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IMPLICATIONS OF A "CHAINED" CPI

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Introduction

Two prominent commissions recently proposed introducing a "chained" consumer price index (CPI) to adjust Social Security benefits, other government benefits, and the brackets in the federal income tax each year. The argument is that a chained CPI would be more accurate since it reflects the extent to which people substitute one item for another in the face of a price increase. The chained CPI is projected to rise about 0.3 percentage points per year *more slowly* than the current index. Thus, the change would result in lower cost-of-living adjustments (COLAs) for Social Security beneficiaries and for federal civilian and military retirees, and would also lead to an increase in federal taxes. Although this provision was not included in the initial package of cuts to raise the debt limit, it will almost certainly be considered by the Congressional Joint Select Committee on Deficit Reduction, which has been assigned the task of identifying an additional $1.5 trillion in cuts over 10 years by the end of November. Therefore, it is important to understand how a chained CPI would work and how it would affect Social Security beneficiaries.

This *brief* proceeds as follows. The first section describes what the CPI is intended to measure and how it is constructed. The second section summarizes progress to date in accounting for substitution and the goal and mechanics of creating a chained CPI. The third section discusses one of the assumptions underlying the improved accuracy of a chained CPI – namely, that the current index fully reflects the increase in prices faced by beneficiaries. This assumption may not hold, since the CPI-E, which re-weights components to reflect the market basket of the elderly, has risen more rapidly than the current index. The fourth section explores another underlying assumption of the chained CPI – namely, that everybody has an equal ability to substitute when relative prices change. To the extent that the low-income elderly lack this flexibility, adopting a chained version of the CPI would understate the impact of inflation on their welfare.

The final section concludes that, under current circumstances, moving to a chained index should be viewed as a cut in benefits. The cut could impact the poor, who are less likely to be able to shift their spending patterns in response to price changes, and the oldest old as they see the effects compounding over time. The adverse impacts can be mitigated by one-time adjustments around age 85, as suggested by both commissions. But, in the current context, moving to a chained CPI is much more than a technical correction.

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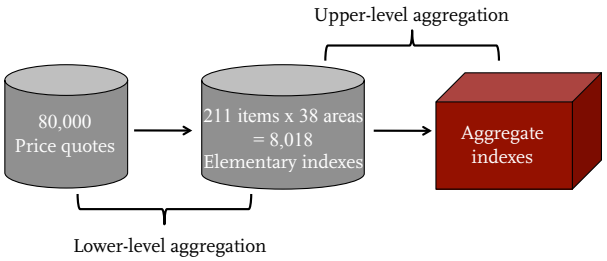
The Consumer Price Index

When the Social Security COLA was first introduced in 1972, the Bureau of Labor Statistics (BLS) had only one consumer price index (CPI); it was for urban wage earners and clerical workers, which covers about 32 percent of the population. After the introduction of other versions, this original CPI was designated the CPI-W and is still used today to adjust Social Security benefits. As new uses were developed for the CPI, the need for a broader and more representative index became apparent. In 1978, the BLS expanded the sample to all urban residents and created the CPI-U, which covers about 87 percent of the population, including most retirees. The CPI-U is used to index the brackets and other parameters in the personal income tax. Except for coverage, the two indexes are virtually identical.

The CPI is intended to be a cost-of-living index. In the context of utility maximizing behavior, a cost-of-living index compares the minimum expenditure levels required to attain a given level of satisfaction in two periods. The CPI-U and CPI-W, however, must be viewed as upward bounds on changes in the cost of living. These CPIs are based on a *Laspeyres* index, which holds the quantities of goods fixed at the level consumed in the base period and allows prices to vary. Holding quantities fixed at the base level does not allow for substitution among goods in response to relative price changes. To the extent that people can make substitutions and attain the same level of utility with different mixes of goods, the CPI will overstate the true increase in the cost of living.

Today, the CPI is constructed in two stages. In the first stage, price quotes are collected for roughly 80,000 specific items per month. For example, observers report the prices of approximately 10 different brands and styles of watches at various locations in Chicago each month.[1] The changes in the price quotes for these different watches are averaged to produce an index of price changes for watches in Chicago. Watches are one of the 211 elementary items, and Chicago is one the 38 elementary areas in the current CPI market basket structure.[2] This stage in the process is called "Lower-Level Aggregation;" it involves averaging observed prices for specifically defined consumer products (see Figure 1).

Figure 1. Two-Stage Construction of the CPI



Source: Based on figure in Cage, Greenlees, and Jackman (2003).

In the second stage, the elementary indexes are averaged together to yield various aggregate indexes and, ultimately, the comprehensive CPI. The BLS adjusts the weights for the 211 broad groups of goods and services every two years based on Consumer Expenditure Surveys. This stage in the process is called "Upper-Level Aggregation."

Accounting for Substitution within the CPI

Within the two-stage construction of the CPI, substitution can occur at both levels. That is, it can occur within the elementary items, such as consumers substituting a digital watch for an analog watch. Or it can occur across elementary categories, such as substituting jewelry for a watch. Figuring out how consumers might adjust their spending in response to price changes was originally a daunting task that would have required econometrically estimating the likelihood of consumers substituting all the items in the index with each other. Fortunately, economists and statisticians devised a series of "superlative" indexes, based on observable price and quantity data, that can approximate a true cost-of-living index by incorporating expenditure weights in both the base period and the next period (see Box, on the next page). Theoretically, a superlative index could be used at both stages to account for consumer substitution.

What Is a Superlative Index?

If you ever took a statistics class, you probably learned about two types of index numbers – *Laspeyres* and *Paasche*. Both these indexes use quantities from one period only: the *Laspeyres* calculates changes in price for fixed base period quantities, while the *Paasche* uses fixed present period quantities.

Laspeyres Index: $P_P = \frac{\Sigma p_t q_o}{\Sigma p_o q_o}$ *Paasche* Index: $P_L = \frac{\Sigma p_t q_t}{\Sigma p_o q_t}$

Laspeyres and *Paasche* indexes, therefore, do not reflect consumers' attempts to maximize their utility in the face of changing prices. If the price of linguini increased between the base period and the current period, consumers would likely substitute some other, relatively cheaper pasta, such as macaroni. The *Laspeyres* index would ignore that change and only take into account the original linguini consumption, overstating the impact of the price change on the cost of living. The *Paasche* index, on the other hand, would assume that consumers had always purchased macaroni instead of linguini, which would understate the impact of the price change.

A superlative index, such as the *Fisher Ideal* index or *Törnqvist* index, takes into account the original and current amounts of linguini in the consumer's basket, albeit in different ways. The *Fisher* index is simply the geometric mean of the *Laspeyres* and *Paasche* indexes, which splits the difference between the two.

Fisher Index: $P_F = \sqrt{P_L P_P}$

The *Törnqvist* index, which is used to calculate the chained CPI, takes a more involved approach: it is the exponential sum of the average of the nominal shares of total expenditures represented by each good in the base and current periods, weighted by the logarithmic growth rate of the quantity of that same good in the consumption basket.

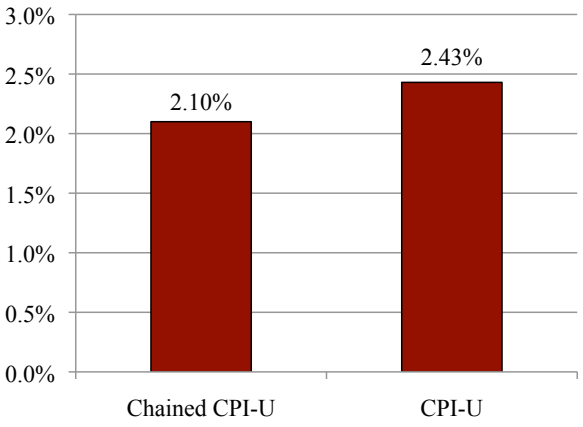
Törnqvist Index: $P_T = exp\left(\sum \frac{1}{2}\left(\frac{p_o q_o}{\Sigma p_o q_o} + \frac{p_t q_t}{\Sigma p_t q_t}\right) \ln\left(\frac{p_t}{p_o}\right)\right)$

These superlative indexes therefore fall between the upper and lower bounds on true cost-of-living given by the *Laspeyres* and *Paasche* indices, respectively.

The BLS was not able to use the superlative at the first stage ("digital for analog watch") because it did not have reliable monthly expenditure data for each of the 80,000 lower-level price quotes. That is, it had reliable information on the prices but not on the quantity purchased. As an alternative, the BLS in 1999 began using a geometric mean price index formula for most of the elementary indexes to approximate a superlative index for substitution at the first stage.[3] This change slowed the growth in the CPI.

What remains is substitution at the second stage ("jewelry for watches"), where the CPI-W and CPI-U continue to use a *Laspeyres* index that holds the quantities fixed at the base period levels. To the extent that substitution occurs in response to price changes, these indexes overstate the increase in prices. To quantify the extent of overstatement, the BLS in 2002 began publishing the chained CPI – the C-CPI-U – that employs a superlative formula and uses data from two *Consumer Expenditure Surveys* to reflect any substitution that consumers make across categories in response to relative prices. As shown in Figure 2 (on the next page), the C-CPI-U has increased about 0.3 percentage points slower each year than the CPI-U.

Figure 2. Average Annual Percentage Change in Chained CPI-U and CPI-U, Dec. 1999-Dec. 2010



Source: U.S. Bureau of Labor Statistics (2011a). Chained CPI-U data for 2010 are preliminary.

The Chained CPI and Social Security

The National Commission on Fiscal Responsibility and Reform (co-chaired by Erskine Bowles and Senator Alan Simpson) and The Bipartisan Policy Center's Debt Reduction Task Force (co-chaired by Senator Pete Domenici and Alice Rivlin) both recommended the adoption of the chained CPI. Domenici-Rivlin said, "This is a technical change that will be applied in all government programs that use COLAs, including the indexation of tax brackets." Bowles-Simpson characterized the chained index as "a more accurate measure of inflation." In each case, switching to the C-CPI-U was estimated to reduce Social Security's 75-year actuarial deficit by 0.5 percent of taxable payrolls. Since the deficit is about 2 percent of taxable payrolls, this change alone would eliminate about one-quarter of the long-range deficit.[4]

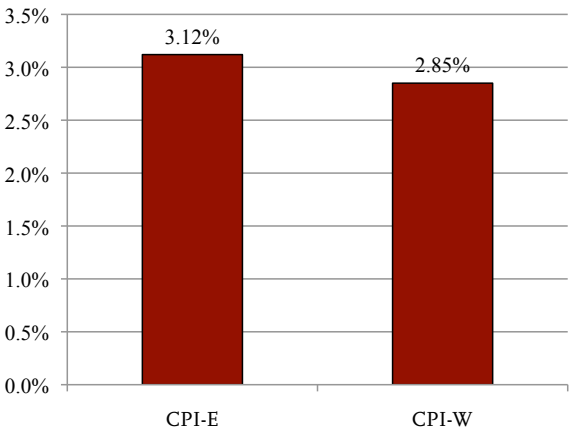
It may seem surprising that such a small change could eliminate such a large portion of the deficit. After all, 0.3 percent less in a COLA applied to the average monthly benefit of $1,200 amounts to only about $4 per month. But while shifting to a chained CPI involves a relatively small change for young retirees, it results in a substantial benefit cut as retirees age. A COLA that is 0.3 percentage points lower per year would produce a monthly benefit that is about 6.5 percent lower by the time a retiree reaches 85.

Such a cut could be viewed as simply making the system fairer – by more accurately reflecting the change in the cost of living for beneficiaries – if the current index (CPI-W) adequately reflected the cost increases faced by the elderly. In fact, the adequacy of the CPI-W as an index for Social Security beneficiaries has been questioned for decades. The Older Americans Act of 1987 directed the BLS to develop an Experimental Price Index for the Elderly (CPI-E) for Americans 62 and older.

A true index for the elderly would require collecting price quotes on the products that older people buy at the type of retail outlets they frequent. It could be that older people with ample time shop at Costco and enjoy lower prices and less inflation than the rest of the population or they could be limited to shopping at their neighborhood 7-Eleven store and face higher prices and more inflation. Instead of constructing an entirely new index, the BLS simply re-weights the elementary indexes in the CPI-U to reflect the expenditure pattern of older consumers.

A key difference in the spending patterns of the old and the young is medical care. *The Consumer Expenditure Survey* shows that health care accounts for 13 percent of expenditures for those 65 and older compared to 5 percent for those under 65. Since medical costs are rising rapidly, putting more weight on this component would be expected to produce more rapid price increases. And, indeed, over the period 1982-2010, the CPI-E has increased 0.27 percentage points faster each year than the CPI-W (see Figure 3).

Figure 3. Average Annual Percentage Change in CPI-E and CPI-W, Dec. 1982-Dec. 2010



Source: U.S. Bureau of Labor Statistics (2011a and 2011b).

Thus, while it is impossible to say with certainty without a properly constructed index for older Americans, the CPI-E suggests that the index currently used to adjust Social Security benefits understates the rate of price increase. So, a fair discussion of the Social Security COLA should acknowledge the offsetting biases of the *understatement* due to not recognizing the spending patterns of the elderly and the *overstatement* for not accounting for upper-level substitution.

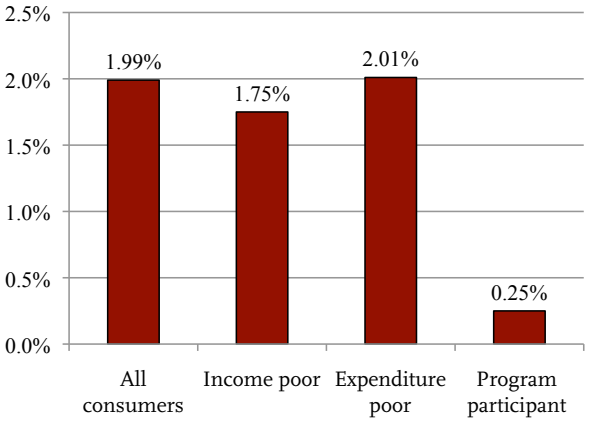
Adopting a C-CPI-U also raises a complication because the initial published value of the index is by necessity preliminary. A final value requires expenditure data from two successive *Consumer Expenditure Surveys*, which are only available with a time lag. Thus, monthly values of the index are issued first in preliminary form using the latest expenditure data and are subject to two subsequent revisions.

The Chained CPI and the Low Income

The other issue is whether low-income elderly really have the flexibility to change what they buy in response to price changes – a key assumption behind the chained CPI. Low-income elderly are not deciding whether to buy a watch or a bracelet. They spend most of their income on essential amounts of necessities, like housing, food, health care, and transportation. If the price of gasoline doubles, they cannot mitigate the impact on their total costs simply by driving less. They are already consuming close to the minimum. Most likely, they will drive a little less and then cut spending on housing, food, and health care. With little ability to respond to price changes, the poor have no mechanism to offset the full brunt of a price increase. Social Security's chief actuary raised this issue in a recent letter.[5]

Unfortunately, very little work has been done on this issue. One BLS study from the mid-1990s attempted to measure substitution bias for the population as a whole and for the low income defined in various ways – income poor, expenditure poor, and program participants.[6] The extent of bias was lower for the income poor and program participants than for the population as a whole (see Figure 4). This finding is consistent with the notion that the poor find it more difficult to substitute one good for another. It was impossible, however, to calculate whether the differences were statistically significant. And the authors concluded that more research was needed, and that conclusion holds today.

Figure 4. Substitution Bias for All Consumer Units and the Poor, 1984-1994



Source: Garner, Johnson, and Kokoski (1996).

Conclusion

Changing Social Security's cost-of-living adjustment is one of the few ways to have current retirees contribute to restoring balance to the program. And one could make the case that not all the burden should fall on younger workers. Moreover, COLA changes are not unprecedented: the Greenspan Commission in 1983 recommended delaying COLA payments by six months.

The proposal on the table – or likely to be on the table – does not involve a one-time adjustment. Rather, the idea is to replace the current CPI with a chained index that compensates for consumers' ability to substitute among the 211 goods and services. This index increases more slowly than the index currently used. If benefits were currently adjusted by the appropriate index, introducing a chained index would probably improve accuracy. But the experimental index for the elderly (CPI-E) suggests that the current index understates the inflation faced by the elderly.

Thus, any adjustment to the nature of the COLA – as opposed to, say, a one-time delay – should take into account both the projected 0.30 percent *overstatement* due to not accounting for the substitution effect and the projected 0.27 percent *understatement* due to not reflecting the spending patterns of the elderly. And researchers should figure out whether the low income have the flexibility to change their spending in response to price changes.

Endnotes

1 This example and much of the analysis is derived from Cage, Greenlees, and Jackman (2003).

2 The CPI is based on prices collected monthly from 87 urban areas around the country. For the purpose of calculation, the urban portion of the United States is divided into 38 index areas, while all goods and services purchased are divided into 211 item strata, resulting in 8,018 item-area combinations.

3 The geometric mean approach assumes that consumers will allocate constant shares of spending to the 211 goods or services, but will shift the quantities they buy depending on what happens to the prices.

4 Goss (2010a and 2010b).

5 Goss (2011).

6 A consumer unit is identified as income poor or expenditure poor if its income or expenditure, respectively, falls under the Census Bureau poverty threshold. The "program participants" receive benefits from any of a number of welfare programs, including SSI, Medicaid, AFDC/TANF, food stamps, and housing assistance.

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