Executive Summary

Each month investors anxiously await news of the latest Consumer Price Index (CPI). If the CPI comes in lower than expected, financial markets usually have a good day, and vice versa. The CPI also has important uses in the private and public sectors.

It is believed that the way the CPI is currently calculated overstates increases in the cost of living, perhaps by as much as 1.1 percentage points. But lowering the CPI would have significant impact, both on the federal budget and on the overall economy.

The CPI is more important to the federal budget than most people realize. Over 30 percent of federal spending, and perhaps more importantly, 57 percent of mandatory spending is adjusted using the CPI. Seventy-one percent of these adjustments occur in one program—Social Security. The other key use of the CPI is to index parts of the federal income tax code, specifically the personal exemption, standard deduction, and income bracket amounts.

A slower increase in the CPI would reduce entitlement benefits. The Congressional Budget Office (CBO) projects that reducing the CPI by one percentage point would lower Social Security outlays by $224.4 billion over the next ten years. The implication is that these savings as a share of spending would continue to grow over time, but that is wrong. The reason is that beneficiaries eventually die and are replaced by younger retirees, whose benefits begin at higher amounts. These savings would not solve the long-run Social Security problem, as some mistakenly believe.

A slower increase in the CPI would raise taxes because the income brackets, personal exemptions, and standard deductions also would increase more slowly. This would increase the amount of income that is subject to tax and push taxpayers into higher brackets sooner than otherwise.

For the economy, reducing the CPI by 1 percentage point would lead to less GDP, less capital formation and fewer jobs. Between 1998 and 2002:

- Higher marginal tax rates on labor would lead to 469,000 fewer jobs.
- Higher marginal tax rates on capital along with lower employment would reduce the stock of capital by $65 billion.
- Less labor and capital would lower GDP by $91.5 billion over the period. By the year 2002, annual GDP would be lower by $43 billion.

The main pressure to lower the CPI is to help reduce the federal deficit. While that would occur, the CBO-projected reduction of $141 billion in the federal deficit by 2002 would likely be closer to $111 billion because the CBO estimate does not incorporate the economic effects of higher taxes.

Taxpayers at all income levels would pay more in federal income taxes. If the CPI were reduced by 1 percentage point, most taxpayers would see their aftertax incomes decline by 0.8 percent.

Because it is used as an inflation adjustment in entitlement programs and the tax code, the CPI will remain a politically-charged issue. What must be avoided, however, is the substitution of arbitrary for scientific judgment on how federal programs should be adjusted for inflation.

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Adjusting the Consumer Price Index

Introduction

Each month investors anxiously await news of the latest Consumer Price Index (CPI), a key inflation gauge produced by the Bureau of Labor Statistics (BLS). If the CPI comes in lower than expected, financial markets usually have a good day. If the CPI comes in higher than expected, prices of bonds and stocks often drop.

Besides being a market barometer, the CPI has important uses in the private and public sectors. Many wage contracts use the CPI to adjust for changes in the cost of living. Since 1972, it has provided the annual inflation adjustment for Social Security benefits. Since 1985, the CPI has been used to index the personal exemption, standard deduction, and income brackets of the federal income tax code.

"….the CPI will also continue to figure in the struggle to balance the federal budget"

Despite the recent budget deal, the CPI will also continue to figure in the struggle to balance the federal budget. In 1996, a commission appointed by the Congress to examine problems with the CPI reported its findings. Headed by Michael Boskin, chairman of the Council of Economic Advisers under President Bush, the commission estimated that the current CPI overstates increases in the cost-of-living by 1.1 percentage points.[1] For example, if BLS reports a CPI of 3.1 percent, a "truer" measure of the cost-of-living increase would be 2 percent.

If correct, the findings of the Boskin commission could greatly affect the federal budget. Smaller cost-of-living adjustments for entitlement programs would save a great deal of money. Smaller increases in the personal exemption, standard deduction, and income brackets of the federal income tax code would boost tax revenues. According to the Congressional Budget Office (CBO), lower spending and higher taxes from shaving one percentage point off the CPI would save $141.1 billion over the next five years and $652.8 billion over the next ten. [See Table 1 for CBO savings by program.]

Change In Federal Spending, Outlays & Deficit
From 1 Percentage Point Reduction in CPI
(By fiscal year, in $billions)

	1998 to 2002	2003 to 2007	1998 to 2007
Revenues	**51.2**	**167.8**	**219.0**
Outlays	**-76.8**	**-244.6**	**-321.4**
Social Security	-54.4	-170.0	-224.4
Railroad Retirement	-0.8	-2.3	-3.1
Supplemental Security Income	-4.1	-15.5	-19.6
Civil Service Retirement	-6.2	-19.5	-25.7
Military Retirement	-4.4	-14.3	-18.7
Veteran's Benefits	-2.7	-8.5	-11.2
Earned Income Credit	-6.1	-24.5	-30.6
Other[1]	-0.3	-0.8	-1.1
Offsets[2]	2.4	10.4	12.8
Debt Service	**-13.1**	**-99.3**	**-112.4**
Deficit	**-141.1**	**-511.7**	**-652.8**

Table 1
Change In Federal Spending, Outlays & Deficit
From 1 Percentage Point Reduction in CPI

Source: Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1998-2007*, Washington, DC, January 1997, p. 41.

Columns may not add due to rounding.

[1] Foreign Service retirement, Public Health Service retirement, Coast Guard retirement and worker's compensation for federal employees.

[2] Food stamps, Medicare and Medicaid.

Such savings would help reduce, although not eliminate, outyear deficits that will mushroom as the baby boom generation begins to retire around 2010. In response, some in Congress have called for lower federal CPI adjustments as recommended by the Boskin commission. Others, including BLS, counsel a more cautious approach.

Accepting that the CPI is far from ideal, the purpose of this report is to examine both sides of the argument. The next section begins by describing how the CPI is constructed. The third section presents the main findings of the Boskin commission along with the BLS response. Federal budget effects are discussed in the fourth section with special focus on Social Security and income taxes. The fifth section reviews the pros and cons of proposed fixes and the last section presents conclusions.

What Is the CPI?

Before judging its potential biases, we should understand what the Consumer Price Index is and is not. Although often used as a proxy to measure increases in the cost of living, the CPI really measures *changes in the costs of buying a fixed market basket of goods and services.* BLS usually updates this fixed basket, which represents average consumption patterns during some base period, every ten years. In contrast, a true cost-of-living index would measure the least amount consumers would need to spend to keep the same level of well-being (or standard of living) at different times. If prices had changed between one period and the next, consumers might well have opted for cheaper items and yet been as satisfied as they were in the earlier period.

A Brief History of the CPI

The CPI traces its history back to World War I. When prices increased rapidly, particularly in shipbuilding centers, an index was needed to figure cost-of-living adjustments for wages. After studying family buying patterns and collecting prices for several years, BLS first published separate price indexes for 32 cities in 1919. The publication of a national index began in 1921.

A new expenditure study conducted in 1934-36 formed the basis for a thorough revision of the index that was introduced in 1940. While the years during and immediately after World War II saw other changes, the next extensive revision did not occur until 1953. Besides revising the makeup of the index, BLS added medium and small-sized cities to the sample and improved computation methods.

A new index was introduced in 1978. Because of its use as an adjustment for wages, the CPI had reflected the buying patterns of urban wage earners and clerical workers (referred to as CPI-W). A new index (the CPI for All Urban Consumers or CPI-U) included professional and salaried workers, part-time workers, the self-employed, the unemployed and retirees. While the CPI-W represented 32 percent of the U.S. population, the CPI-U covered about 80 percent.

In 1983, a *rental equivalence* method replaced the *asset-price* approach for measuring the costs of owning a home for the CPI-U. The problem with the old index, particularly with rapidly escalating housing prices during the 1970s, was that it overstated the investment aspect of owning a home. To fix this problem, the new method attempts to figure what homeowners would pay if they rented their home.[2] Rental equivalence was incorporated into the CPI-W in 1985.

BLS again revised the CPI in 1987 when it updated the market basket using the 1982-84 consumer expenditure survey. Further improvements in sampling, data collection, estimation and statistical estimation also were put in place. Beginning next year BLS will update the basket to use expenditure patterns from a survey done during 1993-95.

The Consumer Price Index Today

As just discussed, the Consumer Price Index measures the change in the cost of purchasing a fixed market basket of goods and services. The mathematical formula is:[3]

$$I_{t,0} = \frac{\sum P_{it} Q_{ib}}{\sum P_{i0} Q_{ib}} \times 100.0$$

Where:

P_{it} is the price of the i^{th} item in comparison period t
P_{i0} is the price of the i^{th} item in comparison period 0
Q_{ib} is the quantity of the i^{th} item consumed in expenditure period b.

Currently the reference base period for the CPI is 1982-84, the date of the last consumer expenditure survey. Generally, the comparison period is the base period.

The numerator in the above formula is the cost of the basket of goods in period t while the denominator is its cost in the base period. The total change in prices from period 0 to period t is measured as a weighted average of the change in prices from b to t.

To illustrate how this index works, suppose that there are two items in the fixed basket—housing and food. Housing accounts for 60 percent of expenditures and for food 40 percent. Suppose the price of housing was $100 while the price of food was $10 in the base period. The starting, or base-period, value of the CPI would be:

$$I_b = \frac{[(\$100 \times 0.6) + (\$10 \times 0.4)]}{[(\$100 \times 0.6) + (\$10 \times 0.4)]} \times 100.0 = \left[\frac{64}{64}\right] \times 100.0 = 100.0\,.$$

Now, suppose that housing prices went to $105 and while food dropped to $9 in the first period after the base period. The index would continue to use quantity weights from the base period, that is, 0.6 for housing and 0.4 for food, even if consumers had changed the amounts they purchased. The value of the first-period CPI would be:

$$I_{1b} = \frac{[(\$105 \times 0.6) + (\$9 \times 0.4)]}{[(\$100 \times 0.6) + (\$10 \times 0.4)]} \times 100.0 = \left[\frac{66.6}{64}\right] \times 100.0 = 104.1\,.$$

In other words, the CPI would have increased by 4.1 percent between the base and first periods.

Suppose that housing increases to $110 and food decreases back to $10 in the second period. Again the quantity weights would be the same as in the base period, and the value of the CPI would be:

$$I_{2b} = \frac{[(\$110 \times 0.6) + (\$10 \times 0.4)]}{[(\$100 \times 0.6) + (\$10 \times 0.4)]} \times 100.0 = \left[\frac{70}{64}\right] \times 100.0 = 109.4\,.$$

In other words, the CPI would have increased by 5.1 percent between the first and second periods (109.4 / 104.1) and by 9.4 percent between the base and second periods.

Of course, the U.S. economy is far more complex, offering tens of thousands of different goods and services, sold through all sorts of retail outlets. Deciding what and where to collect data for the CPI is a complicated, time-consuming process.

Using scientific techniques, BLS samples based on geographic area, retail outlet, item category and particular goods and services within outlet and category. Specifically, the sample includes:[4]

- 88 primary sampling units (PSU) from 85 urban areas,[5]
- Over 20,000 retail and service establishments, and
- 40,000 landlords or tenants and 20,000 owner occupants for information used in the housing component of the CPI.

Outlet sampling is based on a continuing Point-of-Purchase Survey (POPS). Selected households are asked to recall information about purchases during a specific period. For items like food and gasoline, respondents are asked about purchases made in the last week or two. For other items like cars or appliances, the recall period may be up to five years. If the respondent has made a purchase, he or she is asked where it was made and how much was spent. Based on results of the annual household survey, BLS selects a new sample of outlets for about one-fifth of the urban areas each year.[6]

BLS divides all goods and services into the following eight major categories:

- Food and beverages,
- Fuels and utilities,
- Household services,
- Apparel and upkeep services,
- Transportation,
- Medical care,
- Entertainment and furnishings, and
- Other commodities.

These major groups are split into 69 *expenditure classes* (EC) which are divided into 207 *item strata*. The item strata are mutually exclusive and cover all consumer expenditures. Below the item strata are 346 *entry level items* (ELIs), the level at which BLS data collectors begin sampling within each outlet. [See Table 2 for the item strata and entry level items for two sample expenditure classes—cereal and cereal products and hospital and other medical care services.]

Table 2
Two Examples of How Commodities & Services are Classified in the CPI

Source: BLS Handbook of Methods, Appendix 4.

[1] Expenditure class. Items in the CPI are grouped into 69 ECs.

[2] ECs are divided into 207 item strata.

[3] Entry level items. ECs and item strata are divided into 346 ELIs.

Two Examples of How Commodities & Services are Classified in the CPI			
EC[1]	Item Strata[2]	ELI[3]	Description
01			Cereal and cereal products
	0101		Flour & prepared flour mixes
		01011	Flour
		01012	Prepared flour mixes
	0102		Cereal
		01021	Cereal
	0103		Rice, pasta & cornmeal
		01031	Rice
		01031	Macaroni, similar products & cornmeal
57			Hospital & other medical care services
	5701		Hospital room, in-patient
		57011	Hospital room, in-patient
	5702		Other in-patient services
		57021	Hospital in-patient services other than room
		57022	Nursing and convalescent home care
	5703	57031	Hospital out-patient services
	5709		Unpriced rent or repair of medical equipment
		57090	Unpriced items

To reflect marketplace changes, new items and outlet samples are selected each year for 20 percent of the urban areas in the sample on a rotating basis. For ongoing pricing, BLS field representatives visit over 20,000 outlets each month and collect prices for about 90,000 items. Food, energy and a few other commodities are sampled monthly in all urban areas. Prices for all other item strata are collected monthly in the five largest urban areas (New York, Los Angeles, Chicago, Philadelphia and San Francisco) and every other month elsewhere.

Computing the CPI

Each month BLS collapses the hundreds of thousands of prices it collects into 9,064 indexes—the 206 item strata discussed above for 44 geographical areas.[7] The process is split into two steps—one labeled the *lower level* and the other the *upper level*. The lower level consists of averaging individual price quotes from specific outlets for specific products within an item stratum, say Cheerios and Kellogg's Corn Flakes, to come up with one price for each of the 206 item strata, in this case cereal. Weights are derived from the Point-of-Purchase Survey (POPS), and averaging is done using an **arithmetic mean formula**—a point to remember because it is an important criticism cited in the Boskin report.

The index for an item stratum within an area is computed using a chaining process.[8] For example, suppose that the average price of cereal increased from $4.00 to $4.25 in the Philadelphia area between two months, an increase of 6.3 percent. If the index for cereal in Philadelphia in the first month had been 100.0, the index for the next month would be 106.3.

At the upper level, indexes for more comprehensive categories (e.g., food, medical care and all items) and areas (e.g., cities, regions and the nation) are produced from the lower-level indexes. For example, the CPI for food would combine indexes for cereal, meat, vegetables, and so forth. The CPI for the entire nation combines all item categories for all areas.[9] As with the lower level, these upper-level indexes are computed using an arithmetic mean, prompting another criticism in the Boskin report.

Findings of Boskin Commission

In December 1996, the Boskin commission issued its report on the CPI to the Senate Finance Committee. *Its main finding was that the current CPI overstates increases in the cost-of-living by 1.1 percentage points.* The Commission identified four types of CPI bias: lower-level substitution, upper-level substitution, new products/quality changes and new outlets. The rest of this section summarizes what the Commission said about each type of bias along with the Bureau of Labor Statistics response. [See Table 3 for a summary of the four types of bias cited in the Boskin report.]

Boskin Commission Estimates of CPI Bias

Type of Bias	Estimate	Comments
Upper level substitution: Ignores subsitution across item categories when relative prices change.	0.15	Based on unpublished corrections of previous research by BLS; covers period 1988 to 1995.
Lower level substitution: Does not allow for substitution among goods and services within an item category when relative prices change.	0.25	Based on estimates from academic research adjusted for method changes already adopted by BLS.
New Products/Quality Change: Residual bias due to changes in quality and the emergence of new goods and services	0.60	Based on estimates from academic research for 12 of 27 categories of goods and services. Commission uses its best judgment in the remainder.
New Outlets: Discount stores are not adequately reflected in the CPI.	0.10	Based on estimates from academic research.
TOTAL (Plausible Range)	**1.10** (0.80 to 1.60)	

Table 3
Boskin Commission Estimates of CPI Bias

Source: Advisory Commission to Study the Consumer Price Index, *Toward a More Accurate Measure of the Cost of Living: Final Report to the Senate Finance Committee*, Washington, DC, December 4, 1996, Chapter VI.

Substitution Bias

Lower- and upper-level substitution biases stem from what the CPI is and is not. As mentioned earlier, the CPI has often been called upon to act as a cost-of-living index. A true cost-of-living index would allow consumers to buy different items provided the same amount of spending left them as well off as before. If prices of some goods increased, consumers would substitute cheaper goods while maintaining the same well-being.

The CPI, however, asks a different question. Specifically, how much more does it cost to purchase the *same* market basket in different periods? Because the CPI does not, by construction, allow for item substitution, it will generally overstate the true cost-of-living. An example, shown in Table 4, illustrates how.

Suppose there are only two goods, apples and oranges. In the first period, both sell for $1 a pound and consumers buy one pound of each. Spending on both goods totals $2. In the next period, the price of apples increases to $1.40 and consumers cut back the amount they buy to 0.8 pound while the price of oranges drops to 80 cents and consumers increase their purchases to 1.4 pounds. Spending in the second period totals $2.24.

This change could be measured in several ways. The CPI looks forward, asking the question: How much more would it cost consumers in the second period if they had bought the same amount of apples and oranges (one pound each) as they did in the first? The answer is $2.20, or a 10% increase in total spending over the first period. [See Table 4.]

Table 4
Correcting Time Bias in Fixed Quantity Price Indexes

Correcting Time Bias in Fixed Quantity Price Indexes			
	Apples	**Oranges**	**Total**
Actual Expenditures			
Price in 1st period	$1.00	$1.00	
Quantity purchased in 1st period	1	1	
Expenditure in 1st period	$1.00	$1.00	$2.00
Price in 2nd period	$1.40	$0.80	
Quantity purchased in 2nd period	0.8	1.4	
Expenditure in 2nd period	$1.12	$1.12	$2.24
Price Index Using Past Period Quantity Weights (CPI)[1]			
Expenditure in 1st period	$1.00	$1.00	$2.00
Expenditure using 2nd period prices and 1st period quantities	$1.40	$0.80	$2.20
Value of index			1.10
Percent change from 1st to 2nd period			10.0%
Price Index Using Current Period Quantity Weights[2]			
Expenditure in 2nd period	$1.12	$1.12	$2.24
Expenditure using 1st period prices and 2nd period quantities	$0.80	$1.40	$2.20
Value of index			1.018
Percent change from 1st to 2nd period			1.8%
Price Index Using Geometric Mean Quantity Weights[3]			
Quantity in 1st period	1	1	
Quantity in 2nd period	0.8	1.4	
Geometric mean of quantities[4]	0.894	1.183	
Expenditures using 1st period prices and geometric mean quantities	$0.89	$1.18	$2.08
Expenditures using 2nd period prices and geometric mean quantities	$1.25	$0.95	$2.20
Value of index			1.058
Percent change from 1st to 2nd period			5.8%

[1] This index looks forward because it assumes that consumers would buy the same amounts as they did yesterday at today's prices.

[2] This index looks backward because it assumes that consumers could buy the same amounts that they do today at yesterday's prices.

[3] This index corrects the time bias in the previous two because it gives the same answer whether looking forward or backward.

[4] Geometric mean is the square root of the CPI times the fixed price index, or

$$\sqrt{(1 \times 0.8)} = 0.894$$

in the case of apples.

Looking backward, another question that could be asked is: How much more are consumers spending in the second period than they would have if the prices of apples and oranges were the same as in the first ($1 per pound each)? The answer is, instead of spending $2.24 in the second period, consumers would have spent $2.20 if first-period prices prevailed, or an increase of only 1.8%. [See Table 4.]

Both indexes are mathematically flawed because they fail the time-reversal test.[10] Whether looking forward or backward, the index number should give the same result. As our example shows, however, the price increase measured by the forward-looking index (the CPI) is over 5 times greater than that of the backward-looking index.

Fortunately, there is an easy way to solve the time-reversal problem. So-called *superlative indexes*, like the one developed by economist Irving Fisher, find the middle ground. They take the *geometric* mean, or the square root of the product, of the previous two indexes.[11] In the example, the geometric-mean index would show an increase of 5.8%, roughly halfway between the forward-and backward-looking indexes. [See Table 4.]

While recognizing the time-reversal problem, the Boskin report unfortunately bogs down over the issue of substitution. The argument is: when prices change, consumers will substitute less-expensive goods and services for more-expensive goods and services, most likely in a way that leaves them as well off as before. Because the CPI holds quantities constant, it cannot satisfactorily measure the cost-of-living. That is, how much would spending in the second period have to increase if consumers were allowed to substitute in a way that left them as well off as they were in the first?

"Because the CPI holds quantities constant, it cannot satisfactorily measure the cost-of-living."

As a way to correct this substitution bias, the Boskin report recommends that BLS use **geometric** instead of **arithmetic means** throughout the CPI. However, the focus on substitution bias rather than the time-reversal flaw in the CPI allows BLS to present arguments, for the most part red herrings, as to why geometric means should be used in some parts of the CPI but not others.

The remainder of this section discusses the difference between lower- and upper-level substitution as presented in the Boskin report along with the BLS response. *Remember, however, that geometric means should be used throughout the CPI to correct the basic mathematical flaw, that is, its failure of the time-reversal test.*

Lower-Level Substitution Bias

As discussed earlier, the CPI combines roughly 90,000 price quotations collected each month to form a series of subindexes for categories of items such as cereals, apples or prescription drugs. Price quotes are now combined in a way that does not allow for substitution *within* an item category when relative prices change. *The Boskin commission estimates that this lower-level substitution bias overstates inflation by 0.25 percentage points.*

For example, suppose two items sampled within an individual item category have the same weight—a pound of iceberg lettuce and a pound of Romaine lettuce. Assume that both prices are $1.00 in time period 0, but that the price of Romaine lettuce increases to $1.50 in time period *t*. In the official CPI, the expenditure for the fixed market basket would increase from $2.00 to $2.50, representing a price increase of 25 percent if consumers continued to buy one pound of both the iceberg lettuce and the now, higher-priced Romaine lettuce.[12]

The Boskin report argues that, because consumers would likely substitute iceberg for some Romaine lettuce, the CPI overstates the change in the true cost of living.

As just discussed, using a geometric mean formula, which assumes some substitution takes place, the price increase for lettuce would be only 22.5 percent.[13]

BLS Response

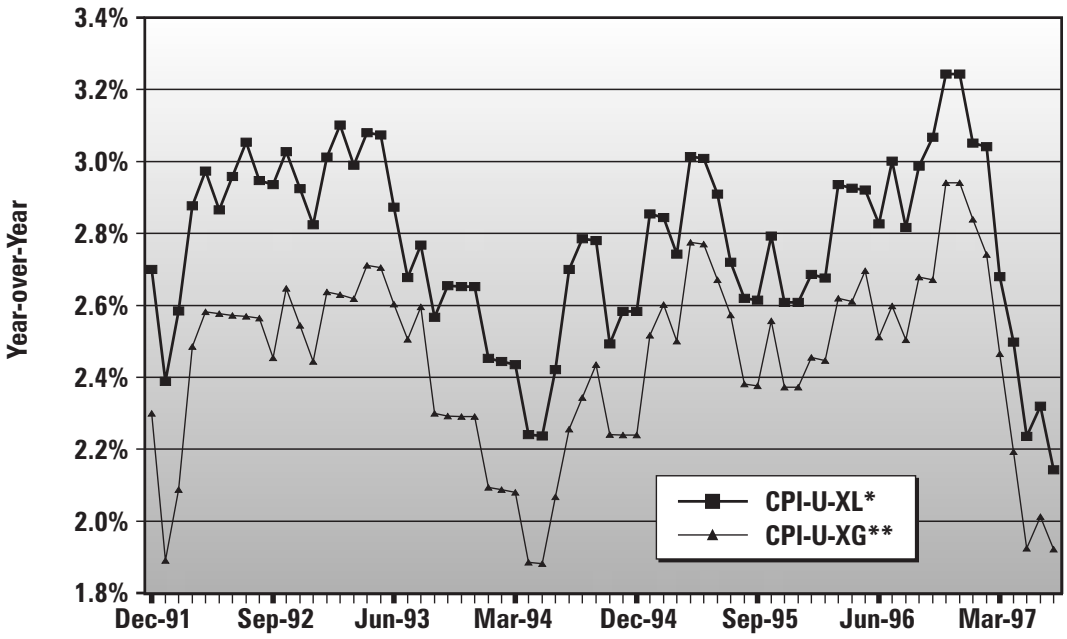
While admitting that the current formula has problems, BLS does not think that consumers would substitute to keep their share of total spending on each and every item the same, as implied by the Boskin solution. For example, while consumers may substitute freely between types of apples, they may not substitute as freely between types of prescription drugs.

In April, BLS released an *experimental CPI* that uses a geometric mean formula at the lower level while keeping the current fixed quantity, arithmetic mean formula for the upper level. Because the experimental CPI (denoted as CPI-U-XG) can not be directly compared to the official CPI, BLS created a Test Laspeyres index (denoted as CPI-U-XL) for this purpose.[14] The experimental CPI, which goes back to 1990, has increased 2.5 percent annually compared to 2.76 percent for the Test CPI. However, the difference has been narrowing in recent years.
[See Figure 1 for a comparison of the test and experimental CPIs.]

Figure 1
Effect of Using Geometric Means at Lower Level of CPI

* The experimental "Test Laspeyres" CPI, all urban consumers, (CPI-U-XL)

** The experimental CPI using Geometric Means, all urban consumers (CPI-U-XG)



BLS currently is evaluating whether to adopt a full or partial geometric-mean formula in the official CPI and will make a decision on revisions by the end of 1997. Based on information so far, an index using geometric means for *all* basic indexes would increase about 0.25 percentage points a year less than the official CPI, given the current environment of modest inflation. *Partial adoption, which is more likely, should reduce the CPI between zero and 0.25 percentage points per year, depending on how many, and which, item indexes use the new formula.*

Upper-Level Substitution Bias

Upper-level substitution bias occurs because the current CPI formula ignores the fact that consumers substitute *across* item categories when relative prices change. For example, if the price of chicken goes up while that for beef goes down, consumers will tend to substitute beef for chicken. But, because the CPI uses an arithmetic rather than geometric mean formula, the CPI would not pick up any substitution that would occur between item categories. *The Boskin commission estimates that failure to incorporate upper-level substitution into the CPI overstates inflation by 0.15 percentage points.*[15]

BLS Response

BLS essentially agrees with the advisory commission on the size and nature of upper-level bias, which is based on BLS research.[16] Because BLS does collect information on consumer expenditures across item categories, like cereal or prescription drugs, it is possible to construct a measure that accounts for substitution across those item categories in response to relative price changes. However, because required information is available only with a lag, the index could not be produced until the fall following the year to which it applies. While BLS already produces these measures on an experimental basis, higher standards of precision and reliability would require additional funding.[17]

New Products/ Quality Change Bias

According to the Boskin report, most of the bias in the CPI is due to quality changes and the emergence of new goods and services. To the extent that the CPI cannot or does not capture new products or improvements in existing products, it overstates increases in the cost of living. For example, air conditioners and VCRs did not show up in the CPI until many years after they first appeared in the marketplace. Cellular telephones, which were not around at the time of the last Consumer Expenditure Survey (1982-84), will finally be added to the CPI next year.

While recognizing that BLS has ongoing efforts to address quality changes and new goods, the Boskin commission believes residual bias remains in the CPI. Dividing the index into 27 categories of goods and services, the Report surveys results from academic research on 12 categories such as fresh fruits and vegetables, apparel, prescription drugs and public transportation.[18] For others, such as professional medical services and hospital and related services, the Commission makes subjective estimates. Overall, *the Commission concludes that the CPI probably overstates inflation by 0.6 percentage points because it is unable to incorporate quality improvements and new products adequately.*

BLS Response

Adjusting for changes in product quality is a key problem in estimating a price index. As the Commission recognized, BLS uses several methods to adjust for quality change and to account for changes in item specifications, such as frequent changes in apparel styles or automobile models.[19] BLS estimates that its adjustments for quality changes currently amount to 2.5 percentage points a year.[20]

"Air conditioners and VCRs did not show up in the CPI until many years after they first appeared in the marketplace. Cellular telephones, which were not around at the time of the last Consumer Expenditure Survey (1982-84), will finally be added to the CPI next year."

While BLS recognizes that its methods are far from perfect, it believes that the subjective way the Commission arrived at its 0.6 percentage-point bias estimate also is flawed. For example, in some categories, absent evidence, the Commission had to rely on its best judgment. What is more, the Commission focused only on positive increases in quality. Yet, BLS often hears complaints about broad-ranging declines in the quality of customer service, reduced convenience and comfort of air travel or deteriorating quality of higher education.

Finally, the Commission puts almost half the quality / new goods problem in medical care and high-tech consumer goods. But, because of especially difficult measurement problems in these two areas, it is hard to say what the bias might be. However, BLS continues to try to improve its methods in these areas, including a change in hospital price measurement procedures and changes in sample rotation procedures that allow more frequent updates of item samples. In general, the Boskin commission does not make explicit recommendations regarding the adoption of procedures to correct the problems it believes exist. In part, this may reflect a lack of consensus among economists about how best to measure the benefit to consumers from new products. For this and the other reasons stated above, *BLS remains skeptical as to the commission's assessment of quality/new products bias in the CPI.*[21]

New Outlet Bias

The Boskin report argues that keeping up with where consumers shop is as important as keeping up with a changing market basket. Sampling the price of a department-store television when consumers are buying at discount stores would enter the wrong (and probably higher price) into the CPI.

Discount outlets, like all other types of outlets, are sampled for the CPI based on their share of consumer expenditures as reported in the Point-of-Purchase Survey. Although new outlets are linked into the survey, the linkage procedure means that prices in the old and new outlets are not compared directly. Thus, the CPI does not reflect any savings that consumers potentially receive from switching to discount outlets, adjusting for quality differences.[22] Based on empirical research, *the Commission posits that new outlet bias overestimates the CPI by 0.1 percentage points annually.*

BLS Response

BLS acknowledges that its procedures could impart an upward bias to the CPI if stores offering lower prices, but comparable service, grew in market share. However, different types of outlets often offer quite different shopping environments.

BLS also has established procedures for bringing new outlets into the index. While the expenditure share information used to aggregate the CPI subindexes is updated only once every ten years or so, specific stores in which prices are collected and the specific items priced are reselected on a five-year cycle. More frequent sample rotations would require more resources. *Overall, BLS is skeptical of the Boskin commission estimate of new outlet bias.*[23]

Importance of the CPI for the Federal Budget

The Boskin commission finding that the Consumer Price Index overstates inflation by 1.1 percentage points has sparked controversy because of the CPI's importance for the federal budget. Over 30 percent of federal spending receives cost-of-living adjustments based on the CPI. Perhaps more importantly, 57 percent of mandatory spending, the part of the budget that so far has been difficult to touch, is adjusted using the CPI. Seventy-one percent of these adjustments occur in one program—Social Security. Other federal retirement programs account for 16 percent, with the rest coming in Supplemental Security Income, veteran's benefits and the earned income credit.

"A reduction in the CPI would lower benefits for millions of beneficiaries and raise taxes for those who pay federal income taxes."

The other key use of the CPI is to index parts of the federal income taxcode, specifically the personal exemption, standard deduction, and income bracket amounts. A reduction in the CPI would lower benefits for millions of beneficiaries and raise taxes for those who pay federal income taxes.

According to the Congressional Budget Office (CBO), lowering the CPI by one percentage point would raise taxes by $51.2 billion between 1998 and 2002 and by $167.8 billion between 2003 and 2007. Outlays would be lower by $76.8 billion between 1998 and 2002 and by $244.6 billion between 2003 and 2008. As a result, shaving one percentage point off the CPI would reduce the federal deficit by $141.1 billion over the next five years and $652.8 billion over the next ten. [See Table 1 for CBO savings by program.]

We now turn to examine what would happen to the spending program most affected, Social Security, and to income taxes if the CPI were cut by either 0.5 or 1 percentage points.

Effect on Social Security

Before 1972, Social Security did not have annual, automatic cost-of-living adjustments. Instead, Congress periodically adjusted benefits to reflect increases in prices and wages. Party and presidential politics, however, led to dramatic benefit increases in the early 1970s.[24]

To depoliticize Social Security, the Congress instituted a benefit formula that would automatically adjust benefits for changes in wages and prices. Unfortunately, flaws in the 1972 Amendments caused benefits to rise much more rapidly than intended. The fix came in the 1977 Amendments which specified the benefit formula that is in use today.

How the CPI Figures into Social Security Benefits

There are two stages to figuring the benefit a Social Security beneficiary will receive. The first involves computing the basic benefit, called the *primary insurance amount (PIA)*. When a worker applies for retirement benefits, the Social Security Administration selects the highest 35 years of earnings and indexes them for the growth in average wages between the year in which the wages were earned and the year the worker turned age 60.[25] Earnings past age 60 are not indexed. These wages are then averaged and applied to the benefit formula to compute the PIA.[26]

The second stage involves inflation-indexing after the beneficiary begins collecting benefits. A beneficiary receives an annual cost-of-living adjustment (COLA) to his or her PIA beginning with the first year of benefit eligibility.[27] The COLA is equal to the change in the CPI-W between the third quarter (July, August and September) of the current and previous year.[28] The 1996 COLA increase, which takes effect in December and shows up in January benefit checks, was 2.9 percent.

"Over 30 percent of federal spending receives cost-of-living adjustments based on the CPI. Perhaps more importantly, 57 percent of mandatory spending, the part of the budget that so far has been difficult to touch, is adjusted using the CPI."

Effect on Beneficiaries

Reducing the CPI would not affect the basic benefit, or PIA, of a retiring worker.[29] It would, however, affect the amount of benefits he or she received over time.

Suppose the unadjusted CPI would increase by 3 percent a year over the next 30 years, and the Social Security COLA also increased by the same amount. Adjusting this CPI lower by one percentage point would also cause the Social Security COLA to reduce to 2 percent. This would reduce a retiree's benefit check by 3.8 percent after 5 years, 8.4 percent after 10 years, 16.9 percent after 20 years and 24.6 percent after 30 years. Reducing the CPI by 0.5 percentage points would lower benefits by roughly half those amounts. [See Figure 2 for benefit reductions under CPI reductions of 0.5 and 1.0 percentage points.] In other words, retirees who live the longest are the ones most penalized by CPI reductions.[30]

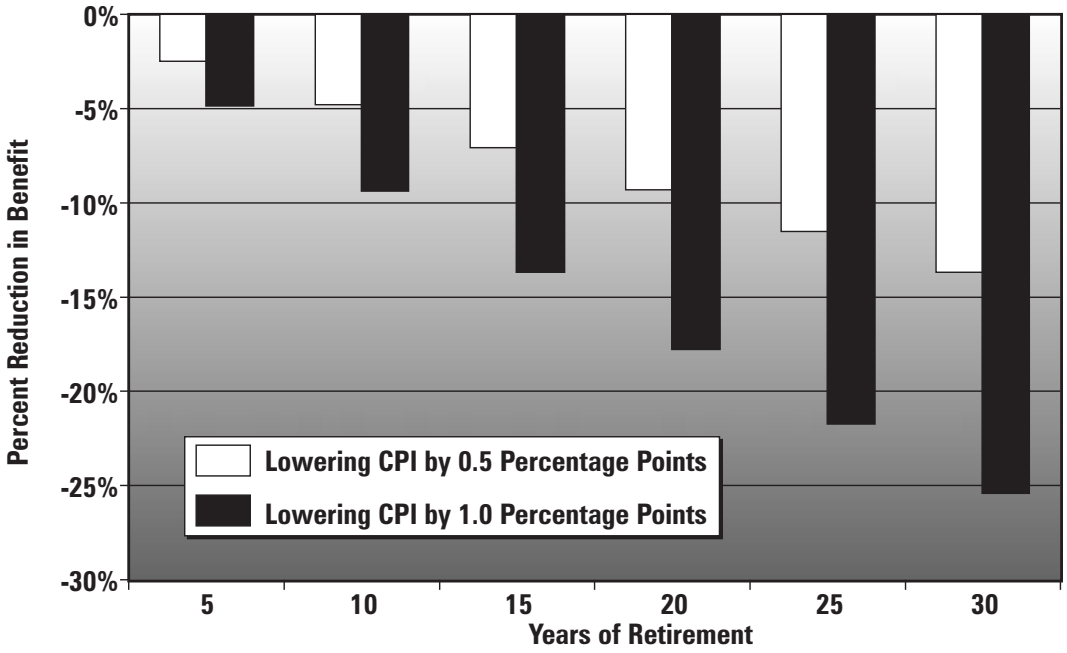
Effect on Social Security's Long-run Financial Picture

The Congressional Budget Office projects that reducing the CPI by one percentage point would lower Social Security outlays by $224.4 billion over the next ten years. Savings in the year 2007 would amount to almost $45 billion, or 7.4 percent of what Social Security spending would be without CPI changes.

At first glance, the implication is that these savings as a share of spending would continue to grow over time. But, that inference would be wrong. The reason is that beneficiaries eventually die and are replaced by younger retirees. New beneficiaries start fresh, that is, their initial benefit depends on the growth in wages, not the CPI. Thus, savings from reducing the COLA depend on the average age of the beneficiary population.

Figure 2
Erosion of Social Security Benefits:
CPI Lower by 0.5 & 1 Percentage Points

Current life expectancy at age 65 is 15.4 years for men and 19.2 years for women.



In any one year, retired worker benefits are being paid to beneficiaries from age 62 and up. Considering the age distribution of retired workers, we estimate that about half of benefits go to those under age 75 and half to those over age 75.[31] As the result, *the most that Social Security could expect to save from reducing the CPI by 1 percentage point is about 11 percent of outlays. A reduction of 0.5 percentage points would produce savings of about 5 to 6 percent of benefits.*

"These CPI savings would not solve the long-run Social Security problem, as some mistakenly believe."

These CPI savings would not solve the long-run Social Security problem, as some mistakenly believe. According to the latest report of the Social Security trustees, annual tax revenues will fall short of covering benefits starting in 2012, and deficits will continue to widen after that. By 2025, benefits will exceed tax revenues by over 25 percent.[32]

Reducing the CPI by 0.5 percentage points would postpone the date when tax revenues fall short of benefits by three years, from 2012 to 2015, and would reduce long-run deficits from over 25 percent to 21 percent of benefits. Reducing the CPI by one percentage point would postpone the date when tax revenues fall short of benefits to 2018 and would reduce long-run deficits to 15 percent. [See Figure 3 for Social Security deficits under present law and assuming 0.5 and 1 percentage point reductions in the CPI.]

Effect on Income Taxes

One of the most important tax policy reforms was the inflation-indexing contained in the Economic Recovery Tax Act of 1981. Since 1985, the income bracket amounts along with personal exemptions and standard deductions of the individual income tax have been indexed to the CPI, limiting "bracket creep" and the government's reward from inflating the economy.

A slower increase in the CPI would raise taxes because the brackets, personal exemptions and standard deductions also would increase more slowly. Lower values for personal exemptions and standard deductions would increase the amount of income that is subject to tax. Lower bracket amounts would push taxpayers into higher brackets sooner than otherwise, subjecting more of their income to tax at higher marginal rates.

Increasing taxes by reducing the CPI would hurt both the economy and taxpayer wallets. To estimate these negative effects, we used our general equilibrium, neoclassical model of the U.S. economy to assess what would happen if the CPI were

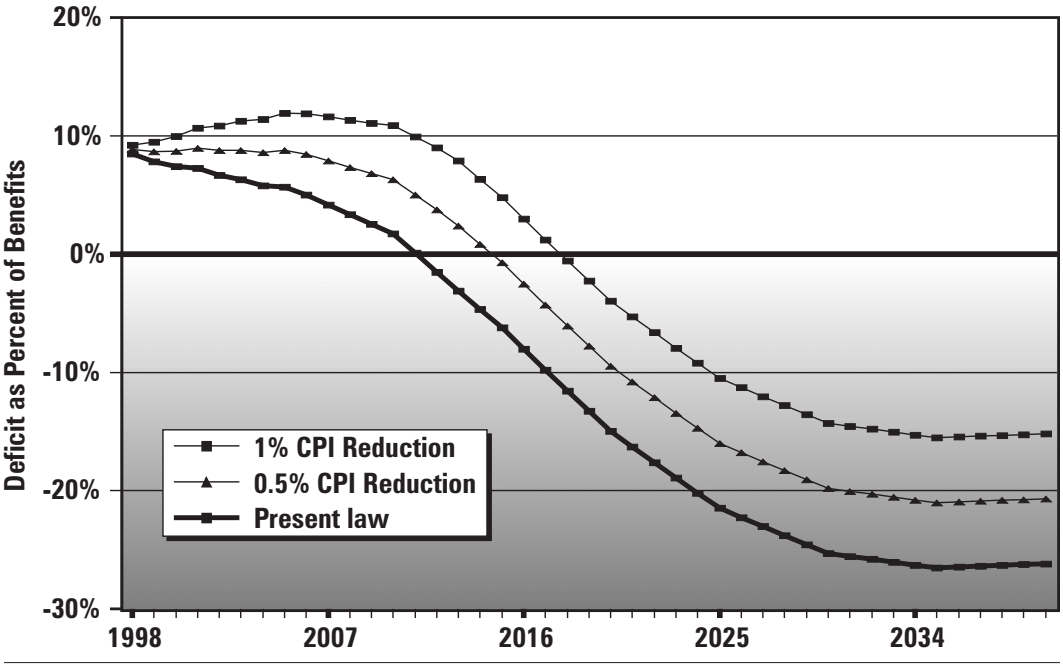


Figure 3
Social Security's Long-Run Deficit:
Present Law vs. CPI Reduction

lower by 0.5 and 1 percentage points.[33] The results, discussed below, show the difference between the economy without any change in policy (the baseline) and under higher taxes due to lower CPI adjustments.[34]

Economic Effects

"Increasing taxes by reducing the CPI would hurt both the economy and taxpayer wallets."

A lower CPI would slightly increase the marginal tax rates on income earned from work (wages and salaries) and saving and investing (dividends, interest, capital gains, net business income). Another more important effect on marginal tax rates would occur through the reduction in Social Security benefits. As described earlier, payroll taxes and benefits are linked through the amount of wages earned. Lowering future benefits would be the same as increasing the tax on labor, or alternatively, reducing the value of labor compensation. Over a worker's expected lifetime, lowering Social Security benefits through a one percentage point reduction in the CPI is the same as a one percent increase in total labor taxes.[35]

Economic Effects of Reduced CPI
Differences from Baseline

	2002	2010
Reduce CPI Indexing by 0.5 Percentage Points		
Annual Change in GDP ($billions)	-22.0	-37.0
Cumulative Change in GDP ($billions)	-51.3	-261.3
Stock of Capital ($billions)	-34.8	-109.6
Employment	-269,000	-321,000
Reduce CPI Indexing by 1 Percentage Point		
Annual Change in GDP ($billions)	-43.0	-67.1
Cumulative Change in GDP ($billions)	-91.5	-565.3
Stock of Capital ($billions)	-65.0	-222.6
Employment	-469,000	-536,000

Table 5
Economic Effects of Reduced CPI
Differences from Baseline
Estimates from the Fiscal Associates Model.

Reducing the CPI by 1 percentage point would lead to less GDP, less capital formation and fewer jobs. Between 1998 and 2002:

- Higher marginal tax rates on labor would lead to 469,000 fewer jobs.
- Higher marginal tax rates on capital along with lower employment would reduce the stock of capital by $65 billion compared to the baseline.
- Less labor and capital would lower GDP by $91.5 billion over the period. By the year 2002, *annual* GDP would be lower by $43 billion.

"…the resulting reduction in the federal deficit, which CBO projects would be lowered by $141 billion, would likely be closer to $111 billion."

Losses from reducing the CPI by 0.5 percentage points would be roughly half these amounts. [See Table 5 for the economic effects of reducing the CPI by 0.5 and 1 percentage points.]

Federal Budget Effects

The main pressure to lower the CPI is to help reduce the federal deficit. While that would occur, the result would be less than forecast using static methods which do not take economic effects from higher taxes into account. For example, static methods would predict that reducing the CPI by 1 percentage point would raise $51 billion in federal income taxes between 1998 and 2002. However, negative economic effects which would reduce tax collections from all sources (personal and corporate income, payroll and excise taxes) would offset almost half that amount. Thus, the resulting reduction in the federal deficit, which CBO projects would be lowered by $141 billion, would likely be closer to $111 billion. Budget effects for reducing the CPI by 0.5 percentage points would be about half these amounts. [See Table 1 for CBO estimates and Table 6 for model estimates of revenue and deficit effects.]

Table 6
Effects on Federal Revenues and Deficits of Reduced CPI

Estimates from the Fiscal Associates Model.

[1] Includes effect of lower debt interest.

Effects on Federal Revenues and Deficits of Reduced CPI (Amounts in $billions)		
	1998-2002	2003-2010
Reduce CPI Indexing by 1 Percentage Point		
Static Federal Revenue	50.8	376.3
Dynamic Federal Revenue	27.6	258.8
% Static Revenue Gain Offset through Lower Growth	45.6%	31.2%
Effect on Federal Deficit[1]	-111.3	N/A
Reduce CPI Indexing by 0.5 Percentage Point		
Static Federal Revenue	25.0	183.6
Dynamic Federal Revenue	11.6	128.0
% Static Revenue Gain Offset through Lower Growth	53.8%	30.3%
Effect on Federal Deficit[1]	-53.4	N/A

Taxpayer Effects

Taxpayers at all income levels would pay more in federal income taxes. For example, on average, a single taxpayer earning between $30,000 and $40,000 would see his or her tax bill increase by $158 if the CPI were reduced by 1 percentage point. Those filing joint returns would see their taxes increase by $98. On average, taxpayers with incomes between $75,000 and $100,000 would see their taxes go up by $232 if filing single returns and by $419 if filing joint returns.

Compared with current tax law, federal income taxes for single returns would go up by 2.5 percent while those for joint returns would go up by 1.8 percent. Taxpayers earning less than $50,000 would experience the largest *percentage* increases in their tax bills. [See Table 7 for average static tax increases by income level assuming a 1 percentage point reduction in the CPI.]

Average Tax Increase by Income Assuming No Economic Feedback Effects, 2002 Reduce CPI Indexing by 1 Percentage Point						
	All Returns		Single Returns		Joint Returns	
Adjusted Gross Income	$Increase	%Change	$Increase	%Change	$Increase	%Change
All Returns	$133	2.0%	$87	2.5%	$198	1.8%
No adjusted gross income	$0	0.0%	$0	0.0%	$0	0.0%
$1 under $5,000	$0	0.0%	$0	0.0%	$0	0.0%
$5,000 under $10,000	$25	52.4%	$39	52.4%	$0	0.0%
$10,000 under $15,000	$31	8.5%	$53	7.2%	$0	0.0%
$15,000 under $20,000	$66	6.6%	$51	3.5%	$65	21.0%
$20,000 under $25,000	$71	4.1%	$51	2.3%	$99	10.8%
$25,000 under $30,000	$69	2.9%	$48	1.7%	$100	6.3%
$30,000 under $40,000	$120	3.6%	$158	4.0%	$98	3.7%
$40,000 under $50,000	$131	2.8%	$241	4.0%	$88	2.2%
$50,000 under $75,000	$152	2.1%	$231	2.2%	$125	1.9%
$75,000 under $100,000	$395	3.1%	$232	1.5%	$419	3.5%
$100,000 under $200,000	$412	1.6%	$371	1.2%	$415	1.7%
$200,000 under $500,000	$1,090	1.5%	$626	0.8%	$1,163	1.6%
$500,000 under $1,000,000	$1,384	0.7%	$1,154	0.6%	$1,417	0.7%
$1,000,000 or more	$1,379	0.2%	$1,156	0.1%	$1,417	0.2%

Table 7
Average Tax Increase by Income Assuming No Economic Feedback Effects, 2002
Reduce CPI Indexing by 1 Percentage Point

Estimates from the Fiscal Associates Tax Model.

But these numbers ignore economic feedback effects. Many taxpayers could be even worse off if their incomes were affected by the lower growth resulting from higher taxes. For example, on average, single taxpayers earning between $30,000 and $40,000 would experience a bigger drop in aftertax incomes ($279) than simply the increase in their tax bill ($158) if the CPI were reduced by 1 percentage point. Most taxpayers would see their aftertax incomes decline by 0.8 percent. [See Table 8 for the change average aftertax incomes by income assuming a 1 percentage point reduction in the CPI.]

Change in Average Aftertax Income Including Economic Feedback Effects, 2002 Reduce CPI Indexing by 1 Percentage Point						
	All Returns		Single Returns		Joint Returns	
Adjusted Gross Income	$Decrease	%Change	$Decrease	%Change	$Decrease	%Change
All Returns	-$305	-0.8%	-$176	-0.8%	-$476	-0.8%
No adjusted gross income	-$45	0.1%	-$44	0.1%	-$43	0.0%
$1 under $5,000	-$11	-0.4%	-$11	-0.4%	-$11	-0.5%
$5,000 under $10,000	-$57	-0.8%	-$70	-0.9%	-$39	-0.5%
$10,000 under $15,000	-$83	-0.7%	-$102	-0.8%	-$61	-0.5%
$15,000 under $20,000	-$133	-0.8%	-$117	-0.7%	-$140	-0.8%
$20,000 under $25,000	-$156	-0.7%	-$136	-0.7%	-$190	-0.9%
$25,000 under $30,000	-$174	-0.7%	-$151	-0.6%	-$211	-0.8%
$30,000 under $40,000	-$248	-0.8%	-$279	-0.9%	-$234	-0.7%
$40,000 under $50,000	-$298	-0.7%	-$392	-1.0%	-$262	-0.6%
$50,000 under $75,000	-$385	-0.7%	-$443	-0.8%	-$363	-0.6%
$75,000 under $100,000	-$720	-0.9%	-$542	-0.7%	-$747	-0.9%
$100,000 under $200,000	-$964	-0.8%	-$852	-0.8%	-$977	-0.8%
$200,000 under $500,000	-$2,226	-1.0%	-$1,669	-0.8%	-$2,309	-1.0%
$500,000 under $1,000,000	-$3,892	-0.8%	-$3,322	-0.7%	-$3,971	-0.8%
$1,000,000 or more	-$10,505	-0.6%	-$8,617	-0.5%	-$10,758	-0.6%

Table 8
Change in Average Aftertax Income Including Economic Feedback Effects, 2002
Reduce CPI Indexing by 1 Percentage Point

Estimates from the Fiscal Associates Tax Model

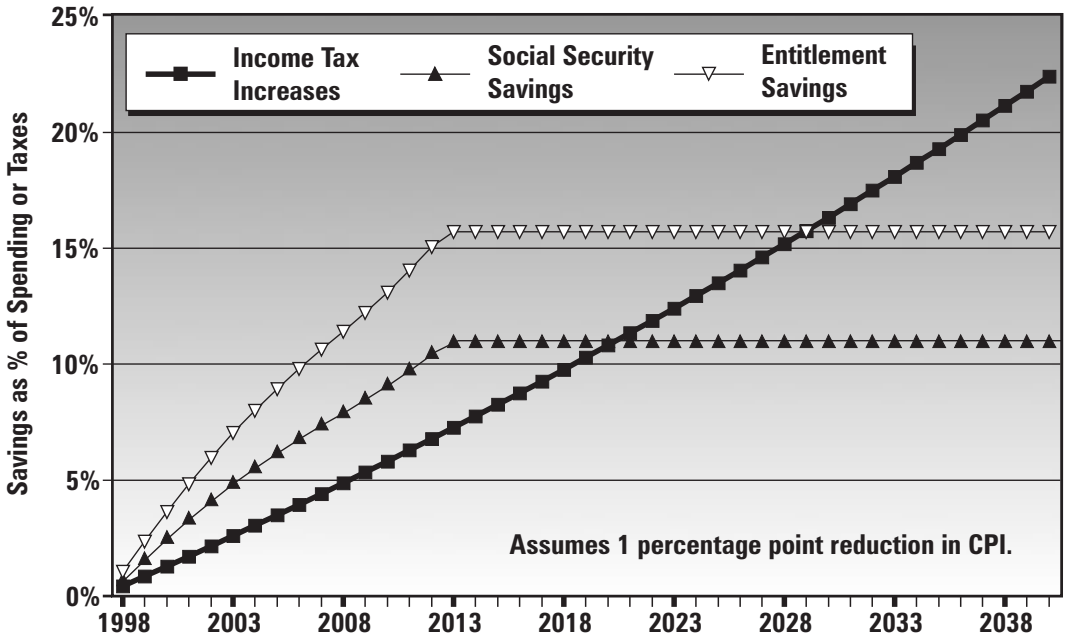
Do More Savings Come from Lower Spending or Higher Taxes?

Will reductions in the CPI produce more savings from lower spending or higher taxes? At least initially, the answer is lower spending. Based on CBO estimates, for every dollar in higher taxes spending would be reduced by $2.50 between 1998 and 2002.

However, savings from entitlement programs would eventually level off. As discussed above, since initial Social Security benefits depend on wage, not CPI, increases, savings would be limited to a fixed share of benefits (11% in the case of a one percentage point CPI reduction). The same would be true for other entitlement programs like railroad and civil service retirement, Supplement Security Income and veteran's benefits.

Taxes are a different matter, however. Compounding of lower CPI adjustments to the personal exemption, standard deduction, and income brackets would continue forever or until Congress legislated new amounts.[36] As a result, savings from higher taxes would eventually surpass those from entitlements. The percent increase in income taxes would exceed the percent reduction in Social Security by 2020 and in all entitlements by 2030. In dollar amounts, higher taxes would exceed Social Security savings by 2005 and total entitlement savings by 2019.[37] [See Figures 4 and 5 for long-run spending and tax implications.]

Figure 4
Entitlement Savings Eventually Level Off but Tax Increases Keep Going



What Can and Should be Fixed?

Estimation of the CPI is a very complex and costly procedure. Many criticisms leveled at its inadequacies as a measure of the cost of living involve changing either sampling or computational procedures, although possibly at greater cost. Other criticisms may be more difficult to address through statistical means, even if more resources were made available. What follows is a summary of criticisms and proposed fixes to the CPI along with our assessment of their practicality or desirability.

1. Substitution Bias

As discussed earlier, substitution bias is really a red herring. The Boskin commission recommendation that geometric means be used throughout the CPI is justified on mathematical grounds. Without such use, the CPI will continue to fail the time-reversal test of a price index. However, while BLS is experimenting with

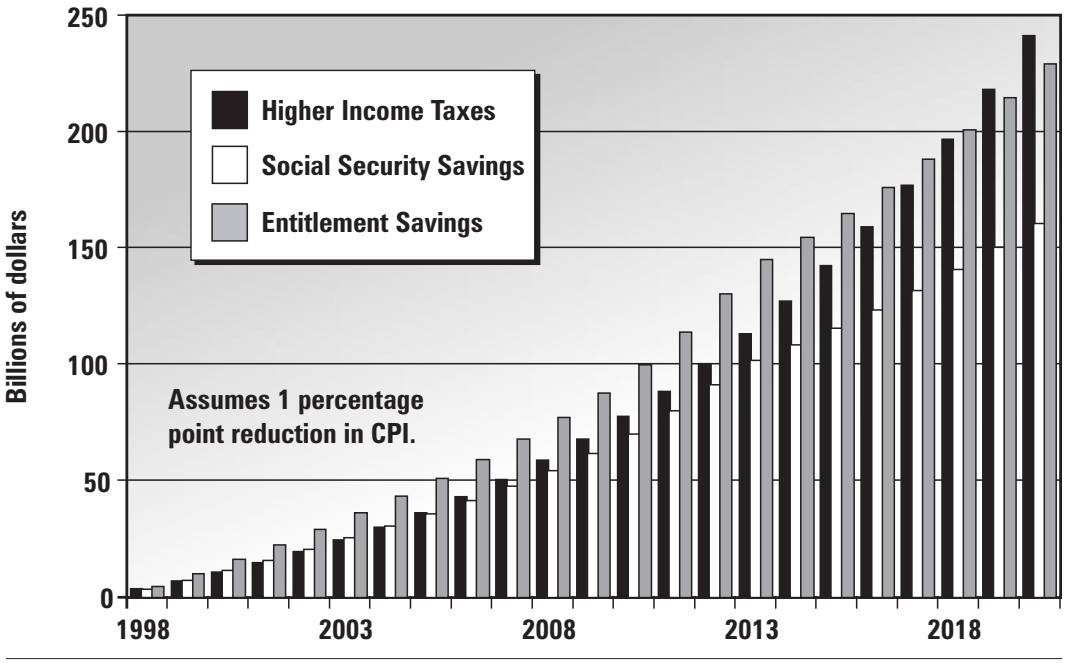


Figure 5
In Dollars, Higher Taxes Exceed Social Security Savings by 2005, Entitlements by 2019

changes to the CPI at both levels, it is reluctant to use geometric means throughout the lower level.

Rather than getting bogged down in substitution bias, BLS should fix the time-reversal problem with the CPI by using geometric means throughout the index as soon as possible. Doing so could lower inflation as estimated by the CPI by roughly 0.4 percentage points annually.

"Most taxpayers would see their aftertax incomes decline by 0.8 percent."

2. Quality/New products/New outlet Bias

According to the Boskin commission, biases associated with quality, new products and new outlets account for 64 percent of the inflation overstatement in the CPI. Addressing these problems, however, is far more difficult than fixing those associated with substitution.

To some extent quality / new product and new outlet biases may be reduced through better and faster sampling and survey design. For example, it should not take ten years for an item as prevalent as cellular phones to work its way into the CPI. And, new outlets can be brought into the CPI faster, something which BLS claims to be doing. Any such improvements, however, will most likely require even more resources at a time when budgets for statistical agencies are already stretched. If deemed worth the cost, of course, the Congress and the President should provide the additional funding.

"It should not take ten years for an item as prevalent as cellular phones to work its way into the CPI."

But measurement of much of these biases, particularly in the area of quality, ultimately falls into a far more subjective realm. As mentioned earlier, statistical measurement of quality improvements, particularly in medical care and high-tech consumer goods which account for almost half the goods problem, is extremely difficult. In the end, the researcher may have to make judgment calls.

Moreover, as BLS has pointed out, the Boskin commission focused on those areas where it believed quality to have improved. However, an unbiased CPI would also have to consider areas, such as customer service, where consumers may have experienced declining quality.

BLS should continue its research efforts in these areas, but it seems that the Boskin commission estimate of a further 0.7 percentage point reduction in the CPI is too optimistic.

Conclusions

The CPI is a key measure of inflation used by both the public and private sectors. Any changes should be carefully considered and implemented using accepted statistical methods.

The Boskin commission has identified some mathematical problems which BLS should correct as soon as possible, possibly reducing the CPI by an average of 0.4 percentage points a year. Issues concerning quality adjustment, new products and new outlets are not so clear cut, but the Congress should see that BLS has adequate funding for more accurate sampling and further research.

Because it is used as an inflation adjustment in entitlement programs and the tax code, the CPI will remain a politically-charged issue. Even a 0.4 percentage point reduction, that appears to have technical merit, could save the federal government roughly $200 billion over the next decade through lower spending and higher tax collections.[38] What must be avoided, however, is the substitution of arbitrary for scientific judgment on how federal programs should be adjusted for inflation.

Endnotes

1 Advisory Commission to Study the Consumer Price Index, *Toward a More Accurate Measure of the Cost of Living: Final Report to the Senate Finance Committee*, Washington, DC, December 4, 1996. Other commission members were Ellen R. Dulberger, Director of Marketing Strategy with IBM; Robert J. Gordon, Northwestern University; Zvi Griliches, Harvard University and Dale Jorgenson, Harvard University.

2 Housing prices in the old index were estimated using selling prices of homes, mortgage interest costs, property taxes, homeowner insurance charges and maintenance and repair. To remove the investment elements of owning a home, housing prices are now measured using owners' equivalent rent and household insurance, excluding the structure.

3 When the expenditure base (b) and reference period (0) are the same, this index becomes the Laspeyres price index formula.

4 U.S. Department of Labor, *BLS Handbook of Methods*, Chapter 19.

5 The New York urban area is split into three PSUs and Los Angeles is split into two. The original 1987 CPI area sample defined 91 geographic areas and 94 PSUs, but 6 were dropped due to 1988 budget constraints. Each Consolidated Metropolitan Statistical Area (CMSA), as defined by Census in 1980, or Metropolitan Statistical Area (MSA), as defined by OMB in 1993, is a PSU. BLS has grouped the remaining non-MSA counties, excluding rural areas, containing any urban population to form PSU's.

6 BLS samples these new outlets, selects the items whose prices will be collected and replaces the former set of items in the CPI from each surveyed city with the new outlets and items.

7 The 88 primary sampling units in which prices are collected are combined to form the 44 areas for which indexes are computed. Of these, 32 are self-representing because of their size and 12 are composites constructed from 56 PSUs which represent smaller and mid-sized cities across the country.

8 Specifically, the index for the current month is the index from the previous month for each area and item multiplied by the change in relative prices between the previous and current month.

9 Base-period expenditure weights for each of the 9,064 basic indexes are derived from the Consumer Expenditure Survey.

10 See Dale W. Jorgenson, *Productivity: Postwar Economic Growth*, Volume 1,Cambridge, MA: The MIT Press, 1995, pp. 150-151.

11 An alternative is to use a weighted average of the growth rates in prices with relative weights equal to the average of the weights in the two periods. Named after one of its originators, the Tornqvist index produces results very similar to the Fisher ideal index.

12 The formula would be:

$$\left[\left(\$1.00/1 + \$1.50/1\right)\right] / \left[\left(\$1.00/1 + \$1.00/1\right)\right] = \$2.50/\$2.00 = 1.25.$$

13 Consumers would have increased their purchase of iceberg lettuce to 1.225 pounds while reducing their purchase of Romaine lettuce to 0.816 pounds. The geometric mean would be:

$$\sqrt{\left(1.00 / 1.00\right)} \times \sqrt{\left(1.50/1.00\right)} = 1.0 \times 1.225 = 1.225$$

14 Several factors seriously reduce the meaningfulness of directly comparing the official CPI with the CPI-U-XG, especially before 1996. Because the geometric mean is undefined when any price equals zero, as can occur in the CPI in rare cases when formerly priced items are offered without charge, the geometric mean estimator is very sensitive to extremely large price decreases . Unlike the official CPI, the CPI-U-XG has special "bounding" rules for handling extremely large percentage price changes. Also, any methodological changes that BLS made between 1990 and 1995 potentially affect the CPI-U-XG over the entire 1990-1995 period while these same changes affect the official CPI only as they were implemented. The Test Laspeyres index (CPI-U-XL) incorporates the same bounding rules and methodological changes as those for the CPI-U-XG.

15 The bias is measured as the difference between the modified Laspeyres formula used by BLS and a Tornqvist index, which is approximately free of substitution bias. While most estimates, including ones

from BLS, cluster around 0.2 to 0.25 percent, unpublished corrections of previous research by BLS show an average bias of 0.15 percent between 1988 and 1995.

16 U.S. Department of Labor, Bureau of Labor Statistics, "Measurement Issues in the Consumer Price Index," Washington, DC, June 1997.

17 Testimony of Katharine G. Abraham, Commissioner Of Labor Statistics, Before The House Budget Committee, March 12, 1997.

18 The Boskin Commission report, Table 2.

19 Estimates of the quality adjustment for new cars is based on changes in manufacturers' costs for specific features. Quality adjustment for apparel uses hedonic regression modeling based on the average consumers' valuation of change as well as manufacturers' costs. BLS currently applies hedonic methods in the Producer Price Index (PPI) for personal computers and peripherals, and projects are underway to develop hedonic quality adjustment methods and improved sampling of new products within the appliance category of the CPI.

20 Abraham testimony. The best available information on this point applies to a CPI subindex covering roughly the commodities and services component of the market basket (about 70 percent of the total, with shelter the largest exclusion). During 1995, this subindex would have risen by 4.7 percentage points had procedures to account for quality changes not been applied, compared to 2.2 percentage points.

21 BLS, "Measurement Issues in the Consumer Price Index."

22 Brent R. Moulton, "Bias in the Consumer Price Index: What Is the Evidence?," U.S. Department of Labor, Bureau of Labor Statistics, Working Paper 294, October 1996.

23 BLS, "Measurement Issues in the Consumer Price Index."

24 For a discussion see Martha Derthick, *Policymaking for Social Security*, Washington, DC: The Brookings Institution, 1979, pp. 339-368.

25 A different procedure for determining earnings histories applies for disabled workers and workers who die.

26 The basic formula used to compute the PIA for workers who reach age 62, become disabled, or die in 1997 is:

> PIA = 90% of the first $455 of AIME + 32% of AIME in excess of $455 but less than $2,741 + 15% of AIME in excess of $2,741 where AIME is the worker's average indexed monthly earnings.

27 Early retirement penalties or delayed retirement credits are applied to the PIA as well.

28 There is a stabilizer provision which limits the COLA to the lesser of the growth in wages or prices if combined assets of the Old-age Survivors Insurance and Disability Insurance trust funds fall below 20 percent of estimated annual expenditures.

29 The same would hold for benefits going to disabled workers or survivors of deceased workers.

30 A women reaching age 65 can expect to live 19.2 more years compared to 15.4 years for men.

31 Currently, about three-fourths of retiring workers start collecting benefits before age 65. This analysis does not look at survivor or disability benefits.

32 *1997 Annual Report of the Board of Trustees' of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*, Washington, DC: U.S. Government Printing Office, April 1997, Table III.B.4.

33 For more on the model see Gary and Aldona Robbins, *Accounting for Growth: Incorporating Dynamic Analysis into Revenue Estimation*, Lewisville, TX: Institute for Policy Innovation, Policy Report No. 138, July 1996.

34 Our baseline, similar to those used by the Congressional Budget Office and the Office of Management and Budget, projects the U.S. economy growing at 2.5 percent a year after inflation over the next fourteen years.

35 We assumed that expected benefits promised under current law would equal 6 percent of total compensation. A one percentage point reduction in the CPI would reduce the value of expected benefits by 6.9 percent and lower take-home pay by 0.4 percent.

36 Before indexing Congress would periodically adjust these tax parameters. However, these adjustments fell far short of keeping up with inflation. For example, the personal exemption remained at $600 between 1954 and 1970 when Congress raised it to $625. Had it been indexed to the CPI, the personal exemption would have been $865 in 1970. For a history of tax parameters see Aldona and Gary Robbins, *Looking Back to Move Forward: What Tax Policy Costs Americans and the Economy*, Institute for Policy Innovation, Tax Action Analysis, Policy Report No. 127, September 1994, pp. 19-23.

37 Social Security estimates are based on projections of outlays from the 1997 Social Security Trustees' report, intermediate assumptions. Between 1998 and 2007, CBO estimates show that Social Security accounts for 70 percent of outlay savings. Our estimates assume that that relationship would hold past 2007, which may overstate the savings from other outlay programs if they do not experience the same baby-boom phenomenon as Social Security.

38 Assumes that negative economic effects of higher tax rates would offset half of the estimated, static revenue pickup.

About the Authors

Gary Robbins is President of Fiscal Associates, an Arlington, VA economic consulting firm, and John M. Olin Senior Research Fellow of IPI. Mr. Robbins has developed a general equilibrium model of the U.S. economy that specifically incorporates the effects of taxes and government spending. He was Chief of the Applied Econometrics Staff at the U.S. Treasury Department from 1982 to 1985. He served as assistant to the Under Secretary for Tax and Economic Affairs from 1981 to 1982, and as Assistant to the Director of the Office of Tax Analysis from 1975 to 1981. Recent publications include IPI Policy Report #138: *Accounting for Growth: Incorporating Dynamic Analysis into Revenue Estimation*, and IPI Policy Report #140: *Tax Cuts: Who Wins? Who Loses.* Mr. Robbins' articles and analysis frequently appear in the financial press. He received his master's degree in Economics from Southern Methodist University.

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