

13th meeting of the Ottawa Group on Consumer Price Indices

Hosted by Statistics Denmark

1st to 3rd May, 2013

Report from the meeting



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Introduction

The 13th Meeting of the Ottawa Group on Consumer Price Indices was hosted by Statistics Denmark, in Copenhagen, from 1 to 3 May, 2013.

Further background on the Ottawa Group, including the Terms of Reference and Governance arrangements can be found on:

<http://www.ottawagroup.org/ottawa/ottawagroup.nsf/home/Ottawa+Home>.

The thirteenth meeting: Summary

The papers submitted for discussion at the meeting were grouped into eight broad categories. The sessions and moderators are shown in chronological order below.

- Session 1 - Housing Price Indices
Chair: Mick Silver
- Session 2 - Commercial Property Price Indices
Chair: David Fenwick
- Session 3 - Measuring Service Prices
Chair: David Fenwick
- Session 4 - Sampling and Data Collection
Chair: Paul Armknecht
- Session 5 - 'Difficult to Measure' Goods and Services
Chair: Carsten Boldsen
- Session 6 - Seasonal Adjustment and Analytical Series
Chair: Carsten Boldsen
- Session 7 - Real Time Estimations of Superlative Indices
Chair: Erwin Diewert
- Session 8 - International Comparability of Price Developments and Price Levels
Chair: Erwin Diewert

In total, 20 papers were presented for discussion in the plenary sessions and 23 papers were presented at poster sessions. A further 3 papers were submitted but not presented.

Evaluations forms indicated very positive delegate feedback on all aspects – notably: the agenda; the individual papers and related discussions and the venue and organisation of the meeting. The 13th meeting introduced, for the first time, the use of poster sessions. This innovation was seen as a welcome development that facilitated much useful discussion in a less formal environment. More information on delegate feedback is given at Annex A.

Papers were well received by participants and useful discussions were had on various topics relating to the concepts, methods and compilation procedures for CPIs and related indices. The group debated many issues at the forefront of current thinking on the development and improvement of consumer price indices. The key points emerging from each session are given in the Chairperson's summary notes at Annex B.

The success of the meeting reflected the following contributions

- the Steering Committee members for their assistance in planning for this meeting
- all participants for the quality of presented papers and their valuable contributions to discussions
- session chairs for leading the debate and preparing summaries of each session
- staff at Statistics Denmark for their help in organising the meeting and for the support they provided to participants

Forward Look to the Next Meeting

The Thirteenth meeting of the Ottawa group was a great success with constructive discussions and debates on many of the key issues facing compilers of price indices today.

The next meeting of the Group will be hosted by Statistics Bureau of Japan and held in Tokyo in May 2015.

It will take into account the delegate feedback from the meeting held in Copenhagen and build upon its success.

Possible topics for discussion at the next meeting are:

- Scanner data
- Housing, commercial
- Decomposition of price indices with different formulas
- Multipurpose Price Statistics
- SPPI's, PPI's
- International harmonisation of price indices
- Seasonal commodities

The final agenda of the meeting is still open to discussion and is dependent on work programmes and future priorities.

Kirsten Balling
Head of Division
Statistics Denmark

Annex A: Summary of delegate feedback from Evaluation Forms

	Very good	Good	Satisfactory	Poor	Comments			
1. Timeliness of papers?	17	16	1		- Almost 50 papers a lot at one meeting			
2. Content of Ottawa Group homepage – was something missing? (please write in comment field)	19	12	2		- Problems with downloading some papers - List of participants would be nice to have.			
3. The meeting venue?	33	1						
4. The seating at the venue (sitting at small tables)?	22	11						
5. The use of poster sessions at the Ottawa Group Meeting?	22	9	3		- Gives a break - Maximum of 4 posters at a time			
6. Overall value of the Ottawa Group Meeting	24	7			- Remarks from plenary should follow right after each plenary presentation			
7. Which topics in the agenda did you find most useful? (more marks allowed)	1: 17	2: 15	3: 8	4: 18	5: 8	6: 13	7: 8	8: 12
8. What is the best way to have the poster sessions? (please mark the preferred option)	Chair presents the poster papers before the poster session: 20		Authors presents poster papers before poster session (less time for actual poster session): 12		No presentation before poster session (most time for actual poster session): 3			
9. How was the division of time in the agenda between plenary and poster sessions? (please mark the preferred option)	More time for plenary sessions would have been useful: 4		Good balance between plenary and poster sessions at this meeting: 27		More time for poster sessions would have been useful: 3			
10. How was the division of time between plenary presentations and plenary discussions? (please mark the preferred option)	More time for plenary presentations would have been useful: 1		Good balance between plenary pre-sentations and plenary discussions at this meeting: 32		More time for plenary discussions would have been useful: 1			

Annex B: Chairperson's summary notes

Session 1 on Housing Price Indices

Chairperson: Mick Silver

Presented papers

There were three papers for presentation.

- “Incorporating Geospatial Data into House Price Indexes: A Hedonic Imputation Approach with Splines” *Robert J. Hill & Michael Scholz (University of Graz)*
- “A Countrywide House Price Index for 152 Years” *Jens Lunde, Anders Holding Madsen & Maria Lundbæk Laursen (Copenhagen Business School)*
- “Residential Property Price Indexes for Tokyo” *W. Erwin Diewert & Chihiro Shimizu (University of British Columbia)*

The presented papers all included extensive empirical work undertaken to very high standards.

Robert J. Hill and Michael Scholz's paper was an appropriate opening paper dealing with the important issue of incorporating geospatial data into HPIs, achieved by means of a hedonic imputation approach using splines. Critical to the success of HPI methodology is the need to account for location, “the” feature of repeat sales methodology. As was demonstrated by the authors in their empirical work for Sydney, geospatial data with unique identifiers for each residence can be readily included in hedonic formulations in a manner that improves substantially on postcode dummies. It was a paper on an issue that matters: their empirical work showed that mis-measured HPIs using postcode dummies, rather than geospatial identifiers, resulted in 15% higher house price inflation over 10 years. The discussion included how the results were sensitive to the degree to which the postcodes delineated locations and to the criteria used to justify the evaluations of different models.

The second paper by *Jens Lunde, Anders Holding Madsen and Maria Lundbæk Laursen* was a major empirical exercise: “A Countrywide House Price Index for Denmark for 152 Years.” A well-tackled and documented study including a full outline of data issues in Denmark; compilation method; treatment of idiosyncrasies; explanation of results in the context of the 30s depression, 1960's growth, the more recent “rocket” and fall in house prices; the CPI's relation to the countrywide HPI; regional differences; and more. Questions focused on the use of the Sale Price Appraisal Ratio (SPAR) to compile the index, controlling for quality-mix. The description in Bourassa (2205); Haan (2008); and de Vries et al. (2009) and in the paper describes SPAR as “value weighted;” this was taken up, as was appraisal smoothing and lag bias, and the interpretation of the quality change component.

Chihiro Shimizu and Erwin Diewert's important paper used a builders' cost model to decompose residential property price change to structures and land components. The paper is important because there is a need, in national accounts, for such a decomposition and the hedonic regression-based method, using the price of the lot size and structure size, provides a means for doing so. There was much experimentation with larger characteristics sets. However, the land and lot estimates are plagued by collinearity. Adj-Rsq between RHS variables may exceed Adj-Rsq of the regression. An exogenously determined construction cost index was used to help decompose the two elements. Issues raised in the discussion included: the applicability of a cost of construction index (CCI) (and builder's cost model) as a timely indicator for macroeconomic planning. This is due to the lags in a CCI feeding into an RPPI; its neglect of margins (which can be variable); and use of 5-year rolling averages to smooth data. There was a methodological thoroughness to the empirical work for Tokyo including experimentation with parsimonious hedonics e.g. 21 ward dummies (but not geospatial); non-linear regression; and depreciation by piecemeal splines.

Papers at the poster session:

There were four papers for the poster session.

- “Hedonic Price-Rent Ratios, User Cost and Departures from Equilibrium in the Housing Market” *Robert J. Hill & Iqbal A. Syed (University of Graz)*
- “Developing a Residential Property Price Index (RPPI) for Canada: Approach, Risks and Challenges” *Annie De Champlain, Heidi Ertl, Gaétan Garneau, Sara Guay, Marllena Ifrim, Klaus Kostenbauer & Jennifer Withington (Statistics Canada)*
- “Housing Price Statistics in Finland: Monthly Prices of Dwellings, Regional Division in Housing Price Statistics and Usage of Administrative Data” *Tomi Martikainen & Petteri Rautaportas (Statistics Finland)*
- “Developing a Definitive Measure of House Prices in the UK” *Joni Karanka, Robert O’Neill, Natalie Weaden, Ria Sanderson, Christopher Jenkins & Derek Bird (Office for National Statistics)*

The poster sessions benefited from detailed accounts by three statistical offices on their HPI methodology: *Statistics Canada*, *Statistics Finland*, and *the UK Office for National Statistics*. Of particular interest was the strategic issue facing the UK, where eight indices are published by a variety of organisations, using a variety of data sources and methodologies, including valuation-based indices. The 2010 Strategy Review formulated a strategy to define and compile an official headline national index by combining other official indices, where they do not overlap, and ignoring ones produced by the private sector. Finland publishes an HPI with sub-indices by age of property, type of property (e.g. flat or house), and whether the property has been purchased with a mortgage and the paper outlined the challenges and current developments. In contrast, only two HPIs are published in Canada, both relate to “existing properties” and both are produced by the private sector. Statistics Canada raised the issue of the reputational risk and potential lack of transparency using private sector data. The StatsCan paper also focused on the demands of international reporting (most particularly, the G-20 data gaps initiative and SDSS plus) and also internal needs (for the CPI and for the Bank of Canada).

The paper by *Robert Hill and Iqbal Syed* was concerned with the detection of disequilibrium (looking at the actual price-rent ratio compared with the user cost-rent ratio) for housing. This is an important area since a postulated equilibrium underlies use of (re-weighted) rent indices for Owner Occupier Housing. Current empirical work was shown to be problematic due to differences in the quality of rented and sold price levels, the concern of disequilibrium. In detailed empirical work on a large Sydney dataset, they demonstrated the importance of taking into account this quality difference; found to be 18.6% between sold and rented properties – consisting of: 8.7% quality difference; 3.7% missing characteristics; 6.2% omitted characteristics.

Session 2 on Commercial Property Price Indices

Chairperson: David Fenwick

Presented papers

There were three papers for presentation.

- “Commercial Property Prices: What should be measured?” *Sebastian Keller (Deutsche Bundesbank)*
- “ECB Progress towards a European Commercial Property Price index” *Andrew Kanutin (European Central Bank)*
- “Commercial Property Price Indexes for Tokyo” *Chihiro Shimizu, W. Erwin Diewert, Kiyohiko G. Nishimura & Tsutomu Watanabe (Reitaku University)*

The paper “**Commercial Property Prices: What Should Be measured?**” set the background to CPPIs. Namely:

- The large total market value (bigger than for residential property?)
- The apparent lack of official data on & standardised approach to commercial property market (despite inclusion in IMF’s set of Financial Soundness Indicators).
- The focus on current information on specific interest groups – offices, retail etc.
- The potentially conflicting demands of different users.

The paper made the case for the need for a methodological framework (which in the context of the paper can be better described as the need for a conceptual framework) and presented different approaches to measuring commercial property prices. Namely:

- Paasche-type for deflating & Laspeyres-type for analysing pure price development.
- Transaction-weighted for market movements e.g. across regions; stock-weighted for nominal value of commercial stock.....for (liquidity etc).

It also made the point that Investment Performance Indicators are distinct from price indices but with some links.

The paper then listed the practical challenges on index construction - different price determining characteristics of land versus structure; difficult to price separately; difficult to measure constant quality etc. and then presented a stylised framework for performance indicators (simplified assumptions) whilst making the point that prices & values can give different results.

The paper “**ECB Progress towards a European Commercial Property Price index**” gave some contextual background. It reviewed the uses of CPPIs – including common components (constant quality, transaction prices, distinction between different sectors [office, retail, industrial & commercial/ residential]) and gave some background to an EU stock-taking exercise undertaken by the ECB. The latter exercise indicated variable data availability, timeliness, and a mixture of transaction prices versus valuations in index construction. But few indices are computed.

The paper also reported on some experimental quarterly indicators of CPPIs computed by the ECB. This relates to work undertaken by the ECB's "Working Group on General Economic Statistics" (WGGES) – with assistance from NCBs & others. It covers EU & the Euro Area plus country-specific e.g. UK, Germany and is based on data from the commercial data supplier (Investment Property Data-bank) & enhanced by ESCB.

There are two data sets 1) valuations & 2) transaction price (euro) + valuations. The plan is for "interim" CPPIs to be computed as part of the European Statistical System and as an interim measure prior to harmonised indices being computed by Member States. The plan is for experimental quarterly statistics to be ready for publication by the end of 2013 & T+2 months after quarter.

The aim is to compute a CPPI which covers the main uses – but the latter were not defined/debated in detail e.g. in conceptual/statistical terms – for instance, the issues of transaction prices (valuations more readily available but second best?); predicted sales price from regression; "transaction" or "stock"; proxy weights (GDP – volumes).

The paper "**Commercial Property Price Indexes for Tokyo**" was more technically orientated and forward looking. The starting point was the fact that appraisals are traditionally used for CPPIs because of the limited number of transactions. The paper then reported on a method of computing denominators & numerators for quality-adjusted CPPIs based on present value approach. The index consists of:

- A numerator – consisting of rental prices for new contracts (cash flow from properties).
- A denominator – the discount rate – which uses real estate investment trust (REIT) share prices. The latter represent stock market's valuation of REIT's property portfolio.

The index = cash flow from properties/discount rate. The ratio represents an alternative measure of the capitalization rate.

The attraction of this approach is that it addresses some of the shortcomings of appraisal based indices whilst avoiding the cost of data for quality-adjusted transaction-based indices.

Initial empirical results indicated that the new method signalled turning points much earlier than appraisal-based methods but the index was more volatile.

Papers at the poster session

There were four papers for the poster session.

- “Estimating and Smoothing Appraisal-Based Commercial Real-Estate Performance Indexes” *Paulo Picchetti (Fundacao Getulio Vargas)*.
- “Developing Commercial Property Price Indicators” *Paolo Passerine (Eurostat)*.
- “A note on Concept and Measurement of Property Price Indices” *Bert M. Balk (Rotterdam School of Management, Erasmus University)*, [revised title].
- “Commercial Property Price Indices in Denmark” *Jakob Holmgaard (Statistics Denmark)* [short room note]

The paper “**Estimating and Smoothing Appraisal-Based Commercial Real-Estate Performance Indexes**” addressed the need for contemporary valuations for appraisal-based CPPIs. Appraisals are updated infrequently & are often out-of-date & transaction prices are infrequent. This can lead to potential bias in the index as it can result in under-estimates of capital return & over-estimates of income return. The paper deployed “hierarchical” regression on a relatively small data set for Brazil which included price-determining characteristics (location, use etc) & used cluster analysis. A main drawback was that linear interpolation is not possible at end points (so the latter is not an option when attempting to estimate current CPP inflation).

The paper “**Developing Commercial Property Price Indicators**” gave an overview of the methodological & practical challenges in developing CPPIs & then presented a strategy for the way forward. It first summarised the main challenges for producers of CPPIs: the lack of international standards (the CPPI Handbook is to outline concepts & practical approaches). The issues were similar to those raised in connection with Residential Property Price Indices but were generally more challenging. This included definition & the issue of land versus structure; classification (offices, retail trade, hotels, industrial buildings, land?); valuation principle (market transaction price); aggregation formulae; weights (stock versus flows); the small number of transactions (use modelling?); and the fact that data sources are often diverse & are not always fully adequate.

In the above context the paper raised the issue of partnerships between official and commercial data suppliers. It also raised the user need for additional indicators to the CPPI – capitalisation rates, yields, vacancy rates, transaction volumes.

The paper “**A note on Concept and Measurement of Property Price Indices**” presented a comparative analysis of the different approaches to compilation. It covered CPPIs & PPIs and implicitly argues for an integrated approach. The paper summarised the main issues in four sections.

Section1 – reviewed transaction-based index and covers: the arithmetic versus the geometric mean; mix-adjustment for changes in property types/characteristics; different index formulation (Laspeyres [base], Paasche [current], Lowe, Fisher) [making the point that different formulations can lead to different results]; the challenge of empty cells [because of small numbers of transactions].

Section 2 reviewed the various targets of measurement and classifies these into: primary; secondary; tertiary (derived from a de-composition into price & quantity).

Section 3 reviewed the various estimation methods: the use of stratification where there is a mismatch between numerator & denominator; repeat sales; SPAR (sales price appraisal ratio) [all described in RPPI Handbook].

Section 4 reviewed stochastic methods & repeat sales.

Most importantly the paper described the relationships between different compilations & the underlying assumptions.

The short note by *Statistics Denmark* described what Statistics Denmark was actually producing in the area of property price indices. It provided information on the definitions, methodology etc of the Danish CPPI. The latter follows the SPAR methodology and uses sales reports recorded on Denmark's Electronic Land Registration System.

Discussion included the potential need for a family of indices but with a clear distinction between the different measures – thus the importance of met-data. It was observed that the differences in measured inflation in the *Deutsche Bundesbank* paper were relatively large.

The *European Central Bank* paper raised concerns about the resilience of relying on commercial data providers & the need for processes in to be in place to quality assure & control external data sources. The use of valuation data was thought by some to be a compromise particularly when viewed in the light of Deutsche Bundesbank paper.

The *Chihiro Shimizu, W. Erwin Diewert, Kiyohiko G. Nishimura & Tsutomu Watanabe* paper generated a lot of interest and the index that was presented was seen as a potential preferred methodology for specific uses e.g. for forecasting turning points. The index seemed to perform well on this score.

The poster session delivered a far more intimate environment for the discussion of issues. I spoke to all authors. The papers by *Paolo Passerine (Eurostat)* and *Bert M. Balk (Rotterdam School of Management, Erasmus University)* provided some good background and focused on fairly strategic issues. The papers by *Paulo Picchetti (Fundacao Getulio Vargas)* and *Jakob Holmgaard (Statistics Denmark)* were more specific.

The session re-affirmed that the state-of-the-art in terms of practical index construction is far less developed than for RPPIs and the property market is less transparent.

Session 3 on Measuring Service Prices

Chairperson: David Fenwick

Presented papers

There were two papers for presentation.

- “Quality Change in Services Producer Price Indexes” *André Loranger with updates by Mary Beth Garneau (Statistics Canada)*
- “Methodological Guide for Developing Producer Price Indices for Services, Issues and Challenges” *Anne-Sophie Fraisse (OECD)*

The paper “**Quality Change in Services Producer Price Index**” developed the case for a producer cost approach for quality adjustment using by way of example Advertising services, Air transport & the Distributive Trade services and then presented a specific debate on whether or not consumer utility should be considered when quality adjusting PPIs.

For Air Transport & Advertising Services two views presented: a “Production cost” adjustment was appropriate as only changes that affect production process should be covered & elements of quality differ between producer & consumer; the counter argument that account should be taken of “user value view”.

Again two views presented for Distributive Trades services: the outputs of wholesalers & retailers are a distributive trade only (so quality-adjust only the service element); the counter argument that the quality of the underlying good must be accounted for (raising the issue of how you quality adjust margin prices).

The paper resulted in a great deal of debate about conceptual issues and the need for coherence across the family of indices but came to no firm conclusions about which methods to adopt for PPIs.

The paper “**Methodological Guide for Developing Producer Price Indices for Services, Issues and Challenges**” gave details of the Joint OECD/Eurostat “*Methodological guide for developing producer indices for services*”, to be released 4th Quarter 2013. The guide refers to the use of *margin price*, *price of final specified service output* & a *time based price* depending on different pricing mechanisms (i.e. the charging regime by the economic operators). The guide provides practical guidance for construction of SPPIs for specific services and attempts to address cross-cutting issues. It also raised the possibility of the CPI as a proxy for “Business to Consumer” Indices but this was questioned during the course of discussion given that the measurement of service prices in a CPI can be equally challenging and relatively less well developed than the measurement of goods’ prices in the context of quality adjustment.

It was agreed that it was valuable to debate such cross-cutting issues for coherence & consistency of approach.

There were no **poster papers** for this session.

Session 4 on Sampling and Data Collection

Chairperson: Paul Armknecht

Presented papers

There were three papers for presentation.

- “Product Downsizing and Hidden Price Increases: Evidence from Japan's Deflationary Period” *Satoshi Imai, Chihiro Shimizu & Tsutomu Watanabe (Statistics Bureau of Japan)*
- “Short-term Movements of the RY-GEKS Price Index; Is the Failure of the Identity Test Really a Problem?” *Claude Lamboray (Institut National de la Statistique et des Études Économiques, Luxembourg)*
- “Replacements, Quality Adjustments and Sales Prices” *Jörgen Dalén (Consultant) & Oxana Tarassiouk (Statistics Sweden)*

Satoshi Imai, Chihiro Shimizu and Tsutomu Watanabe (Statistics Bureau of Japan): **“Product Downsizing and Hidden Price Increases: Evidence from Japan's Deflationary Period”**

In the long period of deflation experienced in Japan, producers are not willing to attempt to raise prices, but they seem to be downsizing packaging. This raises the issue of whether they are getting unit price increases that are unrecognized by consumers. The authors identified those instances where product replacements occurred and found that most consumers were aware of the practice and adjusted their purchases accordingly.

Claude Lamboray (Institut National de la Statistique et des Études économiques, Luxembourg): **“Short-term Movements of the RY-GEKS Price Index; Is the Failure of the Identity Test Really a Problem?”**

Using the Rolling Year-GEKS method with scanner data usually shows price changes even when there has been no change largely due to corresponding changes in quantities that affect the observer unit values. The larger the covariance between price changes and quantities, the more severe the problem can become. In most circumstances, the quantity changes are not that large and the effects on the index are small.

Jörgen Dalén (Consultant) and Oxana Tarassiouk (Statistics Sweden): **“Replacements, Quality Adjustments and Sales Prices”**

Standard quality adjustment (QA) techniques currently used in the Swedish CPI are often inadequate. Price collection staff has been making QAs and this practice should be discontinued. The authors proposed enhanced approaches using a matched model method particularly for new product replacements. However, this method may still be biased and further efforts using hedonic modeling techniques, similar to those used in other countries, should be explored.

Papers at the poster session

There were seven papers for the poster session.

- “Sample Design for Goods and Services Components of the Canadian CPI” *Isabelle Marchand (Statistics Canada)*
- “Scanner Data and the Treatment of Quality Change in Rolling Year GEKS Price Indexes” *Jan de Haan & Frances Krsinich (Statistics Netherlands and Statistics New Zealand)*
- “The CIA (consistency in aggregation) approach - A new economic approach to elementary indices” *Jens Mehrhoff (Deutsche Bundesbank)*
- “Issues on the Use of Scanner Data in the CPI” *Muhanad Sammar, Anders Norberg & Can Tongur (Statistics Sweden)*
- “Drawing a Sample from Scanner Data for Use in the Danish CPI” *Nina Gustafsson & Martin Larsen (Statistics Denmark)*

Isabelle Marchand (Statistics Canada): **“Sample Design for Goods and Services Components of the Canadian CPI”**

The author discussed the new sample design features implemented for the Canadian CPI and the optimization and maintenance of the sample. This is part of a five-year project to improve the CPI that is scheduled for completion in 2015.

Jan de Haan and Frances Krsinich (Statistics Netherlands and Statistics New Zealand): **“Scanner Data and the Treatment of Quality Change in Rolling Year GEKS Price Indexes”**

The authors review issues of QA in scanner data using the Törnqvist and RY-GEKS methods. They find that both have upward biases and examine methods for resolution using time dummy regression methods to impute missing values (ITRYGEKS(TD)). This method may be difficult to implement in real time, but it does serve as a benchmark. It is compared to an alternative method (RYTPD) where a pooled time-product dummy index with monthly expenditure share weights and a 13-month rolling window are used. This latter index can be produced more easily in real time. While not as good as the benchmark, it is an improvement. Statistics New Zealand, however, is attempting to implement ITRYGEKS for some CPI component series.

Jens Mehrhoff (Deutsche Bundesbank): **“The CIA (consistency in aggregation) approach - A new economic approach to elementary indices”**

The author notes that the axiomatic approach to choosing an elementary index formula is not the only approach to consider. He proposes that consistency in aggregation is also an important property and that the formula selected for use in the CPI should be consistent at both the elementary and aggregate levels.

Muhanad Sammar, Anders Norberg and Can Tongur (Statistics Sweden):
“Issues on the Use of Scanner Data in the CPI”

Sweden has replaced manually collected price data with scanner data using larger samples than before. The author reports on problems found with computing indices based on all products for which scanner data are available. The approach implemented was to use scanner data for the outlets and products selected for the sample rather than using all the scanner data for all outlets and products.

Nina Gustafsson (Statistics Denmark): **“Drawing a Sample from Scanner Data to Use in the Danish CPI”**

The author reports that Statistics Denmark is using “representative basket methodology” to integrate scanner data in the CPI to avoid possible bias. This is similar to the approach described by Sweden except that the samples are drawn from the scanner data directly. They have developed a model and experience in drawing and maintaining samples using the scanner information.

Session 5 on 'Difficult to Measure' Goods and Services

Chairperson: Carsten Boldsen

Presented papers

There were two papers for presentation.

- “Rent Levels in The Norwegian Rental Market” *Ragnhild Nygaard (Statistics Norway)*
- “How Much Rent Do I Pay Myself? / Methods of Estimating the Value of Imputed Rental for the Weights of the South African CPI” *Patrick Kelly & Lee Everts (Statistics South Africa)*

In response to growing user demand Statistics Norway in April 2013 began publishing statistics on monthly rent levels for 17 regions/cities based on hedonic regression. The paper “**Rent Levels in The Norwegian Rental Market**, by Ragnhild Nygaard (Statistics Norway) explains the development and performance of the hedonic model that has been applied. The additive log-linear form chosen for explaining variations in rent levels appears to produce significant and robust estimates. Location, size, tenant-landlord interaction and the length of the tenancy are the main explanatory variables. Tenant characteristics (income, place of birth) have been tested to be significant explanatory variables but are not included in the model used to produce the official estimates. The statistics require a comprehensive rental market survey with gross sample of 22.000 tenants, resulting in 7.000 responses.

Looking forward the statistical office will consider alternative data sources and sampling issues. In the following discussion utilizing electronic data sources and obtaining the information from landlords instead of tenants were mentioned as possible ways to reduce costs.

In their paper “**How Much Rent Do I Pay Myself? Methods of Estimating the Value of Imputed Rental for the Weights of the South African CPI**”, Patrick Kelly and Lee Everts (Statistics South Africa) present the experiences of calculating proper weights for the imputed value of owner occupied housing in the South African CPI. The paper discusses three methods to estimate imputed rents: 1) by multiplying the value of the dwelling, obtained from a survey, with the yield rate, obtained from a private company; 2) Self-assessed rental value from a survey; and 3) by use of imputed rents, based on ranked matched observations. Based on the estimates the weight of owner-occupied housing seems to vary over time and according to method. The preference is to use the rental equivalent approach, which seems to provide reasonable stable estimates over time and is less depending on subjective assessments. Future work will include investigation of imputation methods, editing and weighting structure of expenditure surveys, comparisons of census and expenditure surveys and alignment with national accounts.

Papers at the poster session

There was one paper for the poster session.

- “Clothing: The Use of Class Mean Imputation in the Swiss CPI – Analysis and Impact on the Results” *Sandrine Roh and Corinne Becker Vermeulen (Swiss Statistics)*

The paper “**Clothing: The Use of Class Mean Imputation in the Swiss CPI – Analysis and Impact on the Results**”, by Sandrine Roh and Corinne Becker Vermeulen, (Statistics Switzerland) illustrates some of the difficulties associated with clothing and presents the approach that has been chosen, which seems to give good results. Before 2011 replacements of similar quality were compared directly, in all other cases the disappearing article was removed from the index and replaced by a new article. Systematic use of overall mean imputation for all replacements showed to give a lower index than the one published, which created concerns that this method could introduce downward bias; a phenomenon that is often associated with clothing. Since January 2011 direct comparison has been used when the quality change is assessed to be zero or negligible, and class mean imputation in all other cases when matched items are unavailable. It requires clear specification of quality characteristics, the selected ones are manufacturer (brand) and fabric, and clear instructions to price collectors. Direct comparison combined with class mean imputation gives a slightly higher index than the method used before 2011, and hence seems to be less exposed to downward bias. The paper also illustrates the usefulness of conducting comparative analysis of different methods since this can serve to identify possible drift/bias and inform the decision of what method to use.

Session 6 on Seasonal Adjustment and Analytical Series

Chairperson: Carsten Boldsen

Presented papers

There were two papers for presentation.

- “An Empirical Illustration of Index Construction Using Israeli Data on Vegetables” *W. Erwin Diewert (The University of British Columbia)*
- “The Treatment of Seasonal Breaks in the Seasonal Adjustment of Harmonised Indices of Consumer Prices” *Matthias Diermeier & Martin Eiglsperger (European Central Bank)*

The paper “**An Empirical Illustration of Index Construction Using Israeli Data on Vegetables**” by W. Erwin Diewert (The University of British Columbia) uses real monthly price and quantity data to test different models for calculating indices for five groups of vegetables with “weak” seasonality in prices and quantities. The study compares 12 months rate of change of Laspeyres, Paasche, Jevons, Carli, Lowe, Young and others indices with baseline Fisher index in chained and direct forms. Chain drift appears to be a general problem of chained indices in the case of price bouncing. The use of maximum overlap month-to-month indices also show sign of chain drift. RYGEKS seems to do well with price bouncing showing no sign of drift and being close to the fixed based Fisher index. “Practical” Lowe, Young, and Geometric Young indices using monthly prices and dated annual weights are compared with the RYGEKS and shows to be subject to some amount of substitution bias. In the discussion the question was raised to what extent conclusions might have been different for other product groups with different characteristics (e.g. substitution elasticities). While Fisher is used as the reference index an analysis of how other superlative indices (e.g. Walsh and Törnqvist) would perform would also be interesting.

An EU regulation on seasonal products in HICP entered into force with the index for January 2011 which for a number of EU member countries has caused seasonal breaks in their HICP series. The paper by Matthias Diermeier and Martin Eiglsperger (European Central Bank): “**The Treatment of Seasonal Breaks in the Seasonal Adjustment of Harmonised Indices of Consumer Prices**” investigates the seasonal breaks in time series and proposes different methods to adjust for the break in series in order to produce coherent time series suitable for seasonal adjustment. The fact that the changes in seasonality do not cancel out over the year causes additional complications. Two approaches for non-energy industrial goods are proposed: 1) Back casting the new seasonal profile by undistorted 12-months growth rates, and 2) Carry forward the previous seasonal profile by undistorted 12-months growth rates. Approach 1) is the preferred one as it maintains the new seasonal profile and allows use of seasonal adjustment methods. In conclusion this approach is found to provide break-adjusted series suitable for seasonal adjustment purposes and exhibits good statistical properties. Further work may look into the usefulness for forecasting purposes.

Papers at the poster session

There were four papers for the poster session.

- “A Daily Frequency Inflation Measure and its Information Content on Forecasts” *Salomão Quadros, Vagner Ardeo & Paulo Picchetti (Fundação Getulio Vargas)*
- “Weights in the CPI/HICP and in Seasonally Adjusted Series” *Jan Walschots (Statistics Netherlands)*
- “The Euro Area Inflation Flash Estimate Procedure” *Pedro Martins Ferreira & Luca Gramaglia (Eurostat)*
- “Addressing the Formula Effect Gap Between the UK’s two Primary Measures of Consumer Price Inflation” *Derek Bird (Office for National Statistics)*

Salomão Quadros, Vagner Ardeo and Paulo Picchetti (Fundação Getulio Vargas): “**A Daily Frequency Inflation Measure and its Information Content on Forecasts**”. While the Brazilian Institute of Geography and Statistics (IBGE) produces the official Brazilian CPI (IPCA), the Fundacao Getulio Vargas (FGV) for historical reasons and meeting user needs produces on daily basis a monthly CPI (the IPC-BR) and daily estimates of the IPCA. The need for a daily CPI derives from the period of hyper inflation in Brazil in the 1980s where inflation rates exceeded 2.000% per year, while today the daily estimates are produced as part of the FGVs online Inflation Monitor. The paper describes the weighting basis and the calculation of the FGV estimates, which are remarkably close to the IPCA. Only minor discrepancies are observed, which seems to be associated with the clothing product group. The production process is optimized to allow production of daily estimates, which requires a quick and efficient production process, from data collection, processing and calculation and dissemination. The sampling has been reduced and optimized over the last years, from 250.000 price quotations in 2008 to less than 120.000 in 2012.

In his paper “**Weights in the CPI/HICP and in Seasonally Adjusted Series**” Jan Walschots (Statistics Netherlands) poses the question: Using indirect seasonal adjustment for sub-index series, which expenditure weights should be used for aggregating the seasonally adjusted series into an unbiased seasonal adjusted headline series? The paper shows that the seasonal adjusted annual expenditure weights will equal the unadjusted annual weights, provided that annual average prices (indices) equals the seasonal adjusted annual average prices (indices). This should usually be the case, depending on the SA method applied. It is concluded that in practice the weights should be very close. The same will not be the case when weights are price-updated to December for use in a chained index with December as link month, since the seasonal adjusted December prices usually will be different from the unadjusted December prices. The paper includes an empirical test of a number of seasonal adjusted HICP sub-indices in which the differences from using unadjusted or seasonal adjusted weights are found to be very small and tends to cancel out at aggregate level. It is concluded that the effect will depend on the size of the seasonal factor in December and the difference between the price trend of products with large seasonal variation and the overall inflation rate.

The paper “**The Euro Area Inflation Flash Estimate Procedure**” by Pedro Martins Ferreira and Luca Gramaglia (Eurostat) presents a newly developed model for producing one-period flash estimates of the euro area HICP. The paper discusses the use of preliminary data in now casting of inflation and advantages and disadvantages of forecasting the aggregate series (direct forecast) compared to aggregating the forecasted sub-indices (indirect forecast). The single-equation multivariate model that has been applied seems suitable for the resources and time constraints for producing the monthly flash estimates. In producing flash estimates for period t , the model, which has been implemented from October 2012, combines three types of data: Historical HICP series of all euro area countries until $t-1$, preliminary (early estimate) HICP series for some of the countries for period t , and energy prices for all euro area countries until period t . This far the model has provided good estimates of the euro area HICP. Further work to reduce possible bias/improve accuracy is planned.

The paper “**Addressing the Formula Effect Gap Between the UK’s two Primary Measures of Consumer Price Inflation**” by Derek Bird (Office for National Statistics) explains the background of the decision of the ONS to continue producing the RPI, which applies both Carli and Dutot indices, while the CPI (the UK HICP) uses Jevons. This creates a gap between the RPI and the CPI. Since the RPI is used for indexation purposes this created a large interest from government and other users of the index. To meet user needs ONS from March 2013 in addition to the RPI based on Carli and Dutot has published an RPI (RPIJ) based on Jevons. The paper provides an excellent overview of the development of UK/ONS consumer prices indices since the early 20th century, highlighting the development of calculation methods over time as well as the development in governance structure. The paper also shows the dilemma between, on the one hand, user needs and huge public and political interest, and on the other hand, the decisions of the statistical officers of what methods to apply. The paper, as one of the lessons learned, underlines the need for an explicit target index defined in statistical terms.

Session 7 on Real Time Estimations of Superlative Indices

Chairperson: Erwin Diewert

Presented papers

There were three papers for presentation.

- “Using the Rolling Year Time Product Dummy Method for Quality Adjustment in the Case of Unobserved Characteristics” *Frances Krsinich (Statistics New Zealand)*
- “Geometric Indexes and Substitution Bias in the CPI” *Gabrielle Bishop (Australian Bureau of Statistics) - presented by Marcel van Kints*
- “Measuring Dynamic Inflation in Brazil” *Vagner Laerte Ardeo & Angelo Polydoro (Fundação Getulio Vargas)*

The paper “**Using the Rolling Year Time Product Dummy Method for Quality Adjustment in the Case of Unobserved Characteristics**” is a follow up paper to the paper listed in the Topic 4 session by Jan de Haan and Frances Krsinich: “*Scanner Data and the Treatment of Quality Change in Rolling Year GEKS Price Indexes*”.¹ Before the contents of the present paper are described, it will be useful to outline the contents of the de Haan and Krsinich paper.

In situations where monthly scanner data are available, it seems reasonable to use a monthly chained superlative index as the target index.² However, recent research³ has shown that chained superlative indexes are subject to a *chain drift problem*⁴ if the price and quantity data are subject to large fluctuations from month to month due to the effect of sales.⁵ A possible solution to the chain drift problem is to use a *multilateral index number technique*, but applied to the time series context. The GEKS multilateral method⁶ applied in the time series context with T periods works as follows: Pick the first time period as the base and compute the Fisher index for each period, giving rise to a sequence of T index numbers, all of which are not subject to the chain drift problem. Now pick the second period as the base and compute a new sequence of T Fisher indexes for each period. Continue on with this process of picking each period as the base, computing Fisher indexes until T sequences of T index numbers has been constructed.

¹ This paper is a revised version of de Haan and Krsinich (2012).

² This is the advice given in *The Consumer Price Index Manual: Theory and Practice*.

³ See Ivancic, Diewert and Fox (2011) and de Haan and van der Grient (2011).

⁴ Walsh (1901; 389) (1921; 540) worked out a method for testing for the existence of chain drift. His test works as follows: suppose price and quantity data are available for say T periods and add an artificial period T+1 which has the price and quantity data of period 1. Work out the sequence of chained index numbers over the T+1 periods and check to see if the final price level equals the initial price level. If not, the chained indexes are subject to a *chain drift problem*.

⁵ A chain drift problem can also arise due to seasonal fluctuations in prices and quantities; see the Diewert (2013) paper presented in the Topic 6 session.

⁶ The GEKS method originated with Gini (1931) but it was also derived by Eltetö and Köves (1964) and Szulc (1964). For alternative derivations of the method, see Balk (1996) and Diewert (1999).

Final indexes for the T periods are obtained by taking the geometric mean of all of these sequences; i.e., the period 1 index is equal to the geometric mean of all T of the period 1 indexes, the period 2 final index is equal to the geometric mean of all T of the period 2 indexes and so on. The resulting GEKS indexes are free from the chain drift problem. However, there is a problem with the GEKS method applied to the time series context: as time rolls on and the data for a new period become available, all of the indexes need to be recomputed. To avoid this problem, Ivancic, Diewert and Fox (2011) suggested a Rolling Year Approach; i.e., in the context of monthly price and quantity data, start the method by computing the GEKS indexes for the first 13 months of data.⁷ Then as the data for a new month become available, drop the first month of data, add the data of month 14 to the Rolling Window, compute new GEKS indexes and use the movement in the new index over the last two months in the window of data to update the previous indexes. The resulting Rolling Year GEKS (RYGEKS) indexes are no longer entirely free of chain drift but numerical experiments by de Haan and van der Grient (2011) suggest that the amount of chain drift is small. This completes the explanation of the first method used by Krsinich in her paper and in the earlier paper by de Haan and Krsinich (2012).⁸

The second method used by Krsinich, the Rolling Year (Weighted) Time Product Dummy (RYTPD) Hedonic Regression Model, also has its origins in multilateral index number theory. The Country Product Dummy method for constructing elementary price indexes across countries, introduced by Summers (1973), is a simple form of a hedonic regression model, where the only characteristic of the product that is used in the hedonic regression is a dummy variable for the product itself. This method can be adapted to the time series context (where time periods replace countries) and it is then known as the Time Product Dummy (TPD) method for constructing elementary indexes. Diewert (2004) (2005) and Rao (2005) introduced expenditure weights into the CPD method and if the method is adapted to the time series context as in Ivancic, Diewert and Fox (2009), it becomes the Weighted Time Product Dummy (WTPD) method for constructing price indexes. Finally, Ivancic, Diewert and Fox (2009) adapted this method to the Rolling Year context; i.e., a window length of 13 months was chosen, the WTPD method was implemented for the first 13 months of price and quantity data, the next month of data was added to the initial data set and the first month was dropped, the WTPD method was run again and the index movement from month 13 to month 14 was used to update the initial index numbers and so on.⁹ This is the Rolling Year Time Product Dummy (RYTPD) method that is the second main method used by Krsinich in her paper.

⁷ Ivancic, Diewert and Fox chose 13 months as the window length because strongly seasonal commodities could then play a role in determining the index movements. The question of the “optimal” window length is a question for further research.

⁸ The GEKS method uses bilateral Fisher ideal indexes as the basic building block. de Haan and Krsinich (2012) use Törnqvist indexes as their basic building blocks, following the example of Caves, Christensen and Diewert (1982). Thus a more accurate name for the RYGEKS indexes used by Krsinich would be Rolling Year Caves, Christensen and Diewert (RYCCD) indexes.

⁹ Ivancic, Diewert and Fox (2009) found that the Rolling Year Weighted Time Product Dummy indexes were quite close to their Rolling Year GEKS indexes for their Australian data set.

The third method that figures prominently in the Krsinich paper (and the earlier paper by de Haan and Krsinich (2012) which introduced this method) is the ITRYGEKS method.¹⁰ A problem with the first two methods described above is that these methods do not deal adequately with the introduction of new products. Thus if a new product enters the marketplace during the last period in the Rolling Year, it will have no effect on the index for the current period and all previous periods. The ITRYGEKS method is not subject to this criticism. The basic building block in this method is a time dummy hedonic regression model that uses the data for two periods. The dependent variable in the model is the logarithm of the item price and a time dummy and various characteristics of the product enter the regression as independent variables. The time dummy coefficient and the characteristic “prices” are the result of a weighted least squares minimization problem. If an item appears in both periods under consideration, the weights in the weighted regression are the (arithmetic) average of the expenditure shares for the item in the two periods; if the item appears in only one of the two periods, one half of the expenditure share on the item for that period is used as the weight. The resulting bilateral price index turns out to equal the usual Törnqvist index if all items are present in both periods but for unmatched items, an imputed price for the missing price enters the index number formula and this imputed price is obtained as a predicted price using hedonic regression. Thus in the general case when there are unmatched items in the two periods under consideration, we obtain a generalization of the usual Törnqvist index that makes use of imputed prices from the hedonic regression and hence de Haan and Krsinich (2012) call the resulting bilateral index number formula the Imputation Törnqvist index.¹¹ The third method used by Krsinich can now be explained: it is simply the Rolling Year GEKS method, except instead of using bilateral Fisher indexes as the basic building blocks, the Fisher indexes are replaced by bilateral Imputation Törnqvist indexes. The resulting indexes are called ITRYGEKS indexes.¹²

Which of the three methods discussed above is “best”? Methods 1 and 2 (RYGEKS and RYTPD) have the disadvantage that unmatched items in any bilateral index used as building blocks in these methods have no impact on the resulting indexes. But these methods have the advantage that no information on product characteristics is required in order to implement these indexes. Method 3 (ITRYGEKS) has the advantage that it is likely to have the least amount of bias due to the introduction of new models and the disappearance of old models but of course, it has the disadvantage that product characteristics information is required in order to implement the method. The bottom line is that ITRYGEKS can be regarded as the best method that can deal with chain drift and quality change in the context of using scanner data.

¹⁰ The IT in ITRYGEKS stands for Imputation Törnqvist.

¹¹ This index is derived in de Haan and Krsinich (2012) and draws on earlier contributions by Diewert (2003) and de Haan (2003) (2004).

¹² It might be more appropriate to call these indexes ITRYCCD indexes since multilateral CCD indexes are used in place of multilateral GEKS indexes in the case where all items are matched.

The actual contents of the Krsinich paper can now be reviewed. Krsinich shows that for electronic products in New Zealand, the RYTPD indexes were closer to the “gold standard” ITRYGEKS indexes than their RYGEKS counterparts. This is a somewhat surprising result since a priori, since it is known that in the two period case where all products are present in both periods, RYGEKS and RYTPD approximate each other closely.¹³ However, the results presented by Krsinich indicate that this close correspondence does not hold in more realistic environments when not all products are present in all periods. The implication of the results presented by Krsinich is that when information on product characteristics is not available, the RYTPD method is preferred to the RYGEKS method. This is an important result.

Krsinich in the remainder of her paper experiments with some variants of the RYTPD method in an attempt to obtain results that are closer to the ITRYGEKS results. These variants tried lagging or centering the estimates obtained from the RYTPD method; e.g., instead of updating the index level of the previous period by the rate of change in the RYTPD estimates for the last two months in the Rolling Year, instead wait say 6 months and update the index level of the previous period by the rate of change in the RYTPD estimates for the middle two months in the Rolling Year. As the author notes, these variant methods are not viable production methods for a non-revisable CPI, but Krsinich indicates that these methods could be used as benchmark methods and other production friendly methods could be compared to these alternative benchmark methods.¹⁴ In any case, Krsinich found empirically that her alternative (lagged) Rolling Year Time Dummy Product methods did not represent clear improvements over the standard RYTDP estimates for the New Zealand scanner data on electronic equipment.

Overall, the paper is a valuable addition to the scanner data literature. A possible follow up topic to the paper would be to experiment with the RYTDP method using longer Rolling Windows; e.g., it may well be that using a 2 year Rolling Window may take us closer to ITRYGEKS than using a 1 year Rolling Window.

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¹³ See Diewert (2005; 564).

¹⁴ However, it would seem to be more appropriate to test these alternative production friendly methods against the ITRYGEKS estimates when available.

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The paper “**Geometric Indexes and Substitution Bias in the CPI**” is a very interesting paper that follows up on the paper by Armknecht and Silver (2012) (which was also presented as a poster session paper). The Armknecht and Silver paper in turn draws on the earlier papers by Lent and Dorfman (2009) and Shapiro and Wilcox (2009) who looked at a very fundamental problem: how can statistical agencies produce a consumer price index (using only monthly or quarterly price information and expenditure information from a distant base year) that will be close to a superlative index?

The Bishop/van Kints paper addresses the above question using Australian CPI data over the period June 2000 to June 2011 by computing Paasche¹⁵ and Fisher indexes retrospectively and then the resulting Fisher index is compared to various indexes that can be produced using only quarterly price information and information on expenditures on a past base year. The “practical” indexes that can be constructed are the Lowe index, the Young index, the geometric Lowe index and the geometric Young index. For the sake of definiteness, these indexes are defined as follows for the case of N upper level expenditure categories (in the above order) for quarter t relative to a base quarter 0:¹⁶

$$(1) P_{Lo} \equiv \sum_{n=1}^N s_n^{0,b} (p_n^t / p_n^0)$$

where the *hybrid expenditure shares* are defined by $s_n^{0,b} \equiv p_n^0 q_n^b / \sum_{i=1}^N p_i^0 q_i^b$;

$$(2) P_Y \equiv \sum_{n=1}^N s_n^b (p_n^t / p_n^0)$$

where the *base year expenditure shares* are defined by $s_n^b \equiv p_n^b q_n^b / \sum_{i=1}^N p_i^b q_i^b$;

$$(3) P_{GL} \equiv \prod_{n=1}^N (p_n^t / p_n^0)^{s_n^{0,b}} ;$$

$$(4) P_{GY} \equiv \prod_{n=1}^N (p_n^t / p_n^0)^{s_n^b}$$

where p_n^b is the price of expenditures in category n for the base year b and q_n^b is the corresponding quantity or more accurately, the corresponding volume for the base year b .

¹⁵ It is not clear from the paper exactly how the Paasche indexes were constructed. The ABS has collected expenditure information only once every 6 years (now changed to once every 4 years). The paper by Diewert, Huwiler and Kohli (2009) shows how approximate annual Fisher indexes can be constructed on a retrospective basis using infrequent information on annual expenditures.

¹⁶ The algebra here is for the case of long term price relatives. The algebra will be different if short term price relatives are used.

The ABS computed Laspeyres, Paasche, Fisher, Lowe, Geometric Lowe and Geometric Young indexes using the data for 2001-2011.¹⁷ As usual, the Laspeyres was above the Fisher and the Paasche below, with the substitution bias of the Laspeyres averaging about 0.24 percentage points per year, which is in line with other estimates of upper level substitution bias. The Lowe index turned out to be well above the target Fisher index¹⁸ and the Geometric Young turned out to be below the Fisher indexes (by about the same amount as the Lowe was above the Fisher indexes).¹⁹ The Geometric Lowe turned out to be very close to the target Fisher index.²⁰

The empirical results in the present paper and the paper by Armknecht and Silver suggest that a pretty good approximation to a target superlative index can be produced in real time in at least two ways:

- Approximate the target Fisher index by the geometric mean of the Lowe and Geometric Young indexes or
- Approximate the Fisher index by the Geometric Lowe index.

The reason why the first approximation works can be traced back to the work of Shapiro and Wilcox (2009) who showed that a superlative index for the US could be well approximated by a Lloyd (1975) Moulton (1996) index which in turn was exact for Constant Elasticity of Substitution (CES) preferences for consumers with an elasticity of substitution equal to 0.7. Now if the CES preferences corresponded to an elasticity of substitution equal to 0, then the Lloyd Moulton index would be equal to the Lowe index while if the CES preferences corresponded to an elasticity of substitution equal to 1, then the Lloyd Moulton index would be equal to the Geometric Young index. Thus since the elasticity of substitution is roughly halfway between 0 and 1, it is plausible that a geometric average of the Lowe and Geometric Young indexes would get us close to a Lloyd Moulton index which is very close to the target superlative index. However, this result will not necessarily hold for other countries and so more research on this topic is required.

The second approximation is more difficult to rationalize. However, we know that the Lowe index is subject to a certain amount of upper level substitution bias. We also know that numerically, the Geometric Young index will lie below the Lowe index; i.e., $P_{GY} < P_{Lo}$.²¹ It seems that this gap between P_{GY} and P_{Lo} is just big enough to compensate for the positive substitution bias that is inherent in the Lowe index (at least, this is the case for Australia and the US).

Our conclusion is that the ABS and Armknecht and Silver paper are very promising and other statistical agencies should try and replicate the results of these studies.

¹⁷ The Young index was not computed but typically, it will lie well above the target Fisher index.

¹⁸ This is not surprising; the ILO Manual (2004) indicated that this will be the usual case.

¹⁹ Thus from Figure 3 in the paper, it looks like the geometric average of the Lowe (labelled the Laspeyres in the Figure) and the Geometric Young would be fairly close to the target Fisher index. This result was also obtained by Armknecht and Silver (2012) using US data.

²⁰ This result was also obtained by Armknecht and Silver (2012) for their US data set.

²¹ Equality will hold if the period t prices are strictly proportional to the period 0 prices. This is Schlömilch's inequality; see Hardy, Littlewood and Polya (1934; 26).

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The paper "**Measuring Dynamic Inflation in Brazil**" attempts to extend the cost of living index number framework from a current period consumption perspective to a comparison of lifetime consumption profiles. This is a very difficult topic and there are many problems with this framework and so at present, it is not ready to be implemented by statistical agencies.

For discussions of some of the problems, the reader should consult Pollak (1989) and section 4 of Diewert (2002).

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Papers at the poster session

There were four papers for the poster session.

- “Notes on GEKS and RGEKS Indices - Comments on a Method to Generate Transitive Indices” *Peter von der Lippe (Universität Duisburg-Essen) – presented by Jens Mehrhoff*
- “Ordinal Utility and the Conceptual Basis of Cost-of-Living Indexes: How History Can Inform Contemporary Debates” *Thomas Stapleford (University of Notre Dame)*
- “Post-Laspeyres: The Case for a New Formula for Compiling Consumer Price Indexes” *Paul Armknecht & Mick Silver (IMF)*

The session on “**Notes on GEKS and RGEKS Indices**” was very spirited! The author made several criticisms of the Rolling Year GEKS method for constructing real time indexes:

- RYGEKS does not eliminate chain drift, contrary to the assertions that it does do this. Put otherwise, RYGEKS does not satisfy Walsh’s Multiperiod Identity Test.
- The length of the Rolling Window is arbitrary. Different window lengths will generate different RYGEKS indexes.
- The method is very complicated. The author seemed to suggest that fixed base or chained indexes would probably do a satisfactory job without all of the computational complications of the RYGEKS method.

The Chair of the session responded to the above criticisms by acknowledging that points 1 and 2 above are indeed valid. However, he had the following responses to the above 3 points:

- Yes, RYGEKS does not completely eliminate chain drift. But using actual scanner data, the amount of chain drift; i.e., violations of Walsh’s Multiperiod Identity Test, appears to be small.²²
- Yes, the RYGEKS estimates will change as the window length changes. But the 13 month window length chosen by IDF was not arbitrary; it was the smallest window length such that strongly seasonal commodities could play a role in the construction of a period to period index. However, the question of the “optimal” window length is still open and requires further research. Ideally, one would like a minimal window length such that adding one more period prior to the present first period does not significantly change the period to period price change for the last two periods in the window. The Chair now believes that the 13 month window length is likely to be too short in view of the above criterion; it seems likely that a *two year rolling window length* would be more stable so that strongly seasonal commodities for each month of the year could play a role in the overall index movements.

²² See de Haan and van der Grient (2011) on this point.

- The RYGEKS method is not that complicated. And what are the alternatives to this method?²³ As has been demonstrated a number of times, chained superlative indexes are subject to chain drift due to strongly seasonal commodities and the effects of sales. Thus chained indexes are no solution to the chain drift problem. But fixed base indexes are also not a solution for two reasons: (1) eventually we have to change the base because of the problem of new and disappearing items so we will still have a problem in determining when to change the base and, more importantly, (2) if we pick say January as the fixed base month, then all of the strongly seasonal commodities for the remaining months can play no role at all in the construction of the fixed base index (because there are no counterpart prices for these strongly seasonal commodities in January). Thus the “solutions” proposed by von der Lippe to simplify index construction are not really practical in view of the above difficulties.

Finally, Jens Mehrhoff in his presentation of the von der Lippe paper noted that the Chair on other occasions had subjected the Carli index to severe criticism because it does not satisfy the Time Reversal Test.²⁴ The Chair responded to this valid criticism with the observation that the Carli index *fails the Time Reversal Test with a definite upward bias* whereas the failure of the Multiperiod Identity Test by RYGEKS does not have this built in bias in one direction.

The paper “**Ordinal Utility and the Conceptual Basis of Cost-of-Living Indexes: How History Can Inform Contemporary Debates**” looked at the historical development of the Consumer Price Index during the past century. Although the paper did not produce any clear cut recommendations for statistical agencies, a wealth of interesting materials were presented and price statisticians interested in the history of our subject will enjoy reading the paper.

The paper “**Post-Laspeyres: The Case for a New Formula for Compiling Consumer Price Indexes**” has already been discussed in the above discussion of Presentation Paper 2. There is little that needs to be added here except to note that the situation in the US is different from the situation in Australia. In the US, the household expenditure survey is continuous so that monthly expenditure baskets can be constructed (with a lag of course) and this facilitates the calculation of month to month superlative indexes. Other national statistical agencies should seriously consider following the US example so that more reliable target indexes can be constructed on an ex post basis.

This paper is strongly recommended for study by national statistical agencies.

²³ A viable alternative to Rolling Year GEKS is the Rolling Year Weighted Time Product Dummy method suggested by Ivancic, Diewert and Fox (2009) and de Haan and Krsinich (2012).

²⁴ The time reversal test is a special case of Walsh’s Multiperiod Identity Test to the case of two periods.

Session 8 on International Comparability of Price Developments and Price Levels

Chairperson: Erwin Diewert

Presented papers

There were two papers for presentation.

- “Concepts and Terminology for International Comparisons of Prices and Real Incomes” *Prasada Rao (University of Queensland) and Bert M. Balk (Rotterdam School of Management, Erasmus University)*
- “Multipurpose Price Statistics” *Roberto Barcellan (Eurostat)*

The 2011 Phase of the International Comparison Program (ICP) is nearing completion and PPPs and real incomes for over 160 countries, covering all the regions of the world, will be released by the end of 2013. The paper “**Concepts and Terminology for International Comparisons of Prices and Real Incomes**” focuses on defining various ICP terms, including *purchasing power parities of currencies, price level indices and real expenditure or volume comparisons across countries*. The paper also relates these concepts the terminology used by national statistical offices in the publication of the CPI and national accounts aggregates at current and constant prices.

Extrapolation of PPPs over time introduces further complexities in terms of comparing “real aggregates” at current and constant prices which can be confused with nationally published aggregates at current and constant prices. The paper defines the concepts and terms used in international comparisons in manner that is consistent with the terminology used by price and national accounts statisticians in different countries. The paper also examines the role of normalization in the computation of PPPs and consequent changes in the interpretation of price level indices. Finally, the paper also formalizes the concepts needed to discuss PPPs (which are prices across space), price movements over time, real and nominal comparisons of volumes and comparisons at current and constant prices.

The paper “**Multipurpose Price Statistics**” makes a strong case for combining the usual collection of prices for the same items over time with the collection of item prices over space so that comparisons of price levels over time and space can be made using essentially the same set of item price data (or modifications of it). The author notes that the development of price collection methods needs to combine the collection of price data so that it can serve as inputs into temporal indexes of prices such as the HICP or CPI and for cross country Purchasing Power Parities (which are indexes of prices across space at the same time). He notes that this modernization of price statistics can be viewed as the development of *multipurpose price statistics*.

Of course, this idea is pretty sensible. What then are the costs of implementing this idea? The main cost is the cost of getting countries within a region to agree on a common list of products or items that all countries in the region will price as part of their regular intertemporal collection of prices. This sounds like a straightforward exercise but it is not that easy to implement, particularly for countries at very different stages of development or who produce and consume very different products. The author goes on to explain some of the practical problems associated with this harmonization exercise and gives some results from a pilot study on detailed average price levels.

The author concludes with a detailed list of recommendations, the most important one which is to develop a common product list to be priced across countries for say 300 products. The author's suggestions seem to be very reasonable.

Papers at the poster session

There were two papers for the poster session.

- “Construction of Panels of Real Incomes at Current and Constant Prices: An Econometric Approach” *Prasada Rao, Alicia Rambaldi and Howard Doran (University of Queensland)*
- “Methodologies of Compiling Consumer Price Indices, 2012: ILO Survey for Country Practices” *Valentina Stoevska (ILO, Department of Statistics)*

In order to construct comparable real incomes (or real output volumes) across countries and across time, the World Bank’s ICP program produces a set of Purchasing Power Parities (PPPs) across countries for a certain time period. These PPPs are used to deflate nominal country incomes at the benchmark time period into comparable real incomes across the countries in the international comparison. Then a panel of comparable real incomes can be generated over time by using country nominal incomes and the corresponding domestic deflators. The problem with this method of generating comparable real income data across time and space occurs when the World Bank calculates a new set of PPPs for a reference year say 5 years later. When the new set of cross country real incomes is constructed using the new PPPs, it invariably turns out that the new set of cross country real incomes does not agree with the extrapolated set of real incomes that were generated by the previous ICP benchmark year and the national price and volume indexes. This would not be a problem if the discrepancies were small but they are invariably rather large! Thus the following question arises: *how to “best” combine the national information on prices and volumes with the periodic World Bank ICP price comparisons in order to construct a consistent series of real incomes across time and space.*

The paper “**Construction of Panels of Real Incomes at Current and Constant Prices**” presents the general form and some analytical properties of a new method for constructing such a consistent set of Purchasing Power Parities (PPPs) and the associated real incomes. The econometric approach proposed by the authors improves upon the current practice used in the construction of the Penn World Tables, PWT and similar tables produced by the World Bank. A state-space formulation is used in combining PPPs for benchmark years constructed by the International Comparison Program (ICP) with PPP predictions from a model of the national price level (or exchange rate deviation index) for all countries and years. Data on price movements available from national sources are also incorporated. The smoothed PPP predictions (and standard errors) obtained through the state-space representation of the model are produced for both ICP- participating and non-participating countries and non-benchmark years. A number of analytical results highlight the properties and flexibility of the authors’ method.

The method is extended to construct panels of PPPs and real incomes at constant prices. The empirical illustration shows the general model can produce variants that either: (a) result in PPP predictions that accurately track the available ICP’s PPPs (benchmarks); or (b) preserve the growth rates in price levels implicit in individual countries’ national accounts data. In other words, the researcher can specify whether the panel should be consistent with all of the benchmark PPP comparisons or with the national time series of real incomes for each country in the comparison. A data set for 141 countries for the period 1970 to 2005 is used to illustrate the flexibility of the method and to compare its performance to PWT6.3.

A problem with the authors' method is that it is difficult to know what relative weight to place on the cross sectional comparisons versus the time series comparisons. But this is a problem with all methods that attempt to harmonize cross sectional comparisons with time series comparisons.

“Methodologies for Compiling Consumer Price Indices, 2012: ILO Survey for Country Practices” - the purpose of the ILO Survey was to provide basic information on the sources and methods used in each country in compiling the CPI published by the ILO. The survey also was used to indicate the differences between the national series with regard to their coverage, definitions, methods of measurement, methods of data collection, reference periods, etc.

74 countries completed the *methodological questionnaire* (out of 178 countries). The distribution of countries that completed the questionnaire by continent was follows:

- Asia 15
- Africa 18
- Europe 24
- Americas 13
- Oceania 4

The structure of the questionnaire was decomposed into the 9 following headings:

- A. Identification;
- B. Coverage;
- C. Concepts, definitions, classifications and weights;
- D. Sample design;
- E. Data collection;
- F. Computations;
- G. Editing and validation procedures;
- H. Dissemination;
- I. Other information.

Here is a summary of the main findings of the survey:

- 2/3 of the countries use weights that are representative for the whole country.
- Probability sampling methods are used in less than 25% of the countries.
- Scanner data are used in the official CPI by only 4% of the countries.
- Second hand goods (mainly cars) are observed in 45% of the countries.
- 55% of the countries used the geometric mean formula at the elementary level (Jevons formula), 32% used the Dutot formula, 5% used the Carli formula and 9% used another formula or method.
- 2/3 of the countries calculate and disseminate average prices for some products.
- In 2/3 of the countries the weight reference period differs from the price reference period (and the index reference period when the index is set equal to 100).
- Half of the countries update the weights only once every 3-5 years.
- 2/3 of countries price update the weights in case where the weights reference period is different from the price reference period (the usual case).
- 45% of the countries use the carry forward method of the last available price when seasonal prices are missing; about 38% use the movements of in season products to impute a price for the missing seasonal item.
- Out of 178 countries, only 13 disseminate their CPI index with a quarterly periodicity; the rest have monthly CPIs.

The paper had a variety of other interesting pieces of information about the actual construction of CPIs around the world.

