

Food Cost Indexes for Low-Income Households and the General Population

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Introduction

Economists and Federal Government agencies have used various fixed-weight price indexes to determine how changing price levels affect consumers and to adjust the benefit levels of welfare and transfer payment programs. The most widely known fixed-weight index in the United States today is the Consumer Price Index (CPI). The total CPI was originally constructed to measure the inflation rate in the economy over time. When government agencies or private industry use the CPI to adjust benefits or salaries, they are no longer using it as a measure of inflation, but as a measure of the cost of living, a function it was not designed to do.

The CPI compares the cost of a fixed market basket of goods and services over time. It uses as weights representative expenditures on goods and services from various types of U.S. households for some base period. These weights are then multiplied by the ratio of the current price of a particular good or service to the price in some base period and summed to form the index. The CPI is a modified Laspeyres index because the weights are expenditures and not base period quantities. The main point is that the CPI compares the cost of this fixed market basket of goods with the cost of the same basket at some other point in time.

However, economic theory postulates that consumers will substitute relatively expensive goods with relatively less expensive goods as relative prices change, holding income constant. Therefore, if economists wish to construct an index that in some way measures the change in the cost of living of consumers, they should not use a fixed-weight index because it cannot take into account these substitution effects. To construct index numbers based upon economic theory and to incorporate substitution effects (and thereby measure the change in the cost of living), economists have developed “true-cost-of-living” indexes that typically are derived from the estimated parameters of a complete demand system. Demand systems, however, tend to be limited to several broad categories of goods due to estimation problems, and they do not capture the substitution effects most likely within individual categories.

Given these obstacles, attempts have been made to find a true-cost index that does not require estimating a demand system. One kind of index, advanced by Diewert (1976) and Fry and Pashardes (1989), is the Tornqvist price index, which, under specific conditions, is a true index. This index is easy to construct because it simply requires a knowledge of budget shares and prices over the relevant time period. However, this index may also fail to capture substitution effects as relative prices change if budget shares tend to be fairly constant over time, since the budget shares are used as weights to construct the index.

A second major criticism of using the CPI as a measure of the cost of living is that the CPI applies one index to all consumers in society, although many economic studies have shown that consumers of different races, in different regions, with different household sizes, and with different expenditure levels consume different bundles of goods. Thus, one would expect, *a priori*, that the rate of change in the cost of living would not be the same for the various demographic groups.

These criticisms of the CPI's shortcomings indicate a need to develop true-cost indexes that take into account substitution and demographic effects. In this way, economists and other interested parties can approximate the extent to which the CPI may be a biased indicator of the real cost of living changes experienced by society as a whole, and by selected demographic groups, especially low-income households.

The main purpose of the research reported here was to construct, from estimated Engel curves, indexes of the true cost of food at home (termed "true-cost-of-food indexes") based on 16 food categories for various U.S. demographic groups. In particular, we constructed true-cost-of-food indexes for blacks and nonblacks, by household size, in the Northeast, North Central, South, and West. In addition, we compared indexes for the total population to indexes constructed for low-income households (using household income that is no greater than 130 percent of the poverty line, which represents the gross income test for food stamp eligibility). To our knowledge, only limited economic analyses have been conducted with index numbers to determine if different demographic groups experience different rates of change in their cost of food. In addition, we wished to determine if the CPI for food at home overestimates or underestimates the change in the cost of food for any demographic group relative to its own true-cost index, particularly the low-income households that may be eligible for food stamps.

The index numbers we constructed are based on the premise that it is possible to capture substitution effects by estimating Engel curves in which the intercepts are allowed to shift from one time period to another. This procedure allows the analyst to estimate many individual items that make up a broad category like food and to capture the substitution effects within that category. The true indexes we constructed are closely related to the Tornqvist index, but they used as weights the estimated intercepts from Engel curves.

We constructed food cost indexes for eight reference households for the total population. Reference households are demographic households having the minimum food-at-home expenditures in each demographic category. In addition, indexes based on our sample data were constructed for households with one, two, and four people having average food expenditures. For the low-income households, we constructed food cost indexes for four reference households. These were the households having the minimum food expenditure. The size of the low-income sample was too small to allow us to analyze the data by race.