

# Nineth UN International Working Group on Price Indices

Ottawa Group meeting

Hosted by the Office for National Statistics

Victoria Park Plaza Hotel • London • UK • 14–16 May 2006



Note of the Meeting

## Introduction

This volume contains revised and lightly edited versions of papers presented at the Ninth Meeting of the International Working Group on Price Indices (the Ottawa Group). The meeting was hosted by the UK Office for National Statistics in London from 14 through 16 May 2006.

### Terms of reference of the Ottawa Group

The Ottawa Group provides a forum for specialists and practitioners who work for, or are advisors to, national statistical agencies or international organisations to exchange their experiences and thoughts on crucial problems of measuring price change. The Group's strength is based on its professional authority, independence, and usefulness to national and international agencies.

Without avoiding theoretical issues, the focus of the Group is on applied research, particularly though not exclusively, in the area of consumer price indices. The Group examines advantages and disadvantages of various concepts, methods and procedures in the context of realistic operational environments, supported by concrete examples whenever possible.

Only specialists actively involved in the application of the principles relating to the topics under discussion are invited to the Group's meetings as active participants. The proceedings from the sessions are edited and diffused. They contain the presented papers and the most important elements of discussions. They also include the Group's recommendations when a preponderant opinion clearly emerges from the discussions, or, if this is not the case, a summary of the discordant opinions with balanced commentary.

The Group may also assemble and publish compendia of materials related to specific topics of price statistics, composed of papers and of summaries of discussions from several meetings. Each of these publications could constitute chapters of a Handbook describing best practices in the given area of price statistics.

### Organisation of the Group

The Group has a Steering Committee, which ensures both the continuity and evolution of the Group's activities. The Committee comprises representatives of the agencies that host the Group's recent or upcoming meetings together with others agreed to by the membership from time to time. The representative of Statistics Canada is a permanent member, serving as executive Secretary.

The Committee outlines long-term activity plans for the Group and proposes topics for the meetings. Meetings are organised in principle once a year, with topics established in advance for at least the next two meetings. The Committee extends calls to the member agencies for the submission of papers on the agreed topics and it is responsible for the selection of papers to be presented. Their authors are invited to the meeting, possibly with other specialists whose contribution to the discussion on a specific topic is considered useful. The number of active participants is kept limited for the sake of efficient discussion; however the host agency may additionally invite a reasonable number of observers.

Although the meetings may be divided into sessions, these are not organised in a parallel manner. Each session is devoted to one, clearly defined topic with a designated moderator. Furthermore, each topic has a designated person responsible for producing a summary of the discussions and recording any recommendations.

The host agency provides facilities for the meeting and arranges for the hard-copy publication of proceedings. The participants bear the cost of travel, accommodation and subsistence during the sessions.

The copies of proceedings and information about the Group are also available on the Internet. Prices Division, Statistics Canada, is responsible for maintaining a web-site open to the public. The Steering Committee may also decide to edit and periodically release compendia on selected topics, whenever it is warranted by the status of available materials.

### Previous meetings of the Group

Meeting	Date	Hosting Agency	Location
First	November 1994	Statistics Canada	Ottawa
Second	November 1995	Statistics Sweden	Stockholm
Third	April 1997	Statistics Netherlands	Voorburg
Fourth	April 1998	US Bureau of Labor Statistics	Washington DC
Fifth	August 1999	Statistics Iceland	Reykjavik
Sixth	April 2001	Australian Bureau of Statistics	Canberra
Seventh	May 2003	Institut National de la Statistique et des Études Économiques (INSEE)	Paris
Eighth	August 2004	Statistics Finland	Helsinki

### The Ninth meeting

In 2003 ONS were asked by the Ottawa Group Organising Committee to host the 9th meeting of the Ottawa Group scheduled for 2005/6. The ONS Investment Board agreed to this request with the backing of the National Statistician as the group has always represented a very effective forum for taking forward methodological issues relating to consumer price indices. ONS had been a very active member of the group but had not hosted a meeting in the past.

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

- Session 1 - Families of indices  
Chair: Marc Prud'homme
- Session 2 - Housing costs  
Chair: Martin Ribe
- Session 3 - Services  
Chair: Walter Lane
- Session 4 - Healthcare  
Chair: Walter Lane
- Session 5 - Measuring quality change  
Chair: Peter Hill
- Session 6 - Measuring the statistical quality of indices  
Chair: Dominique Guedes
- Session 7 - Other issues  
Chair: Paul Armknecht

In total, 24 papers were presented for discussion. All papers are included in this volume grouped according to topic and in order of presentation.

All papers were well received by participants and some very useful discussions were had on the various topics.

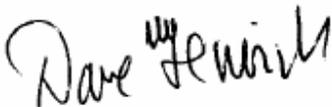
The group debated many issues at the forefront of current thinking on the development and improvement of consumer price indices. These issues included (but were by no means limited to); the treatment of housing in CPIs; the use of hedonic adjustment; measuring CPI quality; and the measurement of price change for consumer services. The key points will be covered in the Chair's summary notes which follow.

The steering committee will report to the United Nations Statistical Commission and send them a copy of these papers and proceedings. Finally, I would like to extend my thanks to the many people who contributed so much to the success of this meeting:

- my fellow steering committee members for their assistance in planning for this meeting;
- all participants for the quality of presented papers and their enthusiastic and insightful contributions to discussions;
- session chairs for leading the debate and preparing summaries of each session;
- Merry Branson of the Australian Bureau of Statistics for taking on the task of facilitating the compilation of the session summaries; and
- the Events Coordination team of ONS for their tireless work behind the scenes and for the support they provided to participants.
- Ben Whitestone of ONS for taking from me a lot of the day-to-day organisation of the conference.

I hope that this volume contains material that will directly benefit compilers of official price indices while encouraging further research in this important field of statistics.

The next meeting of the Group will be hosted by Statistics Canada and will be held in Ottawa in the second half of 2007.



David Fenwick  
Director, Consumer Prices and General Inflation  
Office for National Statistics, United Kingdom

## Session 1: Families of Indices

Chair: Marc Prud'homme, University of Ottawa, Canada

### Papers:

**Wirtz, C and Branchi, M (2006)** *Family of indices - Estimating the impact of government measures on the HICP for the euro area and the EU*

**Hill, P (2006)** *Household Production, Consumption and CPIs*

**Powell, M (2006)** *Applying the Index Family concept in practice - Tracing price changes through the retail sector*

**Hansen, C (2006)** *Price-updating of weights in the CPI*

**Lane, W and Schmidt, M L (2006)** *Comparing inflation between United States and Europe using the methods of the European Union's Harmonized Index of Consumer Prices.*

### Summary:

Session 1 deals with the issue of alternative and broader types of price indices beyond the traditional CPIs produced by most national statistical agencies. The session appropriately carried the banner "Family of indices" for which the session description is as follows:

*"There is a need for an agreed framework to facilitate the theoretical measurement and practical construction of a coherent family of price indices. Such a framework provides the basis for a systematic investigation of gaps in the range of indices available to analysts and policy makers. It also has the potential to enhance analytical capabilities, for example by providing the basis for an exploration of the time dimension to inflation, and how it filters through the economy. In this context it would be useful to explore the role of broader measures of inflation and trend measures.*

To this end, five papers made very helpful and well received contributions in the area of Family of indices. The first presenters were Christine Wirtz from Eurostat and Mariagnese Branchi from the European Central Bank with their paper Family of indices - estimating the impact of government measures on the HICP for the euro area and the EU. As a backdrop to the paper is the inflation environment faced by many European Union (EU) member countries, which is characterized by the relative persistence of inflation as measured by the Harmonized Index of Consumer Prices (HICP). The authors cite indirect taxes and administered prices as partly responsible for current situation. To quantify with more precision just how much of HICP inflation is the result of these two effects, the paper introduces two recently developed metrics, the HICP at constant tax rates (HICP – CT) and estimates of administered price HICP. Although similar measures have existed for many years in various individual EU countries, these two particular measures are the first time that comparable and coherent ones have been developed for the EU as a whole. In 2006, pilot projects for measuring HICP – CT were taking place in 17 EU countries. It is hoped that by 2007, all member countries will be in a position to provide HICP – CT's on a regular basis. With regards to administered price HICP, it is recognized that because of various and numerous ways that administered prices can impact on the HICP, so to reduce any ambiguity in this area, a definition of administered prices was developed by the European Central bank (ECB) in 2005 and is presented in the paper. In 2006, administered prices accounted for 15.5 % (3.5 % fully administered and 11.9 % mainly administered) of the expenditures that fall within the scope and coverage of the HICP. Interestingly, Wirtz and Branchi show that since January 2003, administered prices have progressed faster than non-administered prices and the former measure has outpaced the overall HICP index as a result over this period. Fact remains however, that given the relatively small importance of administered prices in the HICP, these prices have a small effect on overall inflation. Work is still in progress on the administered price front, with possible refinements to appear before the planned deadline of 2006.

Secondly, Peter Hill presented his paper Household production, consumption and CPIs which proposes a novel approach to the compilation of consumer price indices and cost of living indices by making the important distinction between those goods and services that provide direct utility to the consumer from

those that can best be defined as intermediate inputs into household production activities. Moreover, some other goods purchased by households are best described as fixed assets that are used to provide inputs of capital services into future household production and hence also do not provide direct utility to the household. In the final analysis, the households themselves produce most utility generating goods and services. It might be thought that the issue of distinguishing between these two types of expenditures may be a purely academic exercise with little or no practical consequence given the relatively small share of expenditures devoted to so-called intermediate consumption as opposed to final. The author does however cite a study by Landefeld and McCulla that rebuffs this notion by concluding, and contrary to popular belief, that only 12 % of consumption expenditures in the U.S. can be qualified as "final"; when own household consumption is added to this figure yields a new estimate of consumption for which 91 % consists of own consumption. Research into the household production and consumption split can potentially have significant ramifications, most importantly for measuring GDP, whereby the conventional approach, according to the author and the supporting literature, underestimate GDP by some very large margin. The thesis put forward by the authors has important implication for the compilation of household indices, be it a CPI or a COLI. While the former should use consumers' expenditures as its basis, the latter should use only those goods and services that are utility yielding for the household. Admittedly and as recognized by Mr. Hill, estimating price indices for the outputs of own production can be challenging from a conceptual and practical point of view. However, suggested solutions are offered to resolve these issues.

The third paper of the session was by Matthew Powell of the ONS, Applying the index family concept in practice - tracing price changes through the retail sector. It is an interesting attempt to bridge the gap among the prices of similar or identical goods that are transacted among the various sectors of the economy (e.g., retail vs. wholesale) and to analyse the differences that may arise. More precisely, the present paper attempts to fit ONS' available data for values and prices of retailers sales, stocks, and purchases -including imports- into an appropriate analytical framework, explain the theoretical and practical implications and show the gaps in the existing system. The author's paper applies to the retail margin sector and its corresponding price indices ideas, which were first introduced in a paper by Fenwick (System of Price Indices and Supporting Frameworks) who used the System of National Accounts as the framework for integrating various price indices. As stated in the paper, retail sector margins have become ever more important in explaining economic growth in recent years; clearly the issue is an important one. Consumer price statisticians can also draw inspiration from such research because this sector is the source of many consumer price indices. In the end, the author notes that there are problems with using supply prices as a leading indicator. He also adds that there are difficulties of identifying the best way to measure constant price margins, and the difficulties of comparing consumer and producer prices in any way other than through balancing deflated accounts. He concludes by stating that even the simplest comparison of consumer and producer prices immediately suggests discrepancies that warrant investigating and closes by suggesting directions that such an investigation should take: 1) The choice between single and double deflation is clearly an empirical issue that can be answered by looking at price and quantity correlations; 2) The fact that sales and prices are available for commodities but purchases and margins are measured by industry is a serious limit on the measurement and analysis of trade volumes. The only way forward is to look at micro data to try to estimate separate industry and product margins; and 3) Microdata are also needed to reconcile movements in consumer and producer analysis with changes to the Value of trade margins.

Carsten Boldsen Hansen of the UNECE presented the fourth paper of the session and discussed the question of price updating the expenditure weights in the CPI. The author's position is that the question of whether to price-update the expenditure weights or not is important for the interpretation of the CPI and may have significant influence on the measured rate of price change. Lowe and Young indices as introduced in the international *CPI Manual* are used to illustrate his point. The Lowe index with price-updated weights is conceptually clear and measures the changing cost of buying a past reference basket of goods and services. It is upward biased compared to a cost of living index if consumers substitute. For the same reason it is also upward biased compared to an ideal fixed basket index, because of the time lag between the weight reference period and the index link period. However, if the relative quantities remain constant, the Lowe index will be a good estimate of an ideal basket index. This will be the case if, on

average, the elasticity of substitution is close to zero. The Young index, which uses the unadjusted expenditure weights, does not measure the changing cost of buying an actual basket of goods and services. However, the weights can be seen as estimates of the “true” weights in the index link period. It can approximate an ideal basket index, and hence in practice also a cost of living index, if the unadjusted weights are good estimates of the average expenditure weights. This will be the case if, on average, the elasticity of substitution is close to one. In the end whether the expenditure weights are price-updated or not influences the measured rate of price changes, and there are different practices in different countries, which may affect international comparability. The author concludes by recommending that there is a need for further research and discussion, both on theoretical and conceptual issues as well as the empirical implications.

The paper Comparing inflation between United States and Europe Using the Methods of the European Union’s Harmonized Index of Consumer Prices by Walter Lane and Lynn Schmidt from the BLS closed the first session. The paper introduces an experimental consumer price index for the United States that emulates as closely as possible the methods of the EU’s HICP. Consequently, a made-in-the US internationally comparable CPI now exists. The HICP differs from the US CPI in two major respects. First, the HICP includes the rural population in its scope. Second, and probably more importantly, the HICP excludes owner-occupied housing. The paper explains how the US HICP is calculated, makes adjustments for the conceptual differences in, and compares the relative importance of the broadly defined expenditure categories of the US HICP with those of the official CPI. Therefore, to construct the experimental US HICP, the BLS researchers expanded the CPI’s population coverage to the whole population and then narrowed its item coverage to remove the owner-occupied housing costs that the HICP excludes from its scope. Comparative analysis shows little difference between the headline CPI in the US (CPI-U) and the US based HICP. From December 1997 through December 2005, the experimental US HICP rose 20.8 percent while the official CPI rose 21.7 percent. Thus, HICP-measured inflation is lower than inflation as the official CPI measured it, mostly as a result of the exclusion of shelter, which witnessed a higher than average rate of growth during the period of the study. The BLS plan to continue producing the experimental index in the future and to revisit these conclusions is and when the underlying inflation situation changes.

#### Recommendations for statistical agencies:

The five papers offer interesting and valuable insights on issues dealing with families of indices. The presentations were thought provoking and at the same time refreshing with regards to the novel approaches that were suggested. The following recommendations can be drawn from the presented topics:

- 1) Clearly, changes in administered prices and indirect taxes can have an appreciable effect on inflation. Such measures are therefore highly encouraged for the EU member countries and others in order to better understand the price formation process.
- 2) For purposes of international comparability, more non EU countries should probably follow the lead proposed by the BLS and produce their own versions of the HICP.
- 3) The issue of price-updating the weights in the CPI may perhaps only be resolved empirically. Therefore more empirical analysis may be required in this area for the issue to be resolved.
- 4) The linkages between prices for similar products across sectors of the economy is important one and more work along the lines proposed here would certainly be welcomed.
- 5) The issue as to which goods and services should be used when producing a CPI raises some new issues and is sure to stir debate. Again, empirical analysis is needed to further understand the implications here and to that end, the author suggests some useful recommendations as to how this could be achieved.

## Session 2: Housing Costs

Chair: Martin Ribe, Statistics Sweden

### Papers:

**Woolford, K (2006)** *An exploration of alternative treatments of owner-occupied housing in a CPI*

**Klevmarken, A (2006)** *Towards an applicable true cost-of-living index that incorporates housing*

**Koskimäki, T (2006)** *Options for the organisation of rent surveys*

**Prud'homme, M (2006)** *An empirical analysis of the different concepts for owned accommodation in the Canadian CPI: The Case of Ottawa.*

**Shimizu, M (2006)** *Review of the Prices of Rents and Owner-occupied houses in Japan*

**Gudnason, R (2006)** *Market prices, house price indices and flow of services methods*

### Summary:

Housing raises particular problems for the treatment in a Consumer Price Index (CPI), due to the facts that dwellings are unique and last for a very long time. The six papers presented in the session essentially deal with consequences of these problems.

The three papers by Woolford (presented by Branson), Prud'homme, and Gudnason compare the classical alternative approaches to treatment of owner occupied housing in consumer price indices, that is,

- (Net) Acquisition or House Purchase approach
- Rental Equivalence approach
- User Cost approach
- Payments or Money Outlays approach.

The mentioned papers discuss conceptual aspects of these approaches, also recently treated elsewhere by Erwin Diewert (2004, The treatment of owner occupied housing and other durables in a consumer price index, IARIW Conference on Price Index Concepts and Measurement, in Vancouver). The papers present empirical comparisons between the mentioned approaches with regard to their outcome on given data sets. It is seen that in practice the outcome may differ substantially between the approaches, both in terms of index series for housing cost, and in terms of the weight for housing in the overall CPI.

Variants of the mentioned approaches are also treated, e.g. in the paper by Prud'homme, which considers forms of the money outlays approach without and with equity payments, and forms of the net purchase approach without and with interest expenditures. It is notable that the outcome depends heavily not only on the choice of approach, but also on the choice of components within the same main approach. The paper by Gudnason describes the form of user cost approach used for the Icelandic CPI, following house prices and real interest rates.

The paper by Klevmarken develops an approach to owner occupied housing within a general framework of a cost-of-living index. A dynamic model for consumer behaviour is developed, extending the usual theory of the cost-of-living index by accounting for the fact that dwellings retain a value over time. The theoretical considerations lead to an index that is practically computable in real time and is now being considered for possible use in the Swedish CPI.

The two papers by Koskimäki and Shimizu deal with the design of the rent surveys used in Finland and Japan. It is noted that accuracy of statistics on rents is particularly crucial where a rental equivalence approach is used for owner occupied housing. Fundamental design issues in a rent survey are whether to collect rents from tenants or landlords, and how to account for quality differences. Quality differences occur between rented dwellings observed at different times, and between rented and other dwellings. Quality differences are accounted for by a combination of stratification and hedonic regression. Both the Finnish

and the Japanese survey use hedonic models with the logarithm of the rent per square meter of floor area as dependent variable.

In the discussion several issues were noted. One issue is what population or universe a house price index should represent – the set of purchase transactions or the stock of dwellings. The ideal choice may depend on the use of the index, such as monetary policy or compensation. Another issue is the choice of variables to quality adjust dwellings for. In the literature various sets of quality variables have been tried, and here age and size of the dwelling seem to be the most ubiquitously included variables. It may seem desirable to adjust for location (e.g. by use of postcodes), as location is known to be a very essential price-determining factor for dwellings.

Two notable issues in applications of the user-cost approach are (i) whether or not to cover the forgone interest on the paid-up capital (equity), and (ii) whether or not to deduct capital gain from cost. In theoretical models of user cost the two components in question are included, but in current international practice they may often be excluded, as (in the words of Prud'homme's paper) they are not explicitly expensed or realised.

It was suggested in the discussion that real interest rates should be more relevant than the nominal interest rates in the computation of the interest cost component (e.g. in the approach presented in the paper by Klevmarken). However, it may in practice be somewhat problematic to compute real interest rates. In the Icelandic situation, mortgage interests paid are index adjusted (by use of the CPI) and thus real in themselves. A further issue on the interest component is whether it should reflect changes not only in the interest rates but also in the mortgage amounts needed to buy a house.

### **Recommendations for statistical agencies**

1. The high weight of housing in CPIs calls for particular care in considerations for the housing component. This applies on different levels, such as in the choice of approach, in the allocation of resources, and in the design and operation of the index production process.
2. The choice of approach for owner occupied housing is likely to have a decisive impact on the resulting index, and this choice has to be made with regard to both the uses of the index and the available data sources. Two examples: (i) The net acquisitions approach may be a particularly relevant choice for an index used in monetary policy decisions; (ii) The rental equivalence approach may be particularly relevant for a compensation index, but application of it would require that the rental market is similar enough to the market of owner occupied housing.
3. The choice and form of components of housing costs to be covered in a price index have to be thoroughly considered. For instance, in applications of the user cost approach, it has to be decided whether and how to cover capital gains. Further development and consolidation of conceptual frameworks may be motivated to further clarify the theoretical basis.
4. Quality adjustment has to be addressed for surveys of rents and of purchase prices of dwellings. The choice of variables to quality adjust for has to be thoroughly considered. Enhanced international cooperation aiming at further corroborated quality adjustment practices may be helpful.

## Session 3: Services

Chair: Walter Lane, Bureau of Labor Statistics, USA

### Papers:

**Becker, C (2006)** *Recent developments in the Swiss CPI - Scanner data, telecommunications and health price collection*

**Beisteiner, A (2006)** *Measuring prices for telecommunication services in Austria*

**Fixler, D (2006)** *Financial Service prices - Discusses the incorporation of financial services into a CPI*

### Summary:

At Session 3, on the measurement of price change for consumer services, there were three papers. Corinne Becker of presented the first paper, “Recent developments in the Swiss CPI: Scanner data, telecommunications and health price collection,” which she wrote with others at the Swiss Federal Statistical Office. She covered the main innovations they are introducing in their 2005 CPI revision. First, they tested the use of scanner data; this would allow them to reduce reliance on judgment in selecting items, to collect prices representing more of the reference month and the item category, while reducing the burden on respondents and handling special problems more effectively. The second improvement was to the telecom indices where rapid technological change and the turnover in product offerings present particular challenges. They added new sub-indices for mobile telephones and for the Internet to the older one for fixed-line telephone service. Finally, they improved their index for Medicine. Using data from their Office of Public Health and some assistance from the Pharmacists’ Association they grouped the medicines into ingredients and therapy categories and could thus identify the important categories. They then standardized the items by their active ingredient and can price the cost of a standard amount of that ingredient.

Next, Alexandra Beisteiner of Statistics Austria presented her paper, “Treatment of telecommunication services in the Austrian CPI.” She explained how they insure comprehensive coverage of this sector and handle the frequent innovations and changes in the structure of the tariffs for these services in the appropriate manner, consistent with international best practices and European Commission regulations.

Dennis Fixler of the Bureau of Economic Analysis presented the final paper of Session 3. The paper, “Incorporating Financial Services in a Consumer Price Index,” first lays out the underlying theory that justifies including in CPIs what traditionally is out of their scope. Money—and indeed all household financial instruments—contribute to consumer well being by facilitating transactions and inter-temporal transfers; this leads to the conclusion that all costs—including implicit costs—associated with acquiring them belong in a CPI. A “user cost of money” approach that is analogous to the flow of services approach that many CPIs use for housing services and in theory should use for consumer durables is the appropriate way to measure the implicit costs. Fixler’s paper illustrates how CPIs might measure the change in the prices of financial services by using a “reference rate” or risk-free interest rate. The national accounts currently use similar methods

## **Session 4: Healthcare**

**Chair: Walter Lane, Bureau of Labor Statistics, USA**

### **Papers:**

**van Haren, G, Kleima, F and de Haan, J (2006) *The CPI and the new Dutch Health Care System***

### **Summary:**

In Session 4 on Health care, there was just one paper. Jan de Haan of Statistics Netherlands presented the paper, "Medical Care Price and Quantity Indices: Dutch Practice and Unresolved Issues" that he wrote with his colleague Foske Kleima. Spurred by recent changes in Dutch health policy, their CPI and HICP will soon encompass expenditures for health care and health insurance. The paper considers three stylized cases, one where there is no health insurance (all health care is paid out of pocket), one where all care is paid with private insurance and one with public insurance. They consider some of the issues of each case and then proceed to a more realistic mixed case with all three. They all review the choice of the units of measurement interest (health inputs, treatments, or outcomes) and various issues with insurance itself.

## Session 5: Measuring Quality Change

Chair: Peter Hill

### Papers:

**Linz, S (2006)** *Hardware, Software, Network Effects - What's the price for using computers?*

**Manninen, K (2006)** *Hedonic Regressions - A Transaction Economy*

**Moran, P (2006)** *Applying Hedonics in Practice*

### Summary:

The papers by Stefan Linz and Peter Moran are concerned with the practical application of hedonics to the measurement of quality change. They deal with basically the same topic, namely the use of hedonics in the construction of price indices for consumer durables, computers and television sets respectively. The paper by Karl Manninen is quite different. It is a general and theoretical paper about the decomposition of aggregate value change into its price and volume components.

Manninen adopts a descriptive approach to the measurement of price and volume change based on the framework of a transaction economy. A transaction economy consists of three elements: "characteristics space that defines all possible transactions, a stochastic economic process defined onto that space, and cumulative joint probability distribution of all characteristics deduced from the process." Manninen argues that, whereas in traditional index number theory price and quantity indices are jointly determined, the complexity of the characteristics space makes it necessary to define pure price change as the change along the price characteristics axis alone while holding all other characteristics constant. The change in volume is then defined as the residual of value change after controlling for pure price change.

Manninen considers that the transaction economy approach may be most useful in practice when applied at a low level of aggregation, such as an elementary aggregate. By taking only a few products at a time it may be easier to find the most relevant characteristics to be used for estimation purposes. He makes use of the concept of a flexible estimation function that tries to measure the pure price change for individual transactions. An estimation function could be used as a bridge between the data collection and elementary index calculation. This leads into a discussion of hedonic regressions which may be used to obtain approximate estimates.

In contrast to Manninen's rather theoretical paper, the papers by Linz and Moran describe some practical applications of hedonics. Linz examines IT goods. He argues that the computers and their characteristics should not be considered on their own for two reasons. The first is that the availability of an operating system and applications software is a prerequisite for using a desktop or notebook. "Hardware and software should be considered together and the price development be observed for the whole bundle of goods." Hardware and software are not to be treated as "unconnected elements of a 'basket of goods' but rather 'input factors' which must fit together in order to run the computer application functions. The overall price development for applying computer functions can thus not be calculated as a weighted average of the price development of the single hardware and software components."

Linz then considers some estimates for Germany over the period 1996 to 2004. The results suggest that a cost index for complete computer systems did not fall as fast as the hedonic price index for desktop computers on its own. The technical progress for the software was not as fast as for the hardware. The hardware is only an input factor needed to run the application software.

The interaction between hardware and software is relevant for pricing computers. New software often includes new functionalities which may be important for some users but not all but which make higher demands on the hardware or the operating system. These impose higher costs on all consumers who may be obliged to acquire more powerful hardware than they need for their own purposes.

A second reason given for not considering computers on their own is the fact that computer systems are examples of “network goods”. A network can consist of all consumers using the same technology who jointly determine the potential demand for products that are compatible for that technology. The presence of network effects can limit the useful life of a system and may accelerate obsolescence. It can increase the costs of using computers.

The paper by Peter Moran reports on a project in which alternative hedonic indices for computers in the UK were calculated using the same data set. Hedonic methods have been used in the UK CPI since 2003. They are applied to desktops, laptops, digital cameras and mobile phones where the pace of change is so rapid that it may be difficult to price the same item throughout a 12 month period. The need to keep the model up to date is stressed in the paper.

The project concerned flat panel TV sets. The initial conclusion was that there was not a significant enough difference between the hedonic index and the standard imputed base price index to warrant the use of hedonics. It was decided to repeat the investigation using the US Bureau of Labor Statistics methodology and variable selection instead of the UK method. After 12 months the hedonic index using the BLS method was 5 points lower than using the UK ONS method. Using the BLS method the difference between the hedonic function index and the imputed base price index would have been large enough to warrant the use of hedonics.

An investigation into the factors responsible concluded that the differences in the results could not be attributed to the differences in the functional forms used by BLS and ONS. They seem to be mainly attributable to the fact that the BLS method uses fewer variables because brands are grouped and there are no coefficients for outlets. The use of fewer variables also appears to make the index more volatile.

### **Recommendations for statistical agencies**

1. Consumers do not consume computers directly but use them in conjunction with software to produce a variety of different kinds of computing services. Attention needs to be paid the possible effects on utility of interactions between complementary IT goods and services purchased by consumers when the amount of utility derived from one good may be conditional on the availability and ownership of another good.
2. The results obtained from hedonic regressions depend on the choice of variables as well as their functional forms. Statistical agencies may gain useful information about the robustness of their own results by checking them against those obtained by using alternative specifications used by other agencies.

## Session 6: Measuring the Statistical Quality of Indices

Chair: Dominique Guedes, INSEE, France

### Papers:

**Fenwick, D (2006)** *Real World Quality Measures*

**Silver, M (2006)** *Why Elementary Price Index Number Formulas Differ - Price Dispersion and Product Heterogeneity*

### Summary:

Although theoretical studies can help us to choose “a priori” the best methodology to construct CPI, quality assessment needs to be able to give measures of the quality in real world.

The papers of this session are very different but they have the same practical approach: trying to confront and use theory for quantitative evaluation of quality.

The paper from David Fenwick can be divided into two parts :

- an overview of the data quality assessment framework adopted by ONS,
- examples of statistical process to improve sampling.

Some years ago, quality management became a main strategic policy of ONS. A structured organisation was put on for all ONS activities. Being one of the most important official statistics, the CPI was a special concern. Several international standards are used, such as the “European foundation for quality management’s excellence model”, “Investors in People” and ISO 9002.

That has allowed integration, in the current work, of practices related to the improvement of quality through documentation, audits, regular system reviews and taking into account of the feedback of all actors involved (including the users).

In its second part, the paper presents two examples of actions aimed at improving quality. The first action, rather traditional, relates to the optimisation of the sampling by a better allowance for prices collected according to the variability of the prices of each product. This optimisation allows better effectiveness by improving the precision and/or reducing the costs of data collection.

The second action shows the use of scanner data in order to detect possible defects in the representativeness of the sample. With those two examples, we can see how an inappropriate choice of product or inappropriate implicit or explicit weightings can bring a bias in the aggregated index, even if the data collection and the data processing were well carried out.

This paper gives evidence of efficiency of the framework used by ONS for statistical quality. As stressed in the discussion, it is also an interesting tool for communication and a good way to explain our work to users.

Mick Silver presents a study trying to measure difference between Dutot and Jevons index number formula, i.e. arithmetic and geometric aggregation. Mathematical proprieties of these two indices and the superiority of the Jevons index for theoretical reasons are well known. However, the Dutot index is still widely used for practical reasons. Therefore, it is important to try to analyze the difference between the two indices and also to measure the “flaw” of Dutot index. The author uses scanner data on TV sets to compute classical Dutot and Jevons indices but also a “heterogeneity-controlled Dutot index”. An important aspect of the study is to consider data as a sample and indices as sample estimators.

The results make it possible to measure in concrete terms the two indices and to break up their differences between the intrinsic difference in formula and the defects of the Dutot index due to product heterogeneity. In the studied case, the difference is mainly due to the second reason and confirms the superiority of the Jevons index. However this superiority is not absolute and the Dutot index can be justified if the price distribution of the product is homogeneous.

The discussion shows that this conclusion returns to the problem of definition of the products and sampling. Indeed, a narrow definition of the products strongly reduces their heterogeneity, but poses practical problems to find them or replace them. Another way of reducing the variance is to stratify the sample, for example by type of outlet. Methodology exposed by Mick Silver is thus a useful tool to test different situations and to clarify our choices of formula for index aggregation.

## Session 7: Other Issues

Chair: Paul Armknecht, IMF

### Papers:

**Xi, W (2006)** *Vector Based Price Index*

**Balk, B (2006)** *Measuring and Decomposing Rates of inflation Derived from Annually Chained Lowe Indices*

**Dalen, J (2006)** *Spatial price comparisons in poverty measurement*

**Finkel, Y (2006)** *CPI -Aggregating across households*

### Summary:

The session included four papers with somewhat different emphasis on aggregation or uses of the CPI data. The first paper by Wendy Xi discussed a vector analysis approach to solving the index number problem of uniquely disaggregating value change into price and quantity components. This approach offers a new way researchers might look at the index number problem. The paper generated considerable discussion about how the vector approach could be explained in more direct economic terms and how the resulting index differs, in theory, from the superlative indices.

The second paper by Bert Balk discussed the precise methodology needed to decompose the aggregate CPI change for a chained Lowe index into its component series changes. This is important because annually chained Lowe indices are becoming more prevalent (e.g., the HICP and Statistics Netherlands CPI) and an exact method should be used for the decomposition of price changes across periods to better serve user needs. Less precise methods will not allocate the change correctly and could possibly raise questions about the credibility of the CPI.

The third paper by Jorgen Dalén presents the results from using household budget survey (HBS) data for Cambodia to develop a poverty measure. The method used implicit price data along with reported quantity data and household characteristics to develop individual CPIs for all households that reported in the HBS. Given the basic daily nutritional needs and the family's price and quantity information, a poverty measure was developed. The discussion raised the issue of how this approach compared to the more recent approach suggested by Angus Deaton. The answer was not available and could be an area for future research.

The final paper by Yoel Finkel used HBS data for Israel to estimate individual household CPIs and aggregate those CPIs to higher levels using a Democratic weighting system (each household is equally important). This method takes a different approach than that of pricing a representative fixed basket of items at various outlets across the country; rather, it looks at the baskets for representative households throughout the country and aggregates them. It provides an alternative measure of inflation using individual family experiences to derive inflation measures for commodity groups and overall inflation.

## Forward Look to the Next Meeting

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

The next meeting of the Group will be hosted by Statistics Canada and held in Ottawa in the second half of 2007.

Possible topics for discussion at the next meeting are:

- The Ottawa Group: state of play of CPIs 10 years on
- Coherence and integration between different price indices (PPI, relationship with CPI, output price for construction and value of housing stock and housing component in CPI)
- Health and insurance
- New goods/services (timing, theoretical and operational issues, new outlets [internet, telephone, cable, cell phone])
- What is “quality” in the context of the quality of a CPI and fitness for purpose etc. and how can it be measured
- Bundling issue (telecommunications, bills approach etc.)
- Systematic bias- clothing (fashion etc.)
- General conceptual issues

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

