

Recent and planned improvements to Consumer Price Indexes

The Bureau of Labor Statistics is engaged in a continuing effort to improve the Consumer Price Index program. The focus of these efforts in recent years has centered on three areas: (1) employing more current spending patterns and samples of priced items; (2) reflecting the effects of consumer substitution in response to relative price change; and (3) accounting more completely both for changes in the quality of existing consumer goods and services and for new product introductions.

Updating expenditure patterns

The CPI has a two-tiered weighting structure; at the upper level the weights are based upon data from the Consumer Expenditure Survey. Historically, these expenditure weights were updated about every 10 years. The consumer expenditure weights in the CPI now are being updated at 2-year intervals; expenditure weights for the 1999–2000 period were introduced with the release of data for January 2002. The 1999–2000 expenditure weights replaced the weights for the 1993–95 period that had been introduced in January 1998. These new weights were 2 years old at the time of their introduction in January 2002. In contrast, the previous, 1993–95, expenditure weights were 3-½ years old when first used. Expenditure weights will next be updated to the 2001–02 period effective with release of data for January 2004. Although the expenditure weights are now being updated at 2-year intervals, the CPI's geographic area and housing unit samples are not being updated on a 2-year basis. However, the feasibility of a program for continuous rotation of these samples is being studied.

Updating items and outlets

The samples of items priced for the CPI and the retail stores and service establishments in which they are collected now are being updated on a 4-year cycle. Previously, these samples were updated every 5 years. In addition, because of improvements to the survey from which these samples are obtained, it now is possible to focus updating efforts on those areas of consumer spending in which goods and services tend to change rapidly.

Another major enhancement will occur in 2003, when BLS will begin reselecting many CPI item samples within the existing outlet samples, midway between the scheduled 4-year outlet sample rotations. That is, these item samples will be rotated every 2 years. This is a further step in making the CPI more representative of current consumer spending patterns as well as more reflective of new goods and services in the marketplace.

Accounting for consumer substitution

As noted, the CPI has a two-tiered weighting structure. Data from the survey of consumer expenditures do not provide enough detail to weight and combine prices at the individual item level. The weights for these items are presently derived from a survey of where consumers shop—called the Telephone Point-of-Purchase Survey. Within the two-tiered structure of calculating the CPI, consumer substitution can and does occur at both levels—that is, within and across item categories. To better approximate the effect of consumers' responses to changes in relative prices at the lower level of aggregation, BLS introduced a geometric mean estimator for averaging prices within most of the 211 index item categories.

The geometric mean is consistent with the assumption that consumers maintain constant expenditure shares at

the elementary aggregate level. That is, it assumes that consumers substitute within item-area categories such that any increase in price of an item is offset by a corresponding decline in quantity purchased, and thus the item's expenditure share remains constant. The arithmetic mean, by contrast, is consistent with the assumption that consumers purchase fixed quantities of items within an item category and do not substitute in response to changes in relative prices.

The new formula now is being used in categories that, at the time of its introduction in February 1999, comprised approximately 61 percent of total consumer spending represented by the CPI-U. The remaining 15 index categories continue to be calculated as they previously had been, using an arithmetic mean. The geometric mean formula was chosen for those categories within which consumers are likely to change their spending in response to changes in relative prices. The arithmetic mean formula was chosen for those categories within which consumers are unlikely to respond to changes in relative prices.

New C-CPI-U

The Bureau will publish a Chained Consumer Price Index for All Urban Consumers, or C-CPI-U, beginning with release of July data in August 2002. This new index will supplement the Bureau's existing indexes: the CPI for All Urban Consumers (CPI-U) and the CPI for Urban Wage Earners and Clerical Workers (CPI-W).

The C-CPI-U will employ a Tornqvist formula and utilize expenditure data in adjacent time periods in order to reflect the effect of any substitution that consumers make across item categories in response to changes in relative prices. The new measure, a "superlative" index, is designed to be a closer approximation to a "cost-of-living" index than are the CPI-U and the CPI-W. The C-CPI-U uses expenditure data for both a base period and the current period in order to

average price change across item categories. This distinguishes it from the existing CPI-U and CPI-W, which use only a single expenditure base period to compute the price change over time. As noted above, in 1999, BLS introduced a geometric mean estimator for averaging prices within most of the item categories in the consumer price indexes in order to approximate the effect of consumers' responses to changes in relative prices within these item categories. The geometric mean estimator will be used in the C-CPI-U in the same item categories in which it is now used in the CPI-U and CPI-W. (See *Monthly Labor Review*, October 1998, pp. 3–7.)

Expenditure data required for the calculation of the C-CPI-U are available only with a time lag. Thus, the C-CPI-U will be issued first in preliminary form using the latest available expenditure data at that time and will be subject to two subsequent revisions. Accordingly, when introduced in August, the C-CPI-U will present:

- final indexes for the 12 months of 2000
- interim values for the 12 months of 2001
- initial values for January-July of 2002.

In February 2003, with the release of data for January 2003, the C-CPI-U will publish:

- final indexes for 2001
- interim values for the 12 months of 2002
- initial values for January 2003.

In February 2004, the monthly expenditure data from calendar year 2002 becomes available and the C-CPI-U will publish:

- final indexes for the 12 months of 2002
- interim values for the 12 months of 2003
- initial values for January 2004.

The revisions are expected to be small, but in principle each monthly index could differ from its previously published level.

BLS previously has calculated superlative indexes on an experimental basis, but they are not comparable to the C-CPI-U in all computational details. (See, for example, *Monthly Labor Review*, December 1993, pp. 25–33.) Based on BLS research, the C-CPI-U is estimated to increase at an average annual rate of 0.1 to 0.2 percentage point less than the CPI-U.

The C-CPI-U will be issued for national averages only and will not be seasonally adjusted. It will employ a December 1999=100 reference base. Data for periods prior to December 1999 will not be calculated. The component series that will be published are:

- All items
 - Food and beverages
 - Food
 - Food at home
 - Food away from home
 - Alcoholic beverages
 - Housing
 - Shelter
 - Fuels and utilities
 - Household furnishings and operations
 - Apparel
 - Transportation
 - Private transportation
 - Public transportation
 - Medical care
 - Medical care commodities
 - Medical care services
 - Recreation
 - Education and communications
 - Education
 - Communication
 - Other goods and services
 - Services
 - Commodities
 - Durables
 - Nondurables
 - All items less food and energy
 - Energy

The indexes will be published in the monthly CPI news release and *CPI Detailed Report*, and also will be available electronically on the consumer price indexes Web site:

<http://www.bls.gov/cpi/>

Quality changes and new goods

Funding was received, beginning in FY 1999, for special data collection to support the expansion of hedonic quality adjustment as part of a broad CPI improvement initiative. BLS researchers have employed a regression procedure, called hedonic modeling, that decomposes the price of an item into implicit prices for each important feature and component. This yields a mechanism for capturing the price change that may occur as new models replace old ones in the market place without counting the value of quality improvements as price increases. Although hedonic quality adjustments has been applied in the housing and apparel components of the CPI for more than a decade, the recent focus has been on consumer electronic and appliance goods. The products selected for hedonic modeling are at varying points in their development stream, some being fairly new and undergoing very rapid technological improvements, others having been on the market for some time. In 1998, the hedonic model was introduced for the first of these products—personal computers. In 1999, a model was introduced for adjusting television prices for changes in quality. In 2000, hedonic models subsequently were introduced for audio and video products, video cassette recorders (VCRs), Digital Versatile Discs (DVDs) players, refrigerator/freezers, microwave ovens, college textbooks, washing machines, and clothes dryers.

In addition to the enhanced outlet and item resampling procedures mentioned above, efforts are underway that are explicitly targeted at including new goods in the index in a systematic and

timely way. In 1999, BLS researchers began augmenting or replacing CPI samples in selected item categories that are characterized by high rates of new product introduction. The primary focus thus far has been on the categories of prescription drugs and personal computers. It should be emphasized, however, that these improvements are not, by themselves, a complete solution to the problem of the treatment of new goods in the CPI.

BLS RESEARCHERS will continue efforts to

improve the accuracy of the CPI. At the same time, however, solutions are not now available to all of the vexing measurement issues faced in producing this important index. Evidence of this is contained in a recent report by the Committee on National Statistics which outlined a number of recommendations for research and improvements in the CPI. See the Bureau-sponsored report, *At What Price? Conceptualizing and Measuring Cost-of-Living and Price Indexes*, Charles L. Schultze and Christopher Mackie, editors, Washington,

D.C., National Academy Press, 2000; on the Internet at:

<http://www.nap.edu/books/0309074428/html>

Further information on the new CPI-U and the other enhancements to the CPI can be obtained from the Bureau of Labor Statistics, Division of Consumer Prices and Price Indexes, Room 3130, 2 Massachusetts Avenue, N.E., Washington, D.C. 20212-0001; Telephone: (202) 691-6952; e-mail: cpi_info@bls.gov

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