

Consumer Price Index (CPI)

The Consumer Price Index (CPI) is a measure of the average change in the prices paid over time by urban households for a market basket of goods and services. Published monthly by the Bureau of Labor Statistics (BLS), the CPI is calculated for two groups: households of clerical workers and wage earners (CPI-W) and for all urban consumers (CPI-U), which includes all employees in the CPI-W along with professionals, managers, technical workers, the self-employed and unemployed. These groups account for 32 percent and 87 percent of the population, respectively. The index is published using unadjusted and seasonally adjusted data, where seasonal indices control for changes that occur at the same time and magnitude every year, like holidays and climate patterns. In 2002, the BLS introduced a new revisable index, the chained Consumer Price Index for all consumers (C-CPI-U), which is also published monthly, but allows for two subsequent rounds of revision annually before being finalized.

The CPI has three major uses: as an economic indicator, as a deflator of other economic series, and as a means of adjusting dollar values. As the most widely used measure of inflation, the CPI both influences the formulation and tests the effectiveness of government economic policy, including monetary policy. As a deflator, the CPI is used to translate retail sales, hourly and weekly earnings, and components of national income accounts into inflation-free dollars. Finally, and possibly most importantly to U.S. citizens, the CPI functions as the basis of indexation arrangements for consumers' income payments, levels of government assistance, and automatic cost-of-living adjustments for millions of employees. According to the U.S. Department of Labor, changes in the CPI affect the incomes of 80 million workers, 48 million Social Security

beneficiaries, 20 million food stamp recipients, and 4 million Civil Service retirees and survivors. The CPI also influences the choice of income tax brackets, the Department of the Treasury's inflation-indexed government debt and inflation-protected bonds, and many private labor contracts as well.

Calculation of the CPI begins with the selection of the market basket of consumer goods and services, including food, housing, clothing, transportation fees, health and dental care, pharmaceuticals, and other items generally purchased for day-to-day living. One quarter of the market basket is updated each year, producing a full rotation of all items every 4 years. The prices of these goods and services are collected in 87 geographic areas across the nation, including the country's largest 31 metropolitan cities. Taxes are included in the index, as they are additional expenses incurred by consumers.

Most prices are obtained by trained BLS representatives, making telephone calls or personal visits to approximately 50,000 housing units and 23,000 retail establishments. Retail outlets may include catalog vendors or internet stores in addition to traditional brick-and-mortar businesses. Prices of fuel and a few select items are collected monthly in all locations, while prices for the rest of the sample goods and services are collected every month in only the three largest metropolitan cities, and every other month in the remaining areas.

Each component of the CPI market basket is assigned a weight to reflect its importance in consumer spending patterns. These expenditure share weights, along with the choice of market basket items, are formed based on information assembled by the Consumer Expenditure Survey, based on a representative sample of households. The weights are updated every two years. Local data are aggregated to form a nationwide

average, but separate indexes are also published by region, population size, and for 27 local areas.

The index measures changes in price relative to a specified reference date, defining the CPI to be equal to 100 in a reference base period. Currently, the reference base period is 1982-84. For example, the CPI-U in May 2006 was 202.5, meaning that prices have increased 102.5 percent since the reference base period. The CPI is also used to determine the inflation rate, or the change in the price level from one year to the next. To calculate the inflation rate, the prior year's index is subtracted from the current year's index, then divided by the prior year's index, and this number is multiplied by 100 to generate a percentage. For example, the CPI-U in May 2005 was 194.4. Using this information and the May 2006 index, the inflation rate for this period can be calculated as $(202.5 - 194.4) \div 194.4 \times 100 = 4.17\%$.

The price level has increased every year since 1975, though the rate of increase has changed from being rapid during the early 1980s to slower during the 1990s. Between 1975 and 2005, the inflation rate has averaged 5 percent a year, though it has occasionally exceeded 10 percent and once been as low as 1 percent. Recently, increases in the cost of oil have driven up transportation costs, with energy prices in May 2006 up 23.6 percent over one year prior. This, combined with a reported 1.9 percent increase in the price of food and 2.4 percent increase in all other items, is responsible for the 4.17 percent inflation rate.

Given that the CPI has many practical uses with significant implications, measurement accuracy is of extreme importance. If the index is biased, or providing a mis-measured rate of inflation, millions of workers and welfare recipients will be

disproportionately compensated in cost-of-living adjustments. According to the Boskin Commission assigned to examine potential bias in the CPI, if the index reported a change in the cost of living just one percentage point over the true value from 1997 to 2006, it would cost the government approximately \$135 billion in deficit spending in 2006. Besides this cost of overcompensation, the government also uses the CPI to maintain price stability. Costly efforts to avoid nonexistent increases in inflation, along with the cost of unanticipated inflation, make a bias in the CPI in either direction cause for concern.

Given the importance of accuracy in measuring inflation, areas of potential bias in the CPI have been examined by numerous economic experts. The consensus is that the CPI tends to overstate inflation, although the size of the bias has been estimated between 0.3 and 1.6 percent. Averaged across all studies, the CPI likely overvalues inflation by around 1 percent.

There are five main sources of bias in the CPI: Substitution, quality change, new item, new outlet, and weighting bias. Substitution bias is when the index overstates changes in the cost-of-living by ignoring substitutions that consumers make in response to a change in relative prices. For example, if the price of chicken rises faster than the price of beef, consumers tend to buy more beef and less chicken. This bias can occur both across items (substituting beef for chicken) and within items (substituting generics for brand-name items), and may account for roughly one-third of the upward bias in the CPI. The BLS has made several changes in an attempt to correct the source of its bias, such as the introduction of the Chained CPI (in 2002) and using an aggregation formula that now assumes a certain amount of substitution (since 1999).

The next source of bias in the CPI is the effect of quality changes. New models of cars and televisions generally cost more than the versions they replace, although this improvement in quality is not measured by the index. Therefore, a price rise that is in fact a payment for improved quality might be misinterpreted as inflation. In an attempt to correct this bias, the BLS has used econometric models to estimate the value of different item characteristics in the market. This helps to clarify the difference between an increase in price and an increase in quality, and is used for items like computers, televisions, refrigerators, DVD players and college textbooks.

The impact of new goods falls along the same lines, as it is challenging to ascertain the effect of the introduction of new items on welfare. The BLS often faces difficulty in classifying new goods into pre-existing categories, creating occasionally long lags between their first appearance in the market and inclusion in the market basket. For example, the BLS was criticized for long delays in adding cell phones and home computers to the index. The problem arises from the uncertainty of whether a newly introduced good will become a typical consumer expenditure or never amount to much, be it a new form of video recorder or a ropeless jump rope. The BLS faces a trade-off between accepting a delay in the inclusion of essential new goods and incorporating new goods into the index that fail in the marketplace and must be later removed.

The next source of bias is the somewhat recent proliferation of discount outlets. As prices rise, consumers tend to utilize discount stores more frequently. Currently, when new outlets enter the CPI sample, any difference in price between new and old is contributed to a difference in quality, which may not always be the case. The growth of discount chains itself suggests an outlet substitution, or a shift in consumer buying

patterns. Thus, the CPI may either overstate inflation by not properly accounting for the same-quality but less-costly discount alternatives, or understate inflation by dismissing the decrease in price as driven entirely by quality.

Finally, the method in which weights are assigned to goods may cause bias in the CPI. The expenditure weights are derived from a BLS consumer survey composed of an interview and personal diary. The interview and diary are printed on large paper and are 143 and 67 pages long, respectively. With hundreds of questions to answer, survey respondents may not provide truthful and precise information. Respondents may purposely misreport purchases to avoid subsequent questions, have inaccurate recall, and deliberately exclude unattractive purchases like alcohol. The expenditure weights play a vital role in the calculation of the CPI and must be as close to the true values as feasible in order to properly estimate changes in the price level. One suggestion for improvement is the use of scanner data, which could provide information about price and quantities at the time of purchase. Scanner data would provide its own set of problems though, as barcodes change frequently, the cost to purchase data from private firms may be prohibitive, and many goods and services do not have barcodes. Simplifying the questionnaire may also improve the quality of information, although at the cost of losing data. The BLS is continuing to investigate this issue.

Although the Consumer Price Index is not currently a perfect measure of inflation, which may be an impossible feat, it nevertheless provides a reasonable estimate for price level changes and affects millions of people. The BLS is dedicated to resolving sources of bias in the index and will continue to improve the accuracy of the CPI.

Further Readings

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