Indexing Federal programs: the CPI and other indexes

Conflicts between indexing Federal entitlement programs and other policy objectives can be ameliorated somewhat by technical changes such as adopting a different cost-of-living index and altering the indexing adjustment mechanism in some programs, at least during periods of increasing inflation. Nevertheless, substantial conflicts between indexing and other policy goals will continue to arise in periods of rapid inflation and (or) slow growth in productivity even after desirable technical adjustments have been made. The likely continuation of these conflicts in the future requires a more searching re-examination of the rationale for full indexing of real benefits.

Choice of an index

The objective of indexing entitlement programs is to ensure benefit increases commensurate with increases in the cost of living. The Consumer Price Index[1] is typically used for such purposes. However, the CPI has a number of shortcomings as a measure of the cost of living. Furthermore, as the data in table 1 indicate, the CPI has increased more rapidly in recent years than an alternative measure of consumers' cost of living, the fixed-weight, price index for personal consumption expenditures (PCE). While there is no presumption that the PCE price index is precisely "right," methodological problems with the treatment of housing in the CPI suggest that the PCE is on balance a better measure of the cost of living. Furthermore, the differential behavior of the two indexes in response to recent rising inflation calls into question the wisdom of using the CPI as a cost-of-living index.

The two indexes differ conceptually in a number of ways. For example, the PCE price index counts only currently produced goods while the CPI includes several important used items, such as used cars. More important is the difference in the treatment of housing; the CPI treats housing as a purchased good, while the PCE price index uses a rental equivalence approach. Despite these conceptual differences, the two indexes increased at roughly the same rate during the period of low inflation from 1960 to 1972. As inflation rates rose, the CPI began increasing more rapidly. From 1973 to 1976 the annual difference averaged 0.7 percentage points, and by 1979 had risen to over 2½ percentage points. The in-

crease in the CPI has been about 10.5 percent greater than that of the PCE price index during the 1973 to 1980 period.

While these data are only suggestive, they do indicate that the CPI may be systematically biased relative to a "true" cost-of-living measure. Over a substantial period of time, this would lead to a significant difference in the level of indexed benefits. Using the CPI for indexing entitlement programs therefore raises serious issues of equity and the allocation of budgetary resources. Moreover, even if over the long run the CPI yields the correct answer "on average," it can distort the timing of expenditure flows and add to inflationary pressures precisely when this is least desirable from the standpoint of stabilization policy.

The construction of the CPI has been the subject of considerable scrutiny in recent years. Most attention has been devoted to the CPI's use of a fixed and somewhat out-of-date market basket, its treatment of housing and other durable goods, and its treatment of taxes.

Choice of a market basket

A true cost-of-living index would attempt to compare the cost to the consumer of attaining a given level of "satisfaction" in different periods, that is, under different sets of prices. Since satisfaction cannot be measured, it is necessary to approximate it with something that can be measured. In the CPI and other fixed-weight indexes, this is achieved by selecting a market basket of goods and seeing how much it costs to purchase the same basket of goods in subsequent months and years. However, this procedure tends to overstate increases in the cost of living and may do so significantly. This happens because consumers, by purchasing less of those goods that have become relatively more expensive and more of those that have become relatively cheaper, can and do achieve greater satisfaction than they would if they spent the same amount of money on the original basket of purchases.

To illustrate this point, imagine a consumer who initially spends $2 on 1 pound of beef and 1 pound of pork, both of which cost $1 dollar per pound. If the price of pork then doubles but the price of beef remains

Table 1. Percent changes[1] in the Consumer Price Index for All Urban Consumers and the fixed-weight Personal Consumption Expenditures Index, 1960–80

Period	CPI-U	PCE price index
1960–1972	2.9	2.6
1973–1976	8.2	7.5
1977	6.7	6.3
1978	8.9	8.1
1979	12.8	10.2
1980[2]	12.5	10.7

[1] Annual rates, fourth quarter to fourth quarter.
[2] Fourth quarter 1979 to third quarter 1980.

the same, the original basket of purchases would cost $3.00 rather than $2.00. A fixed-weight index like the CPI would register a 50 percent increase in the "cost of living." However, when this person consumes one pound of beef and one pound of pork, additional amounts of pork and beef are worth about the same to him. (We know this because in the original period he paid the same amount for the two meats.) Thus, although the consumer *could* spend his $3.00 on the original market basket, he could make himself even better off by purchasing, for example, ¼ pound less pork and ½ pound more beef. That would mean that $3.00 is a higher expenditure than would be necessary to achieve his original level of satisfaction. In other words, this fixed-weight price index would overstate the increase in the consumer's cost of living caused by the increase in the price of pork.

An alternative choice of a market basket is the common weighting procedure that uses the current period's expenditure weights to construct a price index. The well-known "implicit price deflators" of the national income accounts, which are published by the Commerce Department's Bureau of Economic Analysis, are examples of indexes that use this method of weighting. The PCE implicit price deflator prices the current period's consumption both at current market prices and at base-year prices. The ratio of actual consumption expenditures to the hypothetical cost of current purchases at base period prices is the implicit price deflator for that period. Because changes in the implicit price deflators from one period to the next are affected by changes in both the price and the composition of the market basket, they are less useful measures of price changes than are fixed-weight indexes.

As a measure of changes in the cost of living, the PCE implicit price deflator has a disadvantage that is the counterpart of that of fixed-weight indexes such as the CPI or the PCE fixed-weight index. Just as these fixed-weight indexes tend to overstate increases in the cost of living by taking no account of the gains in satisfaction possible through substitution, the implicit PCE deflator tends to understate cost-of-living increases by assuming that individuals give up no satisfaction as a result of changing consumption patterns through substitution.

An extension of the previous example should make this clear. Suppose that after the price of pork has doubled the consumer decides to purchase 2 pounds of beef and no pork. The cost of the current period's consumption ($2) is the same as it would have been at base period prices, so the implicit price deflator for this consumer would register no increase. But the consumer is almost certainly worse off than he was with the previous set of prices. He could have afforded 2 pounds of beef and no pork in the base period as well as in the second period, but he chose instead to buy a pound of

each. This suggests that the first period's consumption pattern was preferred to that of the second period, rather than equal to it, as implied by the unchanged deflator.

Both a fixed-weight index with out-of-date weights and an implicit deflator have shortcomings. There is an alternative weighting procedure that is, in a sense, a compromise between the fixed-weight index and the implicit deflator. This procedure uses fixed weights to compare price levels between each two adjacent time periods, but the weights reflect the first period's consumption pattern in each case. Thus, between period one and period two the index would be constructed using the market basket for period one, between period two and period three the market basket for period two would be used, and so forth. Such an index, called a "chain-weighted index," has some attractive characteristics as a measure of the cost of living. Like the fixed-weight index, it constructs a fixed-weight comparison of price levels between each pair of adjacent time periods. However, the weights change between periods to reflect changing consumption patterns so that failure to consider substitution does not become a growing problem. Unlike the case with implicit price deflators, period-to-period changes in the index do not confound changes in price with changes in the market basket for adjacent time periods, though for longer time periods a similar problem occurs as the market basket is allowed to change. Because the chain-weighted index neither ignores substitution nor treats it as being costless, it is not possible to identify *a priori* any bias in the chain index as a measure of the cost of living.

The Bureau of Economic Analysis of the U.S. Department of Commerce calculates a chain-weighted price index for personal consumption expenditures parallel to its computation of the fixed-weight index and the implicit price deflator. As table 2 indicates, the chain-weighted index tends to show inflation higher than the implicit deflator and lower than the fixed-weight index.[2] Changes in the market basket consumers purchase are not likely to be a problem from month to month, but over a period of years the effects may be

Table 2. Percent changes[1] in National Income Accounts price measures for personal consumption expenditures, 1960–80

Period	Implicit price deflator	Chain-weighted price index	Fixed-weight price index
1960–1972	2.8	2.7	2.6
1973–1976	7.3	7.4	7.5
1977	5.9	6.2	6.3
1978	7.8	8.0	8.1
1979	9.5	9.8	10.2
1980[2]	10.2	10.4	10.7

[1] Annual rates, fourth quarter to fourth quarter.
[2] Fourth quarter 1979 to third quarter 1980.

substantial. This will especially be the case if the relative price of an important commodity, such as gasoline or heating oil, increases dramatically. Because the currently available fixed-weight indexes (both the fixed-weight PCE price index and the CPI) use a market basket based on data from the early 1970's—largely before the huge run up in oil prices—this issue is of some concern. The data in table 2 suggest that in the last 2 years a fixed-weight index may have overstated the increase in the cost of living by about 0.3 to 0.4 percentage points per year. While not dramatic, this is not inconsequential in terms of indexing entitlement programs.

There is no reason in principle why the CPI or some variant of the CPI could not be constructed as a chain-weighted index. But the CPI is a monthly index, and the cost of revising the relevant market basket each month would be exorbitant. A more feasible approach might be to construct the CPI as an annual chain index, using the fixed weights of the previous year's market basket for all months during each year.

A perhaps more straightforward alternative would be simply to update the market basket on a more frequent basis, although not yearly as in a chain index. Any such development must await the availability of data from the Continuing Survey of Consumer Expenditures. Prior versions of the CPI have relied on data from surveys of consumer expenditures about once per decade to determine the base year market basket. Data for the market basket currently used were gathered in a survey that took place during 1972–74. The Bureau of Labor Statistics has begun to collect data in a continuous survey that will allow more frequent and regular revisions of the market basket. Several years of data collection will be necessary before sufficient data have been collected to permit computation of revised expenditure weights, although revisions more frequent than once a decade will be possible soon thereafter.

Treatment of durables

Durable goods such as housing, automobiles, and washing machines are purchased in one time period but consumed over several periods. In principle, a cost-of-living index should measure the cost in each period of a fixed flow of services provided by these goods rather than the cost of purchasing the durable good. For durables that are rented or leased, such as rental housing or leased cars, measurement of the cost of these services can be made easily because the relevant prices are readily observable. But for durables that are owned by individuals and for which there are no market transactions, the measurement of the cost of consumption services is considerably more difficult. In the current version of the CPI this issue is largely sidestepped by counting the cost of *purchase* of the durable good in the market basket. The following section examines this approach to mea-

suring the cost of owner-occupied housing and discusses alternative measures.

Housing in the CPI. The housing component is the most criticized aspect of the CPI and even the Bureau of Labor Statistics, the producer of the index, is on record as being dissatisfied with the existing treatment of housing. In fact, when the CPI was revised in 1977 BLS gave serious consideration to changing the treatment of housing.

Table 3 compares increases in homeownership costs in the CPI with increases in all other items. Over the past 20 years the homeownership component has increased substantially more rapidly than other components of the CPI. Since the end of 1959 the homeownership component has risen 286 percent, compared with a 167-percent rise for all other items and a 190-percent rise for the CPI as a whole.

Furthermore, because it is heavily influenced by changes in mortgage interest rates, the homeownership component has been far more volatile than other major components and therefore has been a major source of volatility in the CPI. The precipitous decline in mortgage interest rates that occurred in the middle of 1980 reduced inflation in the homeownership component of the CPI from a 25-percent annual rate in the first half of 1980 to 2 percent during the next four months. This resulted in a 6.4-percentage point reduction in the rate of inflation as measured by the CPI, although the corresponding reduction for items other than the homeownership component was only 0.7 points.

Of course, the data in table 3 alone do not show that the treatment of housing is flawed; in recent years energy prices have also been highly volatile and have increased more rapidly than the CPI as a whole. However, as discussed below, in the case of housing there are independent reasons to believe that the current treatment is inadequate and should be changed.

The homeownership component of the CPI consists of five subcomponents, which are listed in table 4 along with their relative importance in the index as a whole. Homeownership is obviously quite important in the CPI, accounting for nearly one-quarter of the index. The last three items in table 4 are not particularly controversial;

Table 3. Percent changes[1] in selected components of the Consumer Price Index for All Urban Consumers, 1959–80

Period	All items	Home-ownership	All other items
1959–1976	4.1	5.0	3.9
1977	6.8	9.2	6.1
1978	9.0	12.4	8.0
1979	13.3	19.8	11.3
Dec. 1979–June 1980	14.8	25.3	11.4
June 1980–Oct. 1980	8.4	2.0	10.7

[1] Annual rates, December to December unless otherwise noted.

Table 4. Relative importance of subcomponents of the homeownership component of the Consumer Price Index, December 1979		
Subcomponent	All items CPI	Homeownership component
Homeownership	.249	1.000
Home purchase	.104	.417
Contracted mortgage interest cost	.087	.347
Maintenance and repairs	.036	.145
Property taxes	.017	.068
Property insurance	.006	.022

the problematic items are home purchase and mortgage interest costs, which account for three quarters of total homeownership costs.

Home purchase. As noted, the CPI treats durables as though they are "consumed" upon purchase. Hence, the cost of purchasing a home enters the CPI just as that of any other item. As noted above, a cost-of-living index should measure the cost of a fixed flow of "shelter services." Unfortunately, however, house prices are a poor measure of the cost of shelter because a house not only provides shelter but also, as an asset, yields a return like any other investment. Consequently, the movement of house prices reflects not only the cost of shelter but also the value of the investment. Just as the CPI excludes, for example, changes in the prices of common stock, changes in the value of a house should be distinguished from changes in the cost of shelter; only the latter, in principle, should be included in a measure of the cost of living. The relevance of this issue is suggested by the steady decline in rent-to-value ratios during recent years as residential rents have increased much less rapidly than house prices.

Apart from this conceptual issue, there are also problems of measurement in the home purchase component. First, the weight for home purchase is very large. This weight is based on the purchase price of homes bought in the base period less the sales price of homes sold. One reason for the large weight of housing in the index is that the base period (1968–1973) was a fairly robust one for housing, with strong housing construction. Furthermore, the house price series used in the CPI is rather weak. It is based on a sample of FHA-insured housing that, as BLS states, "constitutes a small and unrepresentative segment of the market." However, because the criticism of the treatment of homeownership would apply regardless of the quality of the house price series, the problems with the FHA series will not be addressed here.

Mortgage interest costs. While the treatment of home prices in the CPI is questionable, that of mortgage interest costs is even more troublesome. The treatment results in an unreasonably large weight for mortgage

interest costs, which in turn magnifies the volatility of the homeownership component.

In essence, the CPI assumes that part of the mortgage is purchased along with the house. Those who obtain mortgages are assumed, in effect, to make a "purchase" equal to the sum of all interest payments that would be due over the first half of the life of the mortgage, which would include more than half of the interest payments. This approach mixes investment and consumption characteristics of housing in a way that has little logical appeal. At the very least, this treatment of mortgages seems to involve substantial overcounting. It should be noted that this treatment is not accorded all durable goods; for an appliance purchased on credit, no attention is paid to the contracted interest cost.

The net effect of all this is that the CPI treatment substantially overstates the importance of homeownership. Homeownership currently accounts for about one-quarter of the CPI, nearly five times the importance of the residential rent component. This alone suggests a problem, because only about two-thirds of dwelling units are owner-occupied. Further evidence is provided by the fact that, in the national income accounts, homeownership is only about 2½ times as important as rental housing, far below the factor of 5 in the CPI. In view of the marked volatility of homeownership, its large weight in the CPI has unfortunate consequences.

Alternative treatments of housing. The problems with the present treatment of housing in the CPI have been recognized since the Stigler Commission Report on Price Statistics in 1961. Thus, it is hardly surprising that BLS has sought alternative measures. Two leading alternatives— user cost and rental equivalence—have emerged from the BLS analysis. Both these alternatives attempt to measure what a homeowner would have to pay to acquire the shelter provided by the home he owns.

The *user cost* approach builds up the cost of shelter services from its components. In effect, homeowners must "pay" mortgage interest on the funds they have borrowed, implicit interest on the original equity in the house (an opportunity cost since these funds could have been invested elsewhere), property taxes and insurance, and maintenance and repairs. To obtain an indirect measure of the shelter cost one would subtract from these expenditures two offsets: capital gains (or losses), net of depreciation, and savings on personal income taxes due to the favorable tax treatment of owner-occupied housing.

Besides the issue of taxes, there are two serious problems in the construction of a user cost measure of homeownership costs. First, it is not clear what interest rate is appropriate for the calculation of the interest forgone on home equity. The second difficulty concerns the volatility of available measures of capital gains or

losses. This makes the user cost measure of the homeownership component quite volatile, at least in the experimental measures constructed by BLS. Thus, from a practical point of view, the user cost approach does not appear to lead to a useful alternative to the CPI.

There is, however, a conceptually related approach, *rental equivalence,* that circumvents the most glaring operational difficulties with user cost. The rental equivalence approach uses actual market data on rental transactions to estimate the implicit rent on owner-occupied houses. Rental equivalence assumes that the implicit "price" of the shelter services from an owned home can be approximated by actual rents paid for a similar house that is rented. BLS now publishes an experimental CPI measure (X-1) based on this approach.

The rental equivalence approach is not without its own practical shortcomings. To provide a good proxy for the implicit rental cost of owned homes it is desirable to have a sample of rental housing that reflects, as closely as possible, the characteristics of owner-occupied housing with respect to, for example, size of house and the number and types of rooms. Critics of the rental equivalence approach suggest that this matching may be difficult to achieve, not so much because of house sizes but because of more intangible characteristics such as neighborhood quality. A related point is that market rents may reflect costs that are irrelevant for owner-occupied housing, such as a risk premium to compensate landlords for possible mistreatment of property or the average costs of turnover.

Although these are valid points in principle, they do not invalidate the rental equivalence approach. Even if many intangible characteristics remain unquantifiable, this need not bias a rental index. Indeed, many of the objections pertain to differences in rental *levels* between different types of housing rather than rates of increase. Furthermore, even if a fully representative rent sample is not available, there are statistical techniques that may be used to correct for the fact that owner-occupied houses differ from rented houses.

Table 5 presents the movement of four homeownership indexes: the current homeownership component in the CPI, two experimental user cost indexes (X-2 and X-3), and an experimental rental equivalence measure (X-1). In table 5 the volatility of X-2 and X-3 is readily apparent; they are even more volatile than the current homeownership component. X-1, the rental equivalence measure, displays substantially less volatility than either the user cost or the current treatment of housing costs.

Table 6 presents measures of overall consumer price inflation obtained by the use of the X-1 homeownership component in comparison with the conventional CPI and the PCE fixed-weight deflator. Table 6 shows the CPI:X-1 has increased since 1966 at a substantially slower rate than the conventional CPI. Second, the

Table 5. Percent changes[1] in alternative measurements of homeownership				
Year	CPI-U component	Rental equivalence (X-1)	User cost (X-2)	User cost (X-3)
1968	7.6	2.8	11.0	8.0
1969	10.2	3.8	7.1	3.5
1970	10.2	4.5	4.2	1.7
1971	2.7	3.8	−12.1	−8.9
1972	4.1	3.5	2.4	3.2
1973	7.7	4.9	23.0	18.9
1974	13.3	5.4	16.9	12.9
1975	7.9	5.2	2.8	3.4
1976	3.8	5.5	−1.1	1.9
1977	9.2	6.5	2.5	0.4
1978	12.4	7.3	5.7	−1.1
1979	19.8	7.9	28.2	20.5

[1] 12 months ended in December.

CPI:X-1 and the PCE fixed-weight deflator give quite similar results. (Given that the deflator uses the BLS rent index, this similarity is perhaps not surprising.)

While the CPI based on X-1 is a considerable improvement over the current treatment of homeownership costs, further refinements of the rental equivalence approach could be undertaken. As now constructed, the experimental X-1 index is based on the CPI rent index that measures actual rental costs for a typical rental dwelling. That is, no correction is made for differences in the characteristics of rented and owned dwellings—a correction that is desirable in principle. The BLS staff has done some research on this topic suggesting that such an approach should eventually prove practicable. Our review of this research suggests that the approach used in X-1 currently provides a representative cost-of-living index. Hence, even as presently constituted, the CPI based upon X-1 offers a serviceable measure of the cost of living.

Alternatives

At present, there are three main options for indexing entitlement programs: the current CPI; one of the Personal Consumption Expenditure price indexes from the

Table 6. Percent changes[1] in Consumer Price Index for All Urban Consumers, the same index with homeownership component based upon rental equivalence (X-1), and the Personal Consumption Expenditures fixed-weight index, 1960–80			
[In percent]			
Period	CPI-U	CPI-U based on X-1	PCE fixed-weight price index
1960–72	2.9	2.6	2.6
1973–76	8.2	7.7	7.5
1977	6.7	6.4	6.3
1978	8.9	7.8	8.1
1979	12.8	10.7	10.2
1980[2]	12.5	10.9	10.7

[1] Annual rates, fourth quarter to fourth quarter.
[2] Fourth quarter 1979 to third quarter 1980.

National Income Accounts; or a modified version of the CPI which incorporates one of the alternative measures of shelter costs.

The advantages of continuing to use the current CPI is that it is very well known, has achieved a high level of public acceptance, and is extensively used for private contracts. However, the CPI has very serious shortcomings as a measure of the cost of living.

It would be possible to adopt one of the Personal Consumption Expenditure price indexes for indexing entitlement programs. It might be most acceptable to use the fixed-weight or chain-weighted price index because the Implicit Price Deflator tends to understate increases in the cost of living. However, the consumption expenditure indexes have several important drawbacks. First, they were not designed to measure the cost of living or even consumer prices, but rather to measure the cost of

current production for consumption. In addition, the weights for the fixed-weight index are just as outdated as the CPI's weights.

The final alternative is to use a cost-of-living index obtained by modifying the CPI to change the inappropriate treatment of housing. This would eliminate the major problem with the current CPI—its treatment of housing—and would provide a sounder basis for indexing entitlement programs. Over the longer run, further improvements could be made. For example, when the continuing Survey of Consumer Expenditures becomes available, it would be possible to update the market basket of this cost-of-living index on a more timely basis. In short, the CPI based on X-1 offers an index with significant immediate advantages over the current CPI as well as a framework for incorporating further improvements in measuring the cost of living. ☐

————— FOOTNOTES —————

[1] In this report, CPI refers to the Consumer Price Index for All Urban Consumers (CPI-U), which covers approximately 80 percent of urban consumers. The Bureau of Labor Statistics also publishes the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W). It covers about 40 percent of urban consumers.

[2] Because 1972 is the base year used, the fixed-weight index rises less rapidly than the Implicit Price Deflator prior to 1972 and more rapidly after 1972. In all periods, the increase in the chain-weighted index is between those of the fixed-weight index and the Implicit Price Deflator.