Social Security Cost-of-Living Adjustments and the Consumer Price Index

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Summary

OASDI benefits are indexed for inflation to protect beneficiaries from the loss of purchasing power implied by inflation. In the absence of such indexing, the purchasing power of Social Security benefits would be eroded as rising prices raise the cost of living. By statute, cost-of-living adjustments (COLAs) for Social Security benefits are calculated using the Bureau of Labor Statistics (BLS) Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W). Some argue that this index does not accurately reflect the inflation experienced by the elderly population and should be changed to an elderly-specific price index such as the Experimental Consumer Price Index for Americans 62 Years of Age and Older, often referred to as the Consumer Price Index for the Elderly (CPI-E).

Others argue that the measure of inflation underlying the COLA is technically biased, causing it to overestimate changes in the cost of living. This argument implies that current COLAs tend to increase, rather than merely maintain, the purchasing power of benefits over time. Potential bias in the CPI as a cost-of-living index arises from a number of sources, including incomplete accounting for the ability of consumers to substitute goods or change purchasing outlets in response to relative price changes. The BLS has constructed a new index called the Chained Consumer Price Index for All Urban Consumers (C-CPI-U) that better accounts for those consumer adjustments.

Price indexes are not true cost-of-living indexes, but approximations of cost-of-living indexes (COLI). The Bureau of Labor Statistics (2006a) explains the difference between the two:

> As it pertains to the CPI, the COLI for the current month is based on the answer to the following question: "*What is the cost, at this month's market prices, of achieving the standard of living actually attained in the base period?*" This cost is a hypothetical expenditure—the lowest expenditure level necessary at this month's prices to achieve the base-period's living standard. . . . Unfortunately, because the cost of achieving a living standard cannot be observed directly, in operational terms, a COLI can only be approximated. Although the CPI cannot be said to equal a cost-of-living index, the concept of the COLI provides the CPI's measurement objective and the standard by which we define any bias in the CPI.

While all versions of the CPI only approximate the actual changes in the cost of living,

the CPI-E has several additional technical limitations. First, the CPI-E may better account for the goods and services typically purchased by the elderly, but the expenditure weights for the elderly are the only difference between the CPI-E and CPI-W. These weights are based on a much smaller sample than the other two indices, making it less precise. Second, the CPI-E does not account for differences in retail outlets frequented by the aged population or the prices they pay. Finally, the purchasing population measured in the CPI-E is not necessarily identical to the Social Security beneficiary population, where more than one-fifth of OASDI beneficiaries are under age 62. Likewise, over one-fifth of persons aged 62 or older are not beneficiaries, but they are included in the CPI-E population.

Finally, changes in the index used to calculate COLAs directly affect the amount of benefits paid, and as a result, projected solvency of the Social Security program. A switch to the CPI-E for the December 2006 COLA (received in January 2007) would have resulted in an average monthly benefit $0.90 higher than that received. If the December 2006 COLA had been adjusted by the Chained CPI-U instead, the average monthly benefit would have been $4.70 less than with current indexing. Any changes to the COLA that would cause faster growth in individual benefits would make the projected date of insolvency sooner, while slower growth would delay insolvency. Hobijn and Lagakos (2003) estimated that switching to the CPI-E for COLAs would move projected insolvency sooner by 3–5 years. A projection by SSA's Office of the Chief Actuary estimated that annual COLAs based on the Chained C-CPI-U beginning in 2006 would delay the date of OASDI insolvency by 4 years.[1]

Introduction

Several recent legislative proposals have called for the annual Cost-of-Living Adjustment (COLA) for Old-Age, Survivors, and Disability Insurance (OASDI) benefits to reflect the spending patterns and inflation experience of the elderly U.S. population.[2] These proposals are motivated by the belief that the elderly experience higher rates of inflation and therefore should be receiving greater benefit increases. At the same time, many economists and others, including then-Federal Reserve Chairman Alan Greenspan and former Commissioner of Social Security Robert Ball, have argued that the annual COLAs currently being granted are in fact larger than actual inflation and should be reduced rather than increased (Greenspan 1997 and 2004; Ball 2004). Thus, some proposals have called for annual COLAs to be reduced to account for the current overstatement of inflation.[3] This article describes some of the issues involved with indexing Social Security benefits for inflation in general and explores the implications of adopting either of the two alternate COLAs suggested for indexing benefits.

OASDI benefits are indexed after initial receipt to protect beneficiaries from the loss of purchasing power due to inflation.[4] In the absence of such indexing, the purchasing power of Social Security benefits would be eroded as rising prices raise the cost of living, constraining beneficiaries to purchase fewer goods and services with a fixed-dollar benefit. By statute, COLAs for Social Security benefits are currently calculated using the Bureau of Labor Statistics (BLS) Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W). That is, Social Security beneficiaries receive an annual COLA that increases their benefits by the rate of inflation as measured by the CPI-W.

The consumption of medical care by those aged 62 or older is a significant factor behind the belief that the elderly population experiences higher rates of inflation than the overall population and that the annual CPI-W COLAs are insufficient to cover their rising cost of living. In short, the argument is that the elderly consume relatively more medical care than the overall population and that medical care prices have risen more rapidly than prices in other consumption categories. The BLS has developed an Experimental Consumer Price Index for Americans 62 Years of Age and Older, often referred to as the Consumer Price Index for the Elderly (CPI-E), that takes into account increased utilization of medical care and seems to lend support to these claims.[5] The actual COLAs based on the CPI-W and granted to Social Security beneficiaries from 1984 to 2006 have averaged 3.02 percent annually. If the same COLA calculations had been based on the CPI-E instead, the COLAs would have averaged 3.35 percent, 0.33 percentage points higher.[6] In fact, a COLA based on the CPI-E would meet or exceed the CPI-W COLA in every year between 1984 and 2006 except 2005. In 2005, the standard CPI-W COLA would have exceeded a hypothetical CPI-E COLA by 0.30 percentage points.

Although researchers have identified a number of concerns regarding the CPI-E and do not deny that the issue is worth investigating, many doubt the need for or the practicality of constructing a price index specifically for the elderly.[7] Furthermore, the newly developed chain weighted (C-CPI-U) provides strong evidence that the methodology used to construct both

the CPI-W and CPI-E implies a substantial upward bias in the measurement of inflation. A correction of this upward bias in the measurement of inflation would actually imply smaller COLAs, not larger ones.[8] COLAs based on the Chained C-CPI-U would have averaged 2.32 percent between 2001 and 2006, compared with 2.70 percent and 2.92 percent for annual COLAs based on the CPI-W and CPI-E, respectively, over the same period.[9]

In light of these perceived biases, it might seem natural to consider designing a chain–weighted CPI-E price index for the elderly. Such a price index could theoretically address the concerns represented by both alternative points of view. However, as this article demonstrates, both chain–weighted indexes and price indexes restricted to the OASDI elderly population suffer from significant limitations when used as the basis for COLA calculations. Furthermore, as the two currently perceived biases seem to be offsetting and of roughly equal magnitude, there is reason to suspect that such a hybrid index would be similar to the currently used CPI-W.

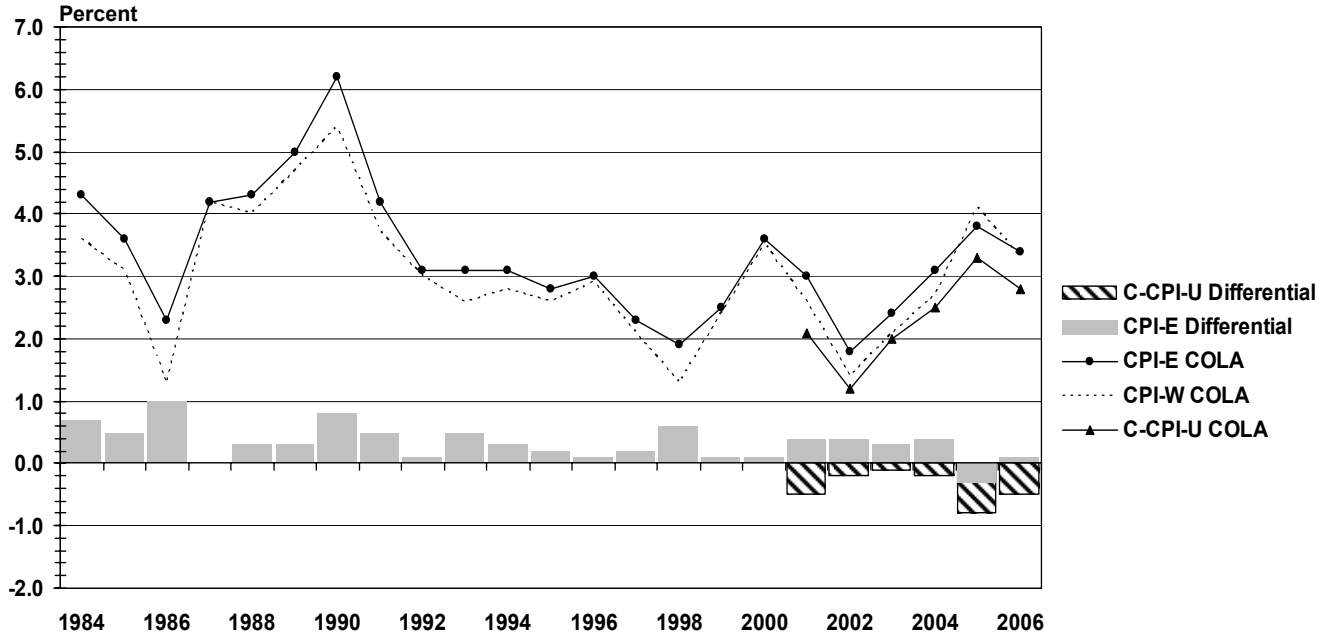
Background

Prior to 1975, Social Security (OASDI) and Supplemental Security Income (SSI) benefit increases were determined only by periodic legislative action. Since 1975, these benefits have been automatically adjusted for inflation. The legislation establishing the automatic indexation of OASDI benefits specified that the annual COLA calculations be based on the rate of increase in the CPI-W as published by the BLS.[10, 11]

> The first automatic COLA, for June 1975, was based on the increase in the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) from the second quarter of 1974 to the first quarter of 1975. The 1976-83 COLAs were based on increases in the CPI-W from the first quarter of the prior year to the corresponding quarter of the current year in which the COLA became effective. After 1983, COLAs have been based on increases in the CPI-W from the third quarter of the prior year to the corresponding quarter of the current year in which the COLA became effective (Social Security Administration 2004).

Chart 1 shows the annual COLAs based on the CPI-W and granted to Social Security beneficiaries between 1984 and 2006.[12] These COLAs averaged 3.02 percent over the past 23 years. Also shown in Chart 1 are what the COLAs would have been if the same calculations had been performed using the CPI-E

Chart 1.
Annual Cost of Living Increases (COLAs): Hypothetical versus actual



SOURCE: Authors' calculations based on CPI data from the Bureau of Labor Statistics.

NOTE: C-CPI-U = Chained Consumer Price Index for All Urban Consumers; CPI-E = Consumer Price Index for the Elderly; CPI-W = Consumer Price Index for Urban Wage Earners and Clerical Workers.

or the chain–weighted CPI-U. The differences between the two hypothetical Colas and the actual historical Colas are illustrated in the bar graph of Chart 1.

Between 1984 and 2006, COLAs based on the CPI-E would have resulted in benefits in 2006 that would have been 15.1 percent higher for individuals who had been beneficiaries for the entire 23-year period.[13] Table 1 outlines the differences in benefits based on which CPI was used and the length of time an individual has been a beneficiary. Individuals who had been beneficiaries for 10 years as of 2006 would have had benefits approximately 3 percentage points higher under a COLA based on the CPI-E, and individuals who had been beneficiaries for 5 years as of 2006 would have had benefits approximately 1 percentage point higher. As of December 2005, approximately 12 percent of retired-worker beneficiaries had been entitled to benefits for at least 23 years; 28 percent of retired-worker beneficiaries had been entitled to benefits for fewer than 5 years, and more than half had been entitled to benefits for fewer than 10 years.[14] Hobijn and Lagakos (2003) calculated that the average benefit for *all* beneficiaries would be 3.8 percentage points higher had the CPI-E been used for COLAs from 1984 to 2001, taking into account differing numbers of years on the program for beneficiaries in 2001.

Table 1.
Accumulated benefit increases from COLAs derived from different CPIs as of January 2007 (in percent)

Starting year and number of years in beneficiary status	Accumulated COLA increase from—		
	CPI-E	CPI-W/ actual	Chained C-CPI-U
2002 (5 years)	15	14	12
1997 (10 years)	32	29	. . .
1992 (15 years)	53	47	. . .
1987 (20 years)	93	83	. . .

SOURCE: Author's calculations.

NOTE: CPI-E = Consumer Price Index for the Elderly; CPI-W = Consumer Price Index for Urban Wage Earners and Clerical Workers; Chained C-CPI-U = Chained Consumer Price Index for All Urban Consumers; . . . = not applicable.

Consumer Price Indices

The Bureau of Labor Statistics (BLS) produces monthly price indices for several subsets of the U.S. population. Among these are the Consumer Price Index for All Urban Consumers (CPI-U) and the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W). About 87 percent of the U.S. population fits the BLS definition of All Urban Consumers, while 32 percent fit the definition of Urban Wage Earners and Clerical Workers. In addition, the 1987 Amendments to the Older Americans Act of 1965 directed the BLS to develop a new experimental data series, the CPI-E, to measure the inflation experience of those aged 62 or older, an even smaller subset of the U.S. population (approximately 15 percent in 2001-2002) (Bureau of Labor Statistics 2006b). The CPI-E data series produced by the BLS is unpublished, but is available from the BLS upon request.

These different price indices are constructed using a common framework. The BLS surveys prices for a collection of roughly 90,000 goods and services from a sample of urban retail purchasing outlets. The basket of goods and services are divided into broad "major group" expenditure categories, which are further divided into expenditure classes. Expenditure classes are further subdivided into item strata and still further into sub-strata. The Food and beverages category is an example of a major group expenditure—the fresh fruits and vegetables expenditure is a class within this major group category; and the apples item is a stratum within this class. Within the apples item stratum, the whole array of apples (for example, Fuji, Golden Delicious, MacIntosh)—is priced. The sampled prices are combined into a price index for each sub-stratum and these sub-strata price indices are aggregated up to form price indices for each stratum, class, and category. The price indices for each expenditure category are then combined to form an overall consumer price index like the CPI-U, CPI-W, or, CPI-E.

When forming the overall price indices like the CPI-U and CPI-W, the BLS examines the spending patterns of each subset of the population using data from the Consumer Expenditure Survey (CEX).[15] These data are used to estimate expenditure weights that measure the fraction of total expenditures made on each expenditure category for a given subset of the population. The December 2005 expenditure weights for each population are shown in Table 2.

The apparel item category accounts for a larger fraction of total expenditures made by Urban Wage Earners and Clerical Workers than for All Urban Consumers and thus receives a larger expenditure weight in the CPI-W than it does in the CPI-U. Similarly, the medical care item category receives a larger expenditure weight in the CPI-E than it does in either the

CPI-U or the CPI-W because the elderly spend a larger fraction of their income on medical care. It is only the variation in these expenditure weights across subsets of the population that cause the overall price indices to differ.

The housing category receives the largest expenditure weight in each of the three CPI measures and is larger for the CPI-E than for either the CPI-U or CPI-W. This is significant because in 2005, 68 percent of owner-occupied housing units with an elderly householder were owned free and clear (U.S. Bureau of the Census 2006, Table 7-15). This means that "Owner Equivalent Rent of Primary Residence" (the largest stratum in the housing category in Table 2 above), which represents 28.8 percent of total expenditures of the elderly, is measuring an opportunity cost for many of the elderly rather than an actual out-of-pocket expense. Rental equivalence is used to identify the value of housing services provided by a purchased home, not necessarily the cost to individuals of obtaining those housing services. Using mortgage payments or other home purchase data to form the expenditure weight is considered to be inappropriate since the purchase of a home provides a form of saving in addition to providing a flow of housing services.

Traditionally, the CPI-U, CPI-W, and CPI-E were known as fixed-weight Laspeyres indices. A Laspeyres price index measures the cost of purchasing a fixed basket of goods and services and assumes that consumers do not alter their spending patterns as prices change. Beginning with data for December 1999, the BLS has also produced a chain-weighted index, the Chained Consumer Price Index for All Urban Consumers (C-CPI-U), using a Tornqvist formula. In chained price indices, the expenditure weights are not held constant, reflecting the fact that consumers alter their spending patterns in response to price changes.

CPI Measurement Issues

In 1996, the Senate Finance Committee formed the Advisory Commission to Study the CPI (commonly referred to as the Boskin Commission) to evaluate

Table 2.
Expenditure categories by CPI population, December 2005 (in percents)

Expenditure categories	CPI-U	CPI-W	CPI-E
All items	100.00	100.00	100.00
Food and beverages	15.10	16.80	12.90
Food at home	8.10	9.40	7.60
Food away from home	6.10	6.40	4.60
Alcoholic beverages	1.00	1.10	0.70
Housing	42.20	39.30	48.20
Shelter	32.40	29.70	37.60
Rent	6.10	8.00	3.90
Owners' equivalent rent	23.00	19.60	28.80
Apparel	3.70	4.00	2.50
Transportation	17.70	20.10	14.00
Medical care	6.20	5.10	10.90
Medicare care commodities	1.50	1.10	3.10
Medical care services	4.70	3.90	7.80
Recreation	5.60	5.40	4.40
Education and communication	5.80	5.40	3.20
College tuition	1.40	1.00	0.50
Other goods and services	3.70	3.90	4.00
Tobacco and smoking products	0.80	1.30	0.60

SOURCE: Bureau of Labor Statistics (2006b).

NOTES: CPI-U = Consumer Price Index for All Urban Consumers; CPI-W = Consumer Price Index for Urban Wage Earners and Clerical Workers; CPI-E = Consumer Price Index for the Elderly.

the accuracy of the CPI as a cost-of-living measure. The Boskin Commission estimated that bias in the CPI likely overstated increases in the cost of living by 1.1 percentage points annually. The BLS itself has stated that the CPI is only a proxy for the cost of living and that changes in the CPI are an upper limit of the cost of living (Abraham 1995 and 1997).

Bias in the CPI as a cost-of-living index can arise from a number of sources. Substitution bias refers to the ability of consumers to substitute one good or service for another in response to relative price changes, an ability that is poorly accounted for in the measurement of the fixed-weight CPI. For example, if the price of grapefruit rises, individuals may purchase oranges instead. A fixed-basket approach, however, incorporates the price increase of grapefruit in the CPI by assuming that the consumer still purchased the same number of grapefruit as in the prior period.

Another form of substitution bias refers to the ability of consumers to alter their purchasing outlets in response to price changes; again, this is poorly accounted for in the measurement of the CPI. If a store lowers its price on DVDs, consumers may start buying DVDs from that store instead of the store they bought DVDs from in the previous period. This change in purchasing outlet is not captured in a fixed-weight basket.

There are also new product and quality change biases inherent in the fixed-basket CPI. New products are ignored until they are ultimately included in the basket, often long after their prices have already fallen substantially. For instance, prices of computers and electronic items often decline rapidly after introduction, but these declines would not be tracked until the items are included in the CPI basket. Likewise, price changes that reflect quality improvements rather than inflation are difficult to measure. For instance, computers or cars today may cost more than in the past, but these items are generally of higher quality. Changes in quality are especially problematic for sectors like medical care and technology because they experience rapid changes in the quality of goods and services available for consumption.[16]

The BLS has not ignored these issues; on the contrary, the BLS has continually updated its techniques and procedures over time to better address the shortcomings of a fixed-basket approach to calculating a CPI (Abraham 1997). Since the Boskin Commission's report, the BLS has implemented a number of changes in its methodology for measuring the CPI. These changes included the replacement of arithmetic mean estimators with geometric mean estimators to better reflect substitution;[17] increasing reliance on hedonic price regressions to account for quality change;[18] new methods of sampling among different purchasing outlets; pricing medical treatments rather than specific medical procedures; more frequent updating of the basket of goods and services; and several other technical changes. As a result, the CPI today measures changes in the overall price level more accurately.

The changes to CPI measurement resulting from the Boskin Commission's report slowed the rate of growth of the CPI by about 0.2 percentage points per year. Moreover, the bias in the CPI as a cost-of-living measure was reduced by an even greater amount. According to a General Accounting Office (2000) survey of the Boskin Commission members in 1999, the changes to the measurement of the CPI reduced the bias from 1.1 percentage points to 0.8 percentage points. A recent article by Lebow and Rudd (2003) places the remaining upward bias in the CPI at 0.87 percentage points.

The extent of remaining bias in the CPI as a cost-of-living measure is of concern for a variety of reasons. In addition to being a measure of inflation that influences both fiscal and monetary policy, the CPI is used to index or adjust expenditures of many government programs. Most importantly for present purposes, Social Security benefits are indexed for inflation according to the CPI-W, but the CPI is also used to adjust income-tax brackets and determine interest rates for Treasury Inflation Protected Securities commonly referred to as TIPS.[19] An upward bias in the CPI implies that many government programs are being overindexed, or rising faster than the cost of living. Duggan and Gillingham (1999) estimated the financial impact to Social Security from errors in the CPI. They calculated the present-value cost to the OASDI trust funds through 2040 to be $965 billion at the end of 1997.[20]

Starting with data for December 1999, the BLS has also produced a chain–weighted Consumer Price Index for All Urban Consumers, the Chained C-CPI-U. This chain-weighted CPI reduces substitution bias by changing the expenditure weights each month rather than biennially, as is done for the other nonchained consumer price indexes. In this way, the chain-weighted CPI better accounts for changing purchasing habits. The annual COLAs based on the new C-CPI-U for 2004-2006 would have been 2.5 percent, 3.3 percent, and 2.8 percent, respectively. In contrast, the CPI-W based COLAs actually granted were 2.7 percent, 4.1 percent, and 3.3 percent, respectively. This provides further evidence that the current formula for

COLAs based on the CPI-W actually overcompensates for inflation. On average, increases based on the C-CPI-U would have been 0.38 percentage points lower than the actual COLAs based on the CPI-W since 1999.

The Chained C-CPI-U suffers from limitations of its own. Because the C-CPI-U relies on expenditure data that is available only after a significant time lag, its values are not final when first published. Final values for the C-CPI-U are not published until up to 2 years after the initial values are published. Interim values for the C-CPI-U become available in February of the following calendar year.[21] Some method of reconciling this substantial time lag would have to be developed before annual COLAs could be based on the chain weighted C-CPI-U.

Medical Care

The treatment of medical care is particularly complicated when measuring inflation, and a number of important issues need to be considered. This is especially true in the context of measuring inflation experienced by the elderly, since medical care has a larger expenditure weight for the CPI-E than in the CPI-U or CPI-W.

The medical component of the CPI has several issues inherent to the goods and services it covers that other components may not. For example, medical technology is constantly changing. Graboyes (1994) outlines some of the issues that make measurement of medical prices complex: the introduction of treatment for a previously untreatable condition, changes in treatments, preventive measures like vaccination, and changes in efficacy of treatment.[22] The National Research Council (2002) provides a more in-depth discussion of the medical CPI than can be covered here.

Hospitalization

The segment of the medical CPI that covers hospital expenditures has a couple of issues. First, transactions in which Medicare Part A and Medicaid are payors are not included in the CPI (Bureau of Labor Statistics 2001 and Cardenas 1996). Because Medicare Part A coverage is nearly universal for persons aged 65 or older, the price changes calculated on transactions by private payors in the hospital segment are not representative of the hospital expenses for the elderly.[23] This issue is exacerbated when hospitals attempt to compensate for restrictions of allowable charges and reductions for Medicare and Medicaid reimbursement by increasing fees to private pay patients, causing the hospital price index to increase more quickly (Wilson 2003).

The second issue is one of quality change that has partially been addressed. Many medical procedures have decreased the number or intensity of inputs necessary to achieve a particular outcome, from shortening the length of stay to diminished intensive nursing needs following less invasive surgeries. Instead of pricing individual inputs, like hospital room days, the pricing unit as of January 1997 is the hospital visit (Bureau of Labor Statistics 2001 and 2003). The opinion that medical services should be viewed in light of treatment outcomes has been gaining prominence (Bureau of Labor Statistics 2003). Another related issue is that as doctors become more adept at new procedures their success rates rise, improving outcomes, but pricing the input of a hospital visit does not capture this.[24]

Physicians' Services

House, office, clinical, and hospital visits billed by private-practice medical professionals with an MD (except ophthalmologists) are included in this stratum. This stratum index uses transaction prices and includes Medicare Part B payments in addition to payments by private payors (Bureau of Labor Statistics 2003).[25]

Prescription Drugs

Prior to publication of the January 1995 CPI, the BLS did not substitute generic drugs unless the brand name drug was no longer carried by a retail outlet. Since January 1995, however, a brand name drug may be substituted for by a therapeutically-equivalent drug 6 months after it loses patent protection. The 6-month period allows the new therapeutically equivalent drug to gain market share, and then the chance of selection for the sample is determined by the proportion of sales of each version.[26] If a substitute is chosen, the price difference between the original drug and the substitute is recorded as a price change in the CPI (Knudsen 1994 and Bureau of Labor Statistics 2003).[27]

The recent enactment of a prescription drug benefit for Medicare beneficiaries (Part D) introduces another complicating factor in measuring effective price changes faced by the elderly. The impact of Medicare Part D on the inflation experience of the elderly is not yet clear, nor is the effectiveness of the CPI-E in capturing this experience.[28]

Health Insurance

The CPI indirectly factors price changes of medical insurance into three parts. The first part encompasses most of the expenditure for health insurance reflecting insurers' payments for medical treatment. The CPI allocates this segment to the indexes for those treatments. The remaining weight, comprising the unpublished health insurance index, reflects changes in the cost of administering policies and maintaining reserves and profits (Bureau of Labor Statistics 2001).

The CPI considers employer-paid health insurance premiums to be part of the consumers' incomes and not their expenditures, and as such, does not include them in the CPI (Bureau of Labor Statistics 2001). This presents a difficulty for two reasons. The first is best illustrated by an example: suppose a potential employee can choose between two jobs that are identical, with the exception that one offers a health insurance benefit and the other does not, with the salary differential equal to the employer-paid premium. If the employee chooses the job with the health insurance benefit, he has essentially chosen to expend that part of his pay on health insurance:

> Since the employer's portion of health care insurance is a benefit provided to employees, and since employees can, to some extent, choose their employers on the basis of the full compensation package (wages, salaries, and health insurance benefits), it makes sense to incorporate the employer portion of health insurance in the CPI and MCPI weights, rather than treating it as a business expense unrelated to employee compensation or consumers' expenditures.(National Research Council 2002).[29]

The second reason is that, all else equal, a change in the employee-employer relationship could appear as a price change. Suppose the total employee-employer insurance premium remains unchanged, but the employer decides to pay a smaller portion of the premium. This is a decrease in the employee's compensation, but because the employee's share of the premium increases, it also appears as a price increase in the CPI. In this case, the employer has reduced the employee's compensation, but the price the health insurance company receives for the policy remained unchanged.

Limitations of the CPI-E

In addition to the limitations of all CPI indices described in the preceding sections, the experimental CPI-E has several additional technical limitations.

As mentioned previously, the Consumer Expenditure Survey (CEX) is used to compute all variations of the CPI. The CPI-U (all urban consumers) and CPI-W (urban wage earners and clerical workers) represent approximately 87 percent and 32 percent of the U.S. population, respectively. Only 16.5 percent of eligible urban consumers met the BLS definition of elderly in the 2001-2002 CEX used for the CPI expenditure weights in 2004-2005 (Bureau of Labor Statistics 2006b).[30] Because the sample size for CPI-E is smaller than the samples for CPI-U and CPI-W, the expenditure weights used to compute the CPI-E are measured less precisely and have larger sampling errors than the expenditure weights used in either of the published series. This imprecision renders the CPI-E a less accurate measure of inflation than the CPI-U or the CPI-W.

There are additional concerns with using the CPI-E as a measure of the inflation experience of the elderly. While the expenditure weights vary by CPI population group, the price changes within the expenditure categories and classes are based upon the purchases of the entire CPI-U population. Because the purchasing patterns of the elderly may differ from those of the general urban population in ways not captured by the expenditure weights, the CPI-E may mismeasure the inflation experience of the elderly. In other words, the elderly may differ from other groups not only in what they spend their money on, but in how and where they shop and in the prices they may pay. The direction of the mismeasurement is not always clear however, and may differ from one expenditure category to another, or even within the category.

The medical expenditure category is a prime example of how the elderly may differ in the composition of their within-category expenditures. Berndt and others (1998) describe scenarios in which the elderly may be prescribed drugs that would experience faster or slower growth in prices. For acute conditions, the elderly may be more medically fragile and be prescribed the newest drugs with the fewest side effects; for chronic conditions, physicians may not want to switch their elderly patients from the older drugs that they are taking and are working well. The elderly would experience faster price growth in the first case but slower in the second.

Box 1.
Additional complications

While the issues discussed here and many others are easily identifiable, they are often difficult to analyze fully. In many cases the direction of change attributable to an issue is not even clear. For example, while the concentration of elderly in a small number of states is known, it is not known whether these states experience rates of inflation that are higher or lower than the national average. Many elderly choose to live in Florida, but while the BLS does compute separate price indices for major metropolitan areas, it does not compute cost indices by state. For example, during the second half of 2003, Miami experienced inflation higher than the national average while Tampa-St. Petersburg experienced lower inflation (Bureau of Labor Statistics 2004, Table 30). Whether the elderly experience higher or lower rates of inflation as a result of their geographical concentrations remains an open question.

Similarly, the impact of differential use of retail outlets is difficult to assess. While the conventional wisdom may be that the elderly are less likely to make purchases over the internet or from warehouse clubs, it is also true that the elderly may have a lower opportunity cost of time. Because the elderly may have more time to spend searching for the best deal, they may make purchases at or below the prices offered at the more convenient retail outlets (like the internet) preferred by the nonelderly population.

Hospital costs are another area in which the CPI-E may not reflect the experience of the elderly. As mentioned previously, Medicare Part A transactions are not included in the CPI, thereby excluding a substantial number of transactions involving the elderly.

Housing is another area in which there is uncertainty about how the out-of-pocket expenses of the elderly match the estimate in the CPI-E. Over 80 percent of housing units occupied by householders aged 65 or older were owner occupied in 2005, compared with nearly 66 percent of nonelderly householders (U.S. Bureau of the Census 2006, Table 2-1). As mentioned previously, the majority of elderly own their homes free and clear and do not have rental or mortgage payments, making their out-of-pocket homeownership costs smaller.[31] However, property taxes and insurance premiums are highly sensitive to property values, making the out-of-pocket housing expenses of the elderly more volatile than for the nonelderly population. If the objective of a COLA is to protect the purchasing power of the elderly, it is not clear that use of rental rate equivalence will accomplish that, since it measures consumption of housing services rather than out-of-pocket expenditures.

The retail outlets frequented by the elderly population may also differ from those utilized by the general urban population. The retail outlets from which prices are sampled by the BLS are randomly, but relatively uniformly, selected to represent the outlets where purchases are made by households in 87 geographic regions from across the entire United States, while the elderly U.S. population is concentrated more heavily in a small number of states such as Florida.[32] Hence, from the perspective of the elderly, the BLS is undersampling prices from states with high concentrations of elderly and oversampling from other states. Furthermore, the elderly may be less likely to make purchases over the internet or at warehouse clubs than the general urban population. They may also have more physical limitations that would lead them to make purchases through mail order. Berndt and others (1998) indicate that data made available to them from one mail-order firm shows that more than half of the prescriptions it dispensed were to customers aged 65 or older. Because the sampling of retail outlets, from which price changes are determined, is based upon the purchases of the entire urban population, this also can lead the CPI-E to mismeasure the inflation experience of the elderly.

Box 1 above discusses additional complications.

Senior citizen discounts pose an additional difficulty in measuring the inflation experience of the elderly. Because inflation depends on the rate of change of the CPI, senior citizen discounts that represent a fixed-percentage reduction from the normal retail price are not a major concern since they will have, at most, a small effect on the growth rate. Senior citizen discounts that are not a fixed-percentage markdown from the retail price, however, will introduce errors into the CPI-E measure of inflation for the elderly. If a theatre sells a regularly priced movie ticket for $10.00 in 2006 and $11.00 in 2007, it would be a 10-percent increase in price. If the the theatre offers a 10-percent discount to seniors, the ticket costs would be $9.00 in 2006 and $9.90 in 2007; the resulting change in price is still 10 percent. If, however, the theatre offers a fixed $1.00

Table 3.
Fixed percentage versus fixed price discount, 2006-2007 (in dollars unless otherwise specified)

	2006	2007	Change in price (in percents)
Regular price	10.00	11.00	10.00
Senior discount			
Fixed percentage (10 percent)	1.00	1.10	n.a.
Fixed dollar	1.00	1.00	n.a.
Senior price (fixed percentage)	9.00	9.90	10.00
Senior price (fixed dollar)	9.00	10.00	10.00

SOURCE: Authors' calculations.

discount to seniors, the senior price increases from $9.00 to $10.00, resulting in an increase of 11 percent (Table 3).

Finally, it should be noted that the usefulness of CPI-E for indexing Social Security benefits is limited by the fact that many beneficiaries are not elderly. While all retirement beneficiaries must be at least age 62 by definition, spousal benefits, survivor benefits, and disability benefits can accrue to persons under age 62. As of December 2005, 22.2 percent of OASDI beneficiaries were under age 62.[33] Likewise, not all persons aged 62 or older are beneficiaries, but they are included in the CPI-E population. In 2005, 79.8 percent of persons aged 62 or older were beneficiaries.[34] Consequently, indexing annual cost-of-living adjustments and other program parameters to the CPI-E may not necessarily reflect the inflation experience of the OASDI beneficiary population.

Effects of Changes in Indexing

Beyond the technical issues just described, there are practical issues regarding the effects of adopting the CPI-E or the Chained CPI-U for COLAs on individuals and on the Old-Age and Survivors Insurance (OASI) Trust Fund. As noted previously, the average difference between the CPI-E and the CPI-W from 1984 to 2006 was 0.33 percentage points. The average monthly OASDI benefit received in December 2006 was $924.70 (Social Security Administration 2007b). An OASDI beneficiary receiving the average benefit in December would have received a benefit increase of $30.50 with the December 2006 COLA received in January 2007. If the COLA had been based on the CPI-E instead, the benefit increase would have been $31.40, or $0.90 more. The effect of implementing the CPI-E is larger over an extended period of years: accounting for the age distribution of beneficiaries, Hobijn and Lagakos (2003) estimated that the difference in the average monthly benefit from 1984 to 2003 would have been $34. Only if an individual had been a beneficiary for the entire 1984 to 2003 period would the average monthly benefit have been $904, or $62 more per month.

The effect on individual benefits using the Chained C-CPI-U would be larger in size and in the opposite direction. The average difference between the Chained-CPI-U and the CPI-W from 2001 to 2006 was 0.38 percentage points. Had the December 2006 COLA been adjusted by the Chained C-CPI-U instead, an OASDI beneficiary receiving the average benefit in December would have received a benefit increase of $25.80 in January 2007, or $4.70 less than that with the CPI-W.

Hobijn and Lagakos (2003) addressed the potential ramifications of indexing Social Security benefits by the CPI-E for the OASI Trust Fund. Starting the CPI-E indexation in May 2003, two simulations were produced, one assuming that inflation for the elderly was 3.22 and the other assuming it was 3.38 percent.[35] Because benefit levels would increase more rapidly over the next 40 years if the CPI-E were used, the Social Security Trust Fund would become insolvent sooner than the CPI-W projection of 2043 reported in the 2002 Social Security Administration's Trustees' Report. Insolvency would occur in 2041, assuming inflation as measured using the CPI-E of 3.22 percent, or in 2038, assuming CPI-E inflation of 3.38 percent.

The Hobijn and Lagakos results cited above are based on changes to the overall inflation rate and hence include effects (on nominal wage growth for

example) that extend beyond the change in the COLA calculations. In 2005, Social Security's Office of the Chief Actuary (OCACT) produced results for a Social Security Advisory Board publication specifically analyzing changes to the COLA calculations without changing the overall inflation rate. Although these results did not include an analysis of higher COLAs based on the CPI-E, OCACT estimated that basing the annual COLA on the chained C-CPI-U beginning in 2006 would delay the date of OASDI insolvency until 2045, 4 years later than the year 2041 estimated in the 2005 OASDI Trustees' Report. OCACT also reported that fixed reductions of 0.5 and 1.0 percentage points to the current COLA calculations would delay the date of insolvency by 9 and 16 years, respectively.[36]

Once again, because the perceived upward and downward biases in the current COLA calculations seem to be roughly of the same magnitude and hence offsetting, it seems unlikely that any attempt to simultaneously correct both perceived biases would have a substantial impact on the overall solvency of the OASDI system.

Other Related Findings

The general consensus of the economic literature on the CPI and COLAs for the elderly is that while the elderly may experience a slightly higher rate of inflation than the nonelderly, largely due to greater consumption of medical services, the CPI-E as it currently stands is an imperfect guideline for the indexation of benefits. For example, the National Research Council (2002) concluded that there is no rationale for switching to an index along the lines of the CPI-E until the index can capture the differences in the prices or qualities of goods purchased by the elderly. They noted that the heavier weight on medical expenses is largely responsible for the difference between the CPI-E and the CPI-U or CPI-W. As with other sources, the uncounted quality change is blamed for the overstatement in healthcare inflation, but the sources also cite Newhouse (2001), stating that the measurement of medical care prices in the CPI overstated their rise during the periods studied.

Other studies also examine implications of further use of the CPI to adjust benefits. The Boskin Commission (1996) made several recommendations regarding measurement of the total CPI including the addition of "quality of life" issues in the survey. They suggested including data on crime and the environment that "value not only the market consumption basket, but also the resulting leisure and quality of life experienced by the average individual." (Advisory Commission to Study the Consumer Price Index 1996).

The inclusion of a measure of "quality of life" is controversial, however. Tobin (1997) and Solow (1997) argued that attempting to judge the value of quality of life or environmental amenities in a price index is inappropriate.

Several other approaches to indexing benefits are addressed in the literature. Including

- issues surrounding the possible use of a tax and price index, a wage index, or a National Income and Product Accounts (NIPA) index to calculate adjustments to benefits (National Research Council 2002, chapter 7.).
- Myers (1998a) and the resulting discussion, Brown (1998), and reply, Myers (1998b), also discuss indexing by wages and mention indexing preretirement earnings credits to the cost of living, rather than to wages.
- Moulton and Stewart (1999) offer an overview of experimental superlative CPIs and experimental CPIs for poor Americans.
- The Personal Consumption Expenditure (PCE) deflator is an alternative chain-weighted price index that measures inflation at the consumer level. While the CPI is based on consumer utility theory, the PCE deflator is a somewhat broader measure of inflation based on the macroeconomic definition of consumption as defined in the National Income and Product Accounts (NIPA) (Fixler and Valliant 2004 and Seskin and Parker 1998). Beginning in 2000, the PCE deflator became the Federal Reserve's preferred barometer of inflation, although it considers a variety of aggregate price measures when assessing inflation (Board of Governors of the Federal Reserve System 2000).
- Nordhaus (1999) examines an augmented cost-of-living index which would also take into account tax-financed public goods, and goods and services provided by employers and mandated social regulations.
- Jorgenson and Slesnick (1999) advocate the econometric method for cost-of-living measurement, building several group cost-of-living indices, including an index for the elderly. The cumulative difference in their econometric group cost-of-living indices spanning 1978 to 1995

resulted in a price level 1.7 percent higher for the elderly than the non-elderly.

- Because rental rate equivalence in the housing expenditure category measures an opportunity cost rather than actual out-of-pocket expenses for many elderly, Hobijn and Lagakos (2003) question its use for indexing a cash benefit program like OASDI. In addition, several other countries, including Canada, Australia, and the United Kingdom, use alternatives to rental rate equivalence to determine the owner-occupied cost of housing.[37] Diewert (2003) and Woodhouse (1997) provide overviews of the various treatments of owner-occupied housing, such as acquisition cost, rental rate equivalence, and user cost.

Regardless of the methodology employed, the ultimate goal of these and many other papers is to construct as accurate an index as possible to reflect the rate of inflation experienced by a population. An index represents an average level of inflation over an entire population, however, and some individuals in that population experience rises in the cost of living that are higher or lower than indicated by any one particular index.

Conclusion

Annual Social Security COLAs based on the CPI-W were implemented in 1975 to automatically adjust benefits for inflation. Unfortunately, consumer price indexes are not true cost-of-living indexes. Failure to completely account for substitution or changes in quality has led many economists, including the Boskin Commission, to conclude that the CPI overstates inflation. While many of the suggestions made by the Commission have been implemented, only some of the upward bias in the CPI have been eliminated. The Chained C-CPI-U is another step toward eliminating the substitution bias remaining in the CPI-U and CPI-W.

Medical care has been a particularly troublesome area for the CPI. Rapid advances in technology introduce new treatments and increases in quality of medical care that the CPI does not completely capture. Other studies have found that the rise in medical prices indicated by the CPI is overstated. This is exacerbated in the CPI-E because the elderly spend relatively more on healthcare, placing greater weight on this expenditure category than the currently published indices. Thus, potential errors in the measurement of health care inflation would affect the CPI-E more heavily than the CPI-U or CPI-W.

In addition to the fixed-basket index problems encountered with the CPI-U and CPI-W, the CPI-E has additional technical limitations. The expenditure weights for the elderly are the only difference between the CPI-E and the CPI-U or CPI-W. These weights are based on a much smaller sample than the other two indices, making it less precise. In addition, the retail outlets frequented by the elderly and the prices they pay are not reflected in the CPI-E any more than they are in the CPI-U. Perhaps the most practical objection to using the CPI-E for Social Security COLAs is that over one-fifth of OASDI beneficiaries are under age 62. Likewise, over one-fifth of persons age 62 or older are not beneficiaries, but they are included in the CPI-E population.

Notes

[1] See Social Security Administration (2005) and Social Security Advisory Board (2005).

[2] Examples include HR 1953 (110th Congress), HR 2262 (108th Congress), HR 2035 (107th Congress), and HR 1422 (106th Congress). All call for the use of the experimental Consumer Price Index for the Elderly (CPI-E) produced by the Bureau of Labor Statistics to index Social Security benefits. HR 4551 (106th Congress), however, would have required the formation of a separate Consumer Price Index Review Committee to create a more accurate price index for the elderly and repealed the 1993 increase in tax on Social Security benefits.

[3] Examples include HR 440 (109th Congress).

[4] The annual COLAs paid to OASDI beneficiaries should not be confused with recent discussions of price indexed benefits as a Social Security reform option. Price indexing of benefits refers to a change in the formula for calculating the initial benefit. COLAs are applied only after the initial benefit has been calculated.

[5] The BLS created this experimental index in response to the 1987 amendments to the Older Americans Act of 1965.

[6] Thanks to Sharon Gibson of the Bureau of Labor Statistics for providing the CPI-E series and expenditure weights given in a later section along with data from the 2001-2 CEX.

[7] See National Research Council (2002), Boskin and others (1996 and 1998), Boskin and Hurd (1985), and Jorgenson and Slesnick (1983).

[8] Conceptually, both points of view could be accommodated by a chain-weighted C-CPI-E. However, such a price index does not currently exist and significant effort would be required to implement a chained price index for the elderly.

[9] The C-CPI-U series starts with December 1999. Since COLAs are calculated from third quarter to third quarter, 2001 is the first year for which a chained C-CPI-U COLA can be estimated. There is a substantial lag in calculating final values for the chained C-CPI-U so we have used interim values for 2006. This lag is discussed in greater depth later in the paper.

[10] President Nixon signed this measure into law on July 1, 1972 as part of P.L. 92-336 (SSA 2004d).

[11] The U and W distinction did not occur until 1978 when the broader coverage CPI for all Urban Consumers (CPI-U) was initially released. Prior to 1978, the only CPI that existed was the CPI for Urban Wage Earners and Clerical Workers, denoted then as the CPI and now as the CPI-W. CPI-U data from that period are identical to the CPI-W.

[12] The COLAs in the graph are all computed using the ratio of average Q3 values for the CPI-W with base year 1982-84 = 100. In actuality, the COLA granted in 1984 was computed using the same formula, but with the base year 1967 = 100 version (BLS changed the base year in 1988 and has published both versions subsequently) of the CPI-W resulting in a 1984 COLA of 3.5 percent rather than the 3.6 percent shown in Chart 1. Also, Public Law 106-554 legislated a 1999 COLA of 2.5 percent instead of the 2.4 percent shown in the chart.

[13] The restriction to individuals who were beneficiaries over the entire period is because benefits would not be adjusted by the CPI-W (or CPI-E) until receipt of benefits begins.

[14] These calculations were made using Table 5.B4 (Social Security Administration 2005). Entitlement is determined by the date of application.

[15] The Consumer Expenditure Survey provides data on the buying habits of American consumers, including their expenditures, income, and demographic characteristics (Bureau of Labor Statistics 2005b).

[16] See Graboyes (1994) for an overview of problems with medical care price indexes and a guide to published indexes.

[17] A geometric mean is multiplicative mean rather than the common arithmetic mean. For example $\sqrt{x_1 \bullet x_2}$ rather than $\frac{1}{2}(x_1 + x_2)$. See Dalton, Greenlees, and Stewart (1998) for an explanation of geometric mean estimators. Because the geometric mean is used at the lowest level of aggregation, this improvement makes the CPI what is technically known as a Laspeyres-geometric hybrid index.

[18] In order to account for improvements in quality, a hedonic price regression determines the price of an item as a (typically linear) function of its attributes. For example, a computer with a larger hard drive would command a higher price as would a car or truck with greater horse power. See Fixler and others (1999) or Kokoski (1993) for discussion of hedonic regressions and quality change.

[19] They are also called Treasury Inflation Indexed Securities.

[20] This total does not include overpayments from the housing error, which pushes the total cost to the trust funds over $1.25 trillion. For further information on the housing error and its correction, see Bureau of Labor Statistics (1983) and Duggan, Gillingham, and Greenlees (1999).

[21] The hypothetical C-CPI-I COLAs calculated in the preceding paragraph rely on these interim values. How an actual C-CPI-U COLA might be implemented in light of the time lag required to obtain the revised final C-CPI-U values remains an open question.

[22] The BLS has made numerous improvements to the measurement of medical prices over the past several years. This section outlines issues currently involved with the CPI. For an overview of prior concerns about the medical CPI, which affected the index earlier, see Graboyes (1994).

[23] In 2000, over 94 percent of the population aged 65 or older was enrolled in the hospital insurance component of Medicare (Committee on Ways and Means U.S. House of Representatives 2004, Tables 2-2 and A-1).

[24] See Graboyes (1994) for an example. Work by Cutler and others (1998) and Frank and others (2003) find slower, or even negative, price growth in quality-adjusted indices they construct for heart attacks and schizophrenia, respectively, for the time periods they study.

[25] See Bureau of Labor Statistics (2003) for the list of services by other medical professionals included in the CPI.

[26] A recent study by the Government Accountability Office (2005) compared the increase in prices of a selection of commonly used drugs and found that the price of brand drugs increased more quickly from 2000-2004 than the price of generic drugs.

[27] See Bureau of Labor Statistics (2003) for treatment of drugs changing prescription/over-the-counter status.

[28] Any prescription drug subject to senior discounts is eligible to have a Medicare Drug Discount Card selected; any reduction in price due to shifting from a senior discount to the selected card's price is reflected in the index (Bureau of Labor Statistics 2005c).

[29] The National Research Council (2002) refers to Pauly (1997), Summers (1989), and Gruber (1994) for further discussion.

[30] See also Amble and Stewart (1994) or Stewart and Pavalone (1996) for further detail.

[31] The 2003 CEX reports that housing costs account for 33 percent of out-of-pocket expenditures by consumer units 65 or older (Bureau of Labor Statistics 2005a).

[32] In 2002, the elderly comprised 12.3 percent of the population of the United States, but over 17 percent of the population of Florida, and (ranked in descending order) between 14 and 16 percent of the populations of Pennsylvania, West

Virginia, North Dakota, Iowa, Maine, Rhode Island, and South Dakota. (U.S. Bureau of the Census 2003).

[33] The authors' calculations use Tables 5.A5 and 5.A16 of the *Annual Statistical Supplement, 2006* (Social Security Administration 2007 and 2007b).

[34] The authors' calculation uses the 2006 Annual Demographic Survey (Current Population Survey March Supplement).

[35] At the time of Hobijn and Lagakos's estimates, the Social Security Administration's Board of Trustees' long-term solvency projections (2002) assumed future inflation of 3 percent each year. An assumed CPI-E COLA of 3.38 would be consistent with the average CPI-E-CPI-W differential from 1984–2001, and a CPI-E COLA of 3.22 would be consistent with the average differential from 1994–2001. Hobijn and Lagakos (2003) note that Jason Shultz and Seung An of the Social Security Administration's Office of the Chief Actuary provided them projections under these scenarios that matched their own projections derived from their data sample.

[36] See Social Security Administration (2005) and Social Security Advisory Board (2005).

[37] Canada, for example, applies a user cost approach using mortgage interest cost, depreciation, property taxes, homeowners' insurance, maintenance and other related expenses to estimate the effect of price changes on the cost of using dwellings. While Canada uses rental rate equivalence for its National Accounts, Statistics Canada argues against its use in a price index because "the purchasing power of homeowners is neither directly dependent on rent changes nor is it necessarily correlated with these changes, especially in the short and medium terms" (Statistics Canada 2004).

References

Abraham, Katharine. 1995. The consumer price index: Its uses and limitations as a cost-of-living proxy. *Consumer Price Index Detailed Report* July: 3–4.

———. 1997. Testimony before the Senate Finance Committee. February 11, 1997. Available at http://bls.gov/news.release/cpi.br21197.brief.htm.

Advisory Commission to study the Consumer Price Index [M. Boskin, E. Dulberger, R. Gordon, Z. Griliches, and D. Jorgenson]. 1996. Toward a more accurate measure of the cost of living. *Final Report to the Senate Finance Committee*. December 4, 1996. Available at http://www.ssa.gov/history/reports/boskinrpt.html.

Amble, Nathan, and Ken Stewart. 1994. Experimental price index for elderly consumers. *Monthly Labor Review* 117(5): 11-16.

Ball, Robert. 2004. Just a little maintenance. *Washington Post*. 18 July, p. B04.

Berndt, Ernst, I. Cockburn, D. Cocks, A. Epstein, and Z. Griliches. 1998. Prescription drug prices for the elderly. *Monthly Labor Review* 121(9): 23-34.

Board of Governors of the Federal Reserve System. 2000. *Monetary policy report to the Congress, pursuant to the Full Employment and Balanced Growth Act of 1978*. Submitted February 17, 2000. Available at http://www.federalreserve.gov/boarddocs/hh/2000/February/FullReport.pdf. Last accessed February 1, 2005.

Boskin, Michael, E. Dulberger, R. Gordon, Z. Griliches, and D. Jorgenson. 1998. Consumer prices, the consumer price index, and the cost of living. *Journal of Economic Perspectives* 12(1): 3–26.

Boskin, Michael, and M. Hurd. 1985. Indexing Social Security benefits: A separate price index for the elderly. *Public Finance Quarterly* 13(4): 436–449.

Brown, Robert. 1998. A logical, simple method for solving the problem of properly indexing Social Security benefits: Discussion. *North American Actuarial Journal* 2(3): 116–117.

Bureau of Labor Statistics.1983. Changing the homeownership component of the consumer price index to rental equivalence. *Consumer Price Index Detailed Report*. January 1983, pp. 7-11.

———. 1996. *Briefing on the consumer price index*. December 3, 1996. Available at http://www.bls.gov/news.release/cpibrief.htm.

———. 1996a. How BLS uses rent data in the Consumer Price Index. *Consumer Price Index Detailed Report*. September 1996, pp. 7-8.

———. 1996b. How the consumer price index measures homeowners' costs. *Consumer Price Index Detailed Report* September 1996, pp. 9-10.

———. 2001. Measuring price change for medical care in the CPI. Available at http://www.bls.gov/cpi/cpifact4.htm.

———. 2003. Chapter 17. Consumer price index. *BLS Handbook of Methods*. April 1997 edition updated 2003. Available at http://www.bls.gov/opub/hom/pdf/homch17.pdf. Accessed June 9, 2004.

——— 2004. *Consumer Price Index Detailed Report*. January 2004.

———. 2005a. Table 47. Age of reference person: Shares of average annual expenditures and sources of income. Consumer Expenditure Survey, 2003. Available at http://www.bls.gov/cex/2003/share/age.pdf. Accessed May 2, 2005.

———. 2005b. Consumer expenditure survey home page. Available at http://www.bls.gov/cex/home.htm. Accessed February 2, 2005.

———. 2005c. Informal conversation. April 15, 2005.

———. 2006a. Chapter 17. Consumer price index: CPI concepts and scope. *BLS Handbook of Methods*. Available at http://www.bls.gov/opub/hom/pdf/homch17_b.html. Accessed April 3, 2007.

———. 2006b. Experimental consumer price index for Americans 62 years of age and Older, 1998–2005. April 2006. Available at http://www.bls.gov/cpi/cpiexpcpie2005.pdf. Accessed May 9, 2007.

Cardenas, Elaine. 1996. The CPI for hospital services: Concepts and procedures. *Monthly Labor Review* 118(7): 32–42.

Committee on Ways and Means U.S. House of Representatives. 2004. *2004 Green Book*. WMCP: 108-6.

Cutler, David, M. McClellan, J. Newhouse, and D. Remler. 1998. Are medical prices declining? Evidence from heart attack treatments. *Quarterly Journal of Economics* 113(4): 991–1024.

Dalton, Kenneth, J. Greenlees, and K. Stewart. 1998. Incorporating a geometric mean formula into the CPI. *Monthly Labor Review* 121(10): 3–7.

Diewert, Erwin. 2003. The treatment of owner occupied housing and other durables in a consumer price index. Discussion Paper No. 03-08, Department of Economics, University of British Columbia. Available at http://www.econ.ubc.ca/discpapers/dp0308.pdf Last accessed December 29, 2004.

Duggan, James, and R. Gillingham. 1999. The effect of errors in the CPI on Social Security finances. *Journal of Business and Economic Statistics* 17(2): 161–169.

———, ———, and J. Greenlees. 1997. Housing bias in the CPI and its effects on the budget deficit and the Social Security trust fund. Office of Economic Policy Research Paper 9701. U.S. Department of the Treasury.

Fixler, Dennis, and Richard Valliant. 2004. Course notes for *Creating and Updating price indexes: Theory and practice*. For Joint Program in Survey Methodology. December 16-17, 2004.

Fixler, Dennis, C. Fortuna, J. Greenlees, and W. Lane. 1999. The use of Hedonic regressions to handle quality change: The experience in the U.S. CPI. Paper presented at the Fifth Meeting of the International Working Group on Price Indices. Reykjavik, Iceland, August 1999.

Frank, Richard, E. Berndt, A. Busch, and A. Lehman. 2003. Quality-constant price indexes for the ongoing treatment of schizophrenia: An exploratory study. NBER Working Paper No. w10022. October 2003. Available at http://www.nber.org/papers/w10022. Accessed July 22, 2004.

General Accounting Office. 2000. *Consumer price index: Update of Boskin Commission's estimate of bias*. Washington, DC: U.S. Government Printing Office.

Government Accountability Office. 2005. *Prescription drugs: Price trends for frequently used brand and generic drugs from 2000 through 2004*. GAO-05-779. Available at http://www.gao.gov/new.items/d05779.pdf. Last accessed May 23, 2007.

Graboyes, Robert. 1994. Medical care price indexes. Federal Reserve Bank of Richmond. *Economic Quarterly* 80(4): 69–89.

Greenspan, Alan. 1997. Statements to the Congress before the Committee on Finance of the United States Senate. January 30, 1997. Reprinted in *Federal Reserve Bulletin* 83(3): 198+, 4 pages.

———. 2004. Testimony to the Congress before the Committee on the Budget of the United States House of Representatives. February 25, 2004. Available at http://www.federalreserve.gov/boarddocs/testimony/2004/20040225/default.htm.

Gruber, Jonathan. 1994. The incidence of mandated maternity benefits. *American Economic Review* 84(3): 622–641.

Hobijn, Bart, and D. Lagakos. 2003. Social Security and the consumer price index for the elderly. Federal Reserve Bank of New York. *Current Issues in Economics and Finance* 9(5): 1–6.

Jorgenson, Dale, and D. Slesnick. 1983. Individual and social cost-of-living indexes. *Price Level Measurement*. Edited by W. E. Diewert and C. Montmarquette. Ottowa: Statistics Canada. pp. 241–336.

———. 1999. Indexing Government programs for changes in the cost of living. *Journal of Business and Economic Statistics* 17(2): 170–181.

Knudsen, Dave. 1994. Improvements to CPI procedures: Prescription drugs. *CPI Detailed Report* October 1994, p. 4.

Kokoski, Mary. 1993. Quality adjustment of price indexes. *Monthly Labor Review* 116(12): 34–46.

Kozak, Lola Jean, M. Owings, and M. Hall. 2004. National Hospital Discharge Survey: 2001 annual summary with detailed diagnosis and procedure data. National Center for Health Statistics. *Vital Health Stat* 13(156).

Lebow, David, and J. Rudd. 2003. Measurement error in the consumer price index: where do we stand? *Journal of Economic Literature* 41(1): 159–201.

Moulton, Brent, and K. Stewart. 1999. An overview of experimental U.S. consumer price indexes. *Journal of Business and Economic Statistics* 17(2): 141–151.

Myers, Robert. 1998a. A logical, simple method for solving the problem of properly indexing Social Security benefits. *North American Actuarial Journal* 2(3): 113–116.

———. 1998b. A logical, simple method for solving the problem of properly indexing Social Security benefits: Reply. *North American Actuarial Journal* 2(3): 117.

National Research Council. 2002. *At what price? Conceptualizing and measuring cost-of-living and price indexes*. Panel on Conceptual, Measurement, and Other Statistical Issues in Developing Cost-of-Living Indexes, Charles L. Schultze and Christopher Mackie, Editors. Committee on National Statistics, Division of Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.

Newhouse, J. P. 2001. Medical care price indices: Problems and opportunities. *Academia Economic Papers* 29(March): 1–65.

Nordhaus, William. 1999. Beyond the CPI: An augmented cost-of-living index. *Journal of Business and Economic Statistics* 17(2): 182–187.

Pauly, Mark. 1997. *Health benefits at work: An economic and political analysis of employment-based health insurance*. Ann Arbor, MI: University of Michigan Press.

Seskin, Eugene P., and Robert P. Parker. 1998. A guide to the NIPA's – National income and product accounts. *Survey of Current Business* March 1998: 26–68.

Social Security Administration. 2002. *2002 Annual report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*. Washington, DC.

———. 2004. Cost-of-living adjustments. Available at http://www.ssa.gov/OACT/COLA/colaseries.html.

———. 2005. *Annual statistical supplement, 2004*. Washington, DC. Available at http://www.ssa.gov/policy/docs/statcomps/supplement/2004/. Accessed April 7, 2005.

———. 2007a. *Annual statistical supplement, 2006*. Washington, DC.

———. 2007b. OASDI monthly statistics, March 2007. Available at http://www.ssa.gov/policy/docs/statcomps/oasdi_monthly/2007-03/index.html. Accessed May 9, 2007.

Social Security Advisory Board. 2005. Social Security: Why action should be taken soon, September 2005. Available at http://www.ssab.gov/documents/WhyActionShouldbeTakenSoon.pdf

Solow, Robert. 1997. *The nature of consumer price indices. Public Interest Report*, Federation of American Scientists 50(3): 3–4.

Statistics Canada. 2004. The Consumer Price Index reference paper. Catalog 62-553. Available at http://www.statcan.ca/english/sdds/document/2301_D4_T9_V1_E.pdf. Last accessed December 29, 2004.

Stewart, Kenneth, and J. Pavalone. 1996). Attachment F: Experimental CPI for Americans 62 years of age and older. *Briefing on the Consumer Price Index*. December 3, 1996. Available at http://www.bls.gov/new.release/cpi.br12396.a06.htm.

Summers, Lawrence. 1989. Some simple economics of mandated benefits. *American Economic Review* 79(2): 177–183.

Tobin, James. 1997. Thoughts on indexing the elderly. *Public Interest Report, Federation of American Scientists* 50(3): 5–8.

U.S. Bureau of the Census. 1995. Population profile of the United States: 1995. Current Population Reports, Series P23-189, U.S. Government Printing Office, Washington, DC 1995.

———. 2001. *Housing profile: Our homes, our neighborhoods*. American Housing Brief, AHB/01-2. Available at http://www.census.gov/prod/2001pubs/ahb-01-2.pdf.

———. 2003. *Statistical Abstract of the United States: 2003* (123rd edition). Washington, DC 2003.

———. 2006. American Housing Survey for the United States: 2005. Current Housing Reports, Series H150/03. Government Printing Office, Washington, D.C. 2006.

U.S. House. 1987. *A Bill to Provide for a Study Relating to a Consumer Price Index for the Elderly*. Bill introduced to the U.S. House of Representatives. 100th Congress, HR 2561, May 28, 1987.

———. 1999. *Consumer Price Index for Elderly Consumers Act*. Bill introduced to the U.S. House of Representatives. 106th Congress, HR 1422, April 14, 1999.

———. 2000. *Fair Benefits for Seniors Act of 2000*. Bill introduced to the U.S. House of Representatives. 106th Congress, HR 4551, May 25, 2000.

———. 2001. *Consumer Price Index for Elderly Consumers Act*. Bill introduced to the U.S. House of Representatives. 107th Congress, HR 2035, May 25, 2001.

———. 2003. *Consumer Price Index for Elderly Consumers Act*. Bill introduced to the U.S. House of Representatives. 108th Congress, HR 2262, May 22, 2003.

Wilson, Todd. 2003. Consumer prices up slightly more in 2002, led by energy and hospital services. *Monthly Labor Review* 126(3): 3–8.

Woodhouse, Tom. 1997. Housing and mortgage interest in the Consumers Price Index. Statistics New Zealand paper prepared for the 1997 Consumers Price Index Revision Advisory Committee. Available at http://www.stats.govt.nz/NR/rdonlyres/6A41F514-4932-4D5A-9C28-40AEF003EC35/0/housing.doc. Last accessed on December 29, 2004.