The Consumer Price Index Development Project in Israel:

An Integrated Approach

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Abstract: This paper deals with a new approach to the CPI in Israel. First stage rebuilding of index infrastructure enables second stage research and analysis. The CPI project integrates data collection with computation, publication and dissemination procedures of the index.

I. Introduction

Consumer Price Indices (CPI) may have many objectives and uses, at times contradictory. Indices for purposes of escalation and compensation for the increase in prices, general indicators of inflation, deflation of national accounts, indicators of cost of living for different population groups - these and others require application of specific and precise methodology. Research and experience accumulated over the years has lead to constructive criticism of CPI suitability for several of its uses.

Upward biases due to lack of substitution of goods, services, outlets and corresponding updated weights, have been well documented in recent years. Seasonal patterns of fruits and vegetables and fashion changes in clothing and footwear varieties may lead to bias in the other direction. Additional formulae bias at the micro-index level, issues of quality adjustment, probability sampling methods, handling of owner occupied housing in a cost of living framework - are all complicated subjects to be dealt with in a CPI.

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Several solutions for each of these methodological issues may be implemented. However, constant financial resources for improving the reliability of a CPI serve as an additional burden for national statistical offices. Reducing substitution bias by conducting ongoing Consumer Expenditure Surveys and Point of Purchase Surveys can be costly. Investment in creation and utilization of new and modern technologies to automate price collection procedures in the field, and formulate alternative micro and macro computations of the CPI at the main office are problematic. Recruitment and training of professional human resources is an additional and critical task not to be overlooked.

Realization of all the above has brought the Israeli Central Bureau of Statistics (ICBS) to launch an integrated ***CPI Development Project*** that will lead the Israeli CPI into the next century. ICBS strategy calls for joint examination of the three intertwined surroundings of the CPI: methodology, technology and field operations - and their connection to the structure and organization of the professional units responsible for construction, collection, computation, analysis and publication of the Consumer Price Index. ICBS believes that the first step in solving the complicated issues mentioned above is to build anew the infrastructure of the index. Solutions to specific methodological issues are performed in second stage procedures with much ease after modern foundations and accessibility to data sources have been completed. In this document we will attempt only to outline the strategic principles of the ICBS ***CPI Development Project***. More specific details of the procedures to achieve all objectives of the project will be documented and presented in future work.

II. Project Background

The Consumer Price Index, in its "modern" form and era, has been conducted in Israel by ICBS on a monthly basis since 1959. The weights of the goods and services in the consumption basket, measured in the index framework, are updated every five to seven years, usually based on the findings of Household Expenditure Surveys (HES) - also conducted twice per decade. The Israeli CPI[2] is measured in accordance with the guidelines of the International Labour

[2] See "Consumer Price Index", Technical Publication Series No. 60, Israel Central Bureau of Statistics, Jerusalem, 1992.

Organization[3] along with modifications relevant to the Israeli economy. ICBS has improved the methodology and procedures of the index over the years and major changes in the index are implemented at the reweighting periods of the CPI. The present base period of the index (1993 average = 100.0 points) commenced in January 1994 and the next update of the CPI will be in January 1999, based on the findings of the 1997 HES.

In 1996 ICBS decided on a two piece strategy to substantially improve the Consumer Price Statistics program. One piece concerned the implementation of an ongoing (annual) Household Expenditure Survey, starting in 1997. ICBS has been successful in completing the 1997 HES (findings to be published in mid-98) and continuing with the 1998 HES in January of this year. The second piece concerned the declaration of the ***CPI Development Project*** - a four year (1996-2000), five-stage project to develop anew the infrastructure of the index. The five stages

1. *initiation documentation (1996-97)*
2. *concurrent engineering and design (1997)*
3. *module development and pre-testing (1998-99)*
4. *production implementation (1999)*
5. *archive development (1999-2000)*

were mandated by the Directorate of ICBS to an ***in-house*** development team of experts representing the three surroundings of the CPI project: methodology, technology and field operations. A Directorate Steering Committee was established to accompany and guide the ICBS development team.

The project team is required to achieve the goals and objectives of the CPI together with awareness of two potential obstacles:

(I) All advantages of the present state (tradition, motivation, professionally performance of tasks, etc.) must be included in the new project and all present disadvantages (inaccessibility to data, non-flexibility for any change) will be converted into advantages in the new system;

[3] See Turvey, R.: Consumer Price Indices, An ILO Manual, International Labour Office, Geneva, 1989.

(b) To allow modularity of the system, in which each of the professional units can perform all their needs independently, including necessary modifications, without hampering the work of the other units in the system.

III. Project Challenges

ICBS is confronted in the CPI project with three kinds of strategic challenges:

1. In order to construct knowledge systems based on evolutionary CPI processes through the decades, standardization of terminology, procedures and data are of great necessity. Assurance of a smooth methodological hand-off between old and new, closed vs. open systems, automatic vs. manual procedures, bureaucracy vs. flexibility is obviously required for a precise CPI. Relevant archive data is attentively ported to a new system only after research and analysis of the methodological continuity has been proved. Enlarged accuracy and precision of data collection and enhanced reflection of reality at the price level on one hand and dissemination of information on the other are our basic challenges.
2. To comprehend the best present methods and procedures conducted in the CPI around the world and adapt into the ICBS project. Building of methodological interface (easy assimilation of formulae, quality adjustment, new goods, reweighting, etc.) for inclusion of future improvements at the test and/or production level.
3. Enhancement of professional human resources: Israel is a relatively small country with a limited amount of 15-20 professionals in all CPI areas. Dealing with development of new and integrated issues along with the day by day CPI procedures requires a high level of planning and scheduling. The capability of the same human resources to perform in different work modes is a task not to be overlooked. Releasing technical responsibilities and operations from CPI professionals and application of their resources to research and development of the CPI.

IV. Project Principles

Seven major principles that ICBS seeks at the tactical level in the project framework are the following:

1. ICBS is interested in the construction of an information system for the CPI. The information base is to allow integration of several data sources: Household Expenditure Surveys, Administrative sources for outlet sampling and current price surveys for the CPI.
2. There is a need for logical connectivity between two different parts of the CPI workflow: planning of data collection (list of observations: outlets, items, prices) and computation of the data (calculation of the index "pyramid" from the micro-index level, sub-indices until the total CPI level).
3. The project encompasses relational main data tables such as: items, outlets, observations, rules and conditions, formulae, etc. Each table consists of three parts: general structure which allows additions only; control mechanisms that allow insertion of filtered data only; hierarchies of access, viewing, editing and other usage modes.
4. The project must allow task-capability of at least four parallel time dimensions: annual updating of the consumer basket components (weights, varieties, etc.); computation and publication of the current month; collection and editing of the following month; current research and debriefing of CPI data and information.
5. Field and office operations will have four different collection methods (CAPI - computer assisted personal interview, CATI - computer assisted telephone interview, DDE - direct data entry, FTP - file transfer protocols) - all programs developed for each of these collection methods will support new technology (usage of the new operational system Microsoft Windows CE in hand held computers) - all collection methods are integrated into one secure networking system.

6. The system will enable completion of four operations at the same time: locating and tracing of sample outlets, first time assimilation (selection of relevant varieties at the outlets), current reporting of price observations, and a multipurpose message system.
7. Move editing, logical and statistical checks, from the headquarters to the field operations - as close as possible to the reporting occurrence (check if variety is suitable to item, check the price observations within different statistical ranges, check completeness and time frame feasibility.

V. The New CPI System

The technological and organizational structure of the new system is designed to achieve the enhancements mentioned above in the methodology of the index and the field operations. Therefore, the system has two major and connected parts: the price sub-system and the data collection sub-system.

The Prices Sub-system structure is based on a local area network (LAN) communication system for the CPI headquarters, with a Windows NT server, an Oracle database and personal computer (clients). Connected to this network are the professionals providing subject (commodity specialists), methodology, publication and information services. The tasks performed in the prices sub-system include: planning, quality control, final nesting of price observations (already filtered in the collection process), index computation, analysis, research and publication.

The Collection Sub-system structure is based on a wide area network (WAN) communication system for ICBS regional offices and operations, with Windows NT, an Oracle data base and clients using Hand Held (HPC) and personal computers. The computers that were chosen for the testing stages of the project are Hewlett Packard 620LX color hand held computers with Windows CE operating system. Connected to this network are the enumerators (field and office), field supervisors and subject matter editors. The tasks performed in the collection sub-system include detailed scheduling of price collection for each enumerator, price collection and automatic logical checking at the micro and macro level.

The scope of this document does not allow a too detailed design report. However one example from each of the sub-systems can give a better illustration of the implementation of the principles such as integration and uniformity mentioned above.
From the Pricing Sub-system we chose the item *module* and from the Collection Sub-system we chose the *CAPI module (computer assisted personal interviewing).*

The *item module* is an important table in the system that includes all required data for collection, computation and future planning and archives of the system. The subject professionals of the Consumer Price Division manage the item table. Certain parts have a view only connectivity for field operations on the one hand and methodological research on the other. Special tools for generating queries and reports are given to the subject managers (an open system). Security is at the highest level due to CPI formula and consists of three levels of system authorization (Head of CPI, commodity specialists and analysts, administrator). This module has six connected and related tables:

1. Logical and physical location of items in the CPI pyramid
2. Definitions of items (name, code, weight, economic branch, etc.)
3. Formulae of the item (method of computation, quality adjustment)
4. Methods of collection for the items
5. Characteristics and varieties, statistical boundaries
6. Specific rules and guidelines, collection timing, other help features

The *CAPI module* is the main collection data table that is used by the enumerators throughout the country. This module is in the authority of the field operational professionals for data handling of the enumeration. However the subject professionals handle the macro statistical checks. This is a closed structured system for the enumerators with special rules and conditions. System security is at specific locations and functions, such as: access authorization and encryption of data through public communication and networks.

This module has three working areas:

1. The collection area deals with 5 sub-modules: organization of weekly collection schedules at the outlets; workflow design within the outlet; selection of first time variety; data entry and price information and a message system.
2. The communication area has 2 sub-modules: primary - the automatic communication where the enumerator connects to the phone and electricity sockets and sends the transmission for uploading and downloading of data; backup and emergency transmission - includes 2 different options manual transmission (FTP) or use of conventional public transportation for sending the data collection flash cards.
3. The general office work area with capabilities on the Window CE operating system; allowing the enumerator to use conventional "office" capabilities like *Word, Excel, Calendar, E-mail.*

F. **Summary**

The ICBS decided on an internal and integrated development project for the CPI in order to achieve the challenges and principles presented in this paper. The project is now (Feb. 1998) in the module development and pre-testing period. The first major technical testing of the systems will commence in May 1998 for a period of three months. The final tests will be at the beginning of 1999.

The coordination of state of the art technology and tasks required by the methodology of the CPI, create capabilities that were not pondered on completely in the initial planning. The demand for many alternative computation methods at the micro-index level, hedonic regression, three-dimensional graphical presentation - are just few of many examples.

The CPI project is a model of how ICBS feels it should go about research and development of official statistics. The project has brought about new modes of cooperation and correct working procedures (Metadata, documentation, ISO-9002, etc.). Analysis, planning, development and assimilation of new technologies have lead to already reaped benefits of second stage methodological analysis.