overstated by 1.1 percentage points a year⁴ leading to an over payment in social security benefits in 1983 of \$ 8.76 billion.
7. It is not surprising therefore that a sizeable proportion of the early the work of the Ottawa Group focused on the four sources of bias identified by Boskin:
 - a. *Substitution bias* which occurs because a fixed market basket fails to reflect the substitutions made by consumers in response to changes in relative prices.
 - b. *Outlet substitution bias* which occurs when no account is taken of the fact that consumers may shift their purchases to lower price outlets.
 - c. *Quality change bias* which occurs when changes (usually improvements) in the quality of products is not measured accurately or not at all.
 - d. *New product bias* which occurs when new products are not introduced into the market basket or are only included after a long time-lag, leading to the basket becoming unrepresentative.
8. Thus, at the 1997 Ottawa Group meeting, the first after the publication of the Boskin Report, ten papers were presented that either directly or indirectly addressed the issue of bias in the CPI, including five papers on hedonic quality adjustment. Also, discussions began in more earnest on the definition of a cost-of-living index and how it can be compiled. An example of the latter is the paper, by Brent R. Moulton and Kenneth J. Stewart, entitled "An Overview of Experimental U.S. Consumer Price Indexes"⁵, which reported on several experimental consumer price indices including an experimental CPI using geometric means and experimental superlative indices that used both base and current period expenditure weights as a theoretically better approximation of a true cost-of-living index.
9. Similarly, at the 1998 meeting seven papers were presented on hedonic quality adjustment.
10. It is interesting to note that scanner data was already a topic under consideration in the early days of the Ottawa Group. For example, in his paper presented to the 1997 meeting entitled "Experiments with Swedish Scanner Data"⁶, Jörgen Dalen reports on how scanner data from supermarkets could provide an account of the full universe of prices and quantities for all goods sold and that this raised a number of issues on index construction. In his paper he reports on experiments being carried out with scanner data for four "supermarket" item groups, showing the difference in index outcome from various approaches.
11. It should also be noted that issues relating to bias were being considered by the Ottawa Group and its members before publication of the Boskin Report, both directly and indirectly, although it was publication of the report that spawned the major programmes of research referred to above. For example, in response to research results published in the USA on the relationship between the US CPI and an ideal cost-of-living index, Marta Howarth in an Ottawa Group paper presented in 1995, entitled "UK RPI: a Cost of Living Index or an

³<https://www.ssa.gov/history/reports/boskinrpt.html#:~:text=The%20Commission's%20December%201996%20report,impact%20numerous%20other%20government%20programs.>

⁴ This figure was subsequently revised in a retrospective evaluation by Robert Gordon to 1.2/1.3 percentage points. See https://www.nber.org/system/files/working_papers/w12311/w12311.pdf.

⁵ <https://stats.unece.org/ottawagroup/download/f36.pdf>.

⁶ <https://stats.unece.org/ottawagroup/download/f45.pdf>.

Inflation Indicator”⁷, discussed the differing concepts of inflation and a paper by Nicolas Oulton of the UK National Institute for Social and Economic Research⁸ looked into substitution and outlet bias in the UK Retail Prices Index and concluded that at that point in time neither were significant. Similarly, Keith Woolford in a paper presented to the Ottawa Group in 1994, entitled “A Pragmatic Approach to the Selection of Appropriate Index Formulae”⁹ reported on work undertaken by the Australian Bureau of Statistics into the formula effect and in this case concluded that micro-aggregation could have a significant impact on the aggregation results. Many more examples can be found on the Ottawa Group website, but this work was relatively piecemeal. It was the Boskin Report that provided the focal point for the research agenda for many years post-publication.

3 MORE RECENT TOPICS

12. Looking at the topics covered by the more recent meetings some interesting points emerge:
 - a. The exploitation of new data sources has expanded from using isolated sets of scanner data into web-scraping and other transaction data and concludes that it is not without problems. For example, a paper by Statistics Austria, presented at the 2017 Ottawa Group meeting¹⁰, shows how new data sources such as web-scraped data and business transaction data (e.g. online and scanner data from retailers) have the potential to improve official price statistics, both in terms of quality (more data and potentially more accurate data) and efficiency (low data collection costs, lower response burden) but that the integration of these new data sources is not straightforward.
 - b. These new data sources give index compilers new opportunities regarding index construction using multilateral methods, such as the GEKS index and the Geary Khamis index¹¹. Multilateral methods have gained a lot of attention in recent years, as national statistical institutes (NSIs) are getting wider access to transaction data.
 - c. More generally, much of the more recent research undertaken by researchers and national statistical offices has focused on new data sources and new techniques to compile price indices, including the implications for index formulae. Most recently, three sessions of the 17th Meeting of the Ottawa Group concerned the use of new data sources and techniques to compile a CPI. This indicates the level of research being undertaken by national statistical agencies in this area and the importance attached to the topic. The papers highlighted the many opportunities given by new data sources, but also

⁷ <https://stats.unece.org/ottawagroup/download/f12.pdf>.

⁸ “Do the UK Price Indexes Overstate Inflation”, Nicholas Oulton, National Institute Economic Review, May 1995. <https://www.jstor.org/stable/23870619>.

⁹ <https://stats.unece.org/ottawagroup/download/f7.pdf>

¹⁰ “From price collection to price data analytics – How new large data sources require price statisticians to re-think their index compilation procedures. Experiences from web-scraped and scanner data” by Joseph Auer and Ingolf Boettcher. <https://stats.unece.org/ottawagroup/download/f458.pdf>.

¹¹ “The Geary Khamis index and the Lehr index: How much do they differ?”. Claude Lombary. <https://stats.unece.org/ottawagroup/download/f462.pdf>.

the many challenges to deliver solutions that align to the statistical concepts to be followed. A mix of the conceptual, empirical, and practical aspects to this work were discussed. This included making production processes more robust and transparent, and providing more rapid development of production processes for new data sources. For example, a platform for testing and determining methods, and setting up the production processes, for supermarket scanner data¹². A paper from Statistics New Zealand¹³, demonstrated such a system on trial and its potential for making the development and production process more analyst-friendly and analytically informative. Thus, providing potential practical applications for other statistical agencies who are grappling with the same challenges in managing the different data sources and bespoke processes when making use of the new data sources and the complex methods required. Scanner data is seen as a potentially useful source of statistical data extending beyond consumer price indices and, by implication, could contribute to the integration of official statistics¹⁴.

- d. New data sources have also been exploited for house price indices and rents, where in recent years more attention has been given to the measurement of the cost of owner-occupied housing, including using hedonics to create separate land and structure indices¹⁵. The complications have been recognised and well researched. For example, the influence of communal structure and land on the sale prices of condominium apartments, and approaches to the computation of associated land price indices were addressed by a Canadian paper¹⁶. Methodologies also differ, influenced in part by differences in the availability of information but also by differing views regarding detail. For example, the Icelandic user cost approach¹⁷ measures the flow of services

¹² And for official house price index from valuation and sales data.

¹³ “A MAP for the future of prices indexes at Stats NZ”, Matthew Stansfield, Frances Krsinich. <https://stats.unece.org/ottawagroup/download/f631.pdf>.

¹⁴ A UN Task Team on Scanner Data, working under the umbrella of the UN Committee of Experts on Big Data and Data Science for Official Statistics has been tasked with drafting methodological guidance, developing code supporting guidance, and developing training material for users of scanner data. This extends beyond CPIs but will be relevant to compilers. An e-handbook is to be published and training material is to be published.

¹⁵ It has been argued, not without contention, that conceptual issues have not been fully aired relating to alternative approaches. Most particularly, the advantages of the payments approach. The payments approach benefits from drawing on actual rather than imputed costs and does not include an element of gazing into the future. In reality, capital gains will depend on future price trends and if and when the owner decides to release equity by selling the family home. In this respect the payments approach is easier to compute at least in theory (assuming the data is available) and provides a more reliable measure of what it is attempting to measure, a measure which is clearly different from the other approaches. Note also that the relationship between house prices and imputed rent is not stable and may be seen as a weakness in the rental equivalence approach. In addition, the assumed rate of depreciation, which has been discussed in a number of papers, can be contentious.

¹⁶ “Developing Land and Structure Price Indexes for Ottawa Condominium Apartments”, Kate Burnett-Isaacs, Erwin Diewert, Ning Huang. <https://stats.unece.org/ottawagroup/download/f546.pdf>.

¹⁷ “Owner occupied housing in the Icelandic CPI, a survey of simple user cost for a quarter of a century”, Rósmundur Guðnason. <https://stats.unece.org/ottawagroup/download/f544.pdf>.

method targeting rental equivalence as defined in the national accounts. All prices are current prices. In contrast, the Swedish and Canadian user cost methods reflect the fact that the main use of the CPI is for compensation. The prices used are from various time points, which are 12-15 years on average in the past. Iceland applies a real interest rate whilst Sweden and Canada use nominal rates.

- e. The construction of quality adjusted price indices for services has been given relatively little attention by the Ottawa Group in recent years, somewhat surprisingly given the fact that index construction that takes into account changes in quality, continues to be a challenge, not just in the context of housing. Also, services are becoming an increasing proportion of household expenditure. Service quality can vary. The standard definition of Service quality is that it is the degree to which a service meets or exceeds the expectations and needs of the customers¹⁸ and it needs to be borne in mind that needs and expectations can vary. Also, service quality is not only determined by the technical aspects of the service, such as reliability, speed, and accuracy, but also by the emotional aspects, such as empathy, responsiveness, and courtesy. It is worthwhile noting that an improvement in service for one household might be a reduction in service for another. For example, the availability of shopping over the internet may be welcome by those that have ready access to a computer and are computer literate but may not be advantageous to an elderly person with no internet access and who experiences a decline in the number of physical outlets in their neighbourhood and a reduction in product choice and in socialising by shopping. There has been a discussion in the Ottawa Group about price indices for different sub-groups of the population. The perception of many people is that service levels have deteriorated since the COVID pandemic, particularly with regard to reliability, and that this isn't reflected in the CPI thus resulting in a downward bias.
- f. The interface between households as consumers and households as producers, and the increasing prevalence of the economic model where individuals and individual households make money from their underused assets, their free time, or both. In a sharing economy, idle assets such as parked cars and spare bedrooms can be rented out short term. In this way physical assets are shared as services. What limited evidence there is, indicates that households acting as producers and sellers of services to other households are relatively small in number, but this can vary significantly by country, household type and service category and is increasing in some cases. With the advent of the Internet, and the use of big data, it has become easier for asset owners and those seeking to use those assets to find each other within their communities. Both accommodation (Airbnb, etc.) and transport (Uber, etc) have increased

¹⁸ This raises the issue of whether service quality should be measured in relative or absolute terms. Consumer expectations can change.

in recent years and generate measurement challenges. The results of an experiment by the Israel Central Bureau of Statistics on the measurement of the sharing (collaborative) economy, illustrated the possibility of producing reliable estimates for the CPI based on data from the internet on short-term rental of properties¹⁹. Similarly, there is an increasing occurrence of home working in some countries. Home working is seen as a perfect solution for those needing flexibility in employment and also as a way of saving on the costs of commuting. Home working may involve some days in the office and some days working at home. Home working in a CPI requires a work allocation of housing costs.

- g. Finally, there has been limited discussion in recent years on cost-of-living indices per se although some of the on-going methodological developments have moved index construction more closely to a true cost of living index. Simplistically, a cost-of-living index is a price index that measures relative cost of living over time. It is an index that measures differences in the price of goods and services, and allows for substitutions with other items as prices vary and there are differences in quality. There are many different methodologies that have been developed to approximate cost-of-living indices. A paper presented by the Bureau of Labor Statistics²⁰ at the 17th meeting of the Ottawa Group illustrated a new method for computing a cost-of-living index (COLI) based on an estimated newly proposed generalized constant elasticity of substitution utility function. The utility function was specified in terms of constant "substitution parameters", time-varying "preferences", and time-varying "qualities". The method was illustrated with an application to monthly data on eight aggregate categories of goods in the U.S. CPI from 1990 to 2008: the resulting proposed COLI index lay about halfway between uniformly higher and lower Laspeyres and Törnqvist price indices computed with the same data. But what is the target index, a COLI or non-COLI, or is there a strong argument for both? If the target index is a COLI how far have National Statistical Institutes gone to compute one based on methodology tried and tested and recommended by the Ottawa Group? A

¹⁹ Merav Oren-Yiftach at a poster session at the Sixteenth Ottawa Group Meeting - Rio de Janeiro, Brazil 08-10 May 2019, entitled Automatic data collection in the Israeli CPI: measuring the sharing economy in the sector of short-term rentals and web scraping for flights and hotels.
[https://www.ottawagroup.org/Ottawa/ottawagroup.nsf/home/Meeting+16/\\$FILE/Automatic%20data%20collection%20poster.pdf](https://www.ottawagroup.org/Ottawa/ottawagroup.nsf/home/Meeting+16/$FILE/Automatic%20data%20collection%20poster.pdf)

²⁰ "Cost of Living Index of an Estimated Generalized CES Utility Function that Accounts for Changes in Preferences for and Qualities of Goods", Peter Zadrozny.
<https://stats.unece.org/ottawagroup/download/f627.pdf>.

paper by Kurtzon examines how much formula and weights matter when attempting to approximate a cost of-living index²¹.

4 THE CURRENT STATE OF INDEX COMPILATION

13. By surveying the CPI methodologies used by National Statistical Institutes through the available metadata, it can be observed that progress has been made in adopting many of the improved methodologies tried and tested by the Ottawa Group, but implementation is not universal even where a consensus has been reached on the approaches to be adopted.
14. The adoption by National Statistical Institutes of systematic workplans for index development and a move to a system of harmonisation, similar to the route followed by Eurostat in developing its' Harmonised Index of Consumer Prices would help facilitate improved CPIs, although the political obstacles may be challenging. In this regard, it would be helpful if the ILO Resolution concerning Consumer Price Indices²² could be either more prescriptive and act as a catalyst for international harmonisation or provide a link to the Ottawa Group or include an addendum listing best practice or improved methodologies. This may be asking too much but is worth debating.

5. CONCLUSIONS AND A LOOK AHEAD

15. The challenges of forecasting the directions of future research and computations of a CPI are fivefold:
 - a. Agreeing objectives, including user needs, and prioritising.
 - b. Identifying the issues.
 - c. Finding the right methods and tools.
 - d. Measuring and analysing data.
 - e. Updating and planning for unexpected changes in retailing and user needs.
16. Measuring price change is becoming more complex and challenging for price statisticians due to the accelerating pace at which retailing is changing and the impact of new technology, leading to more churn in research than ever before.
17. Research is an iterative process where the path ahead can be uncertain as it very much depends on the results of previous and future investigations. It needs to be accompanied by an evaluation of progress towards delivering a firm and practical methodological base for computing the target index or target indices, where the latter is determined by user needs. The iterative process needs to be supported by continuous monitoring and cross-examination.
18. Legitimate questions to ask about external factors, as opposed to the direct feed through from research results, include unmet and unforeseen user needs; anticipated future demands; changes in retailing and shopping habits (for example, over a matter of about a year all major supermarket chains in the UK have introduced loyalty cards which give the holder lower prices for some products for a limited period); and the availability of relevant and good

²¹ "Breaking down the differences between the CPI-U and C-CPI-U: weights vs formula".
<https://stats.unece.org/ottawagroup/download/f444.pdf>.

²² https://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/normativeinstrument/wcms_087520.pdf

quality data. Similarly, the emergence of dynamic pricing was unforeseen and represents a challenge for consumer price statistics²³;

19. Work should be undertaken to identify and progress, through further research, those methodological issues which have the biggest impact on the quality of the index both in terms of bias and in terms of precision. The results should feed into subsequent editions of the international manuals on consumer price indices.
20. A continued close working relationship with the UNECE Expert Group provides a valuable forum for discussions on practical issues on index compilation and for sharing operational solutions. Important methodological issues, where practical index construction is a barrier to implementation and cannot be resolved, should be referred back to the Ottawa Group for advice. Where the conceptual principles cannot be put into operation for practical reasons, the Ottawa Group should be approached to provide guidance on alternative solutions. This process should be used to inform future work programmes.
21. Closer collaboration with the Voorburg Group²⁴ especially so given the increasing significance of households both as consumers and producers, particularly in services. But it should be noted that CPIs and PPIs do not share the same valuation basis.
22. Finally, consumer price indices are compiled for a number of quite different purposes. These include: for wage bargaining and indexation of pensions and social security benefits; for deflating statistics relating to the value of retail sales to derive estimates of sales volumes at constant prices; as a target measure for the purposes of monetary policy. These multiple uses raise the issue of “What Should an Inflation Index be Measuring?” The concepts can be different and need to be clarified. A note by Jill Leyland and John Astin in May 2017 for the UK Advisory Panel on Consumer Price Indices elaborates the arguments and issues of definition in the context of Household Cost Indices²⁵. The definitional issues have yet to be fully addressed and examined systematically at an international forum. A family of consumer price indices needs to be appraised. Is this an issue for the Ottawa Group and should it feed through to the ILO resolution on consumer price indices? This is a question that should be addressed.

“Life is like riding a bicycle. To keep your balance, you must keep moving. The important thing is not to stop questioning” - Albert Einstein.

²³ “Dynamic pricing as a challenge for consumer price statistics”, Blaudow and Burg.
<https://stats.unece.org/ottawagroup/download/f442.pdf>.

²⁴ The Voorburg Group on Service Statistics was created in 1986 in response to a request from the United Nations Statistical Office (UNSO) for assistance in developing services statistics. The main purpose of the Group is to serve as a forum for the exchange of views on service statistics among National Statistics Offices, as well as relevant International Statistical Organisations.

²⁵ APCP-S(17)08 1 ADVISORY PANEL ON CONSUMER PRICES – STAKEHOLDER Household Costs Indices. May 2017. <https://uksa.statisticsauthority.gov.uk/wp-content/uploads/2016/04/APCP-S1708-Household-Costs-Indices.pdf>