# HEPI Design and Use

## The Design of HEPI

The Higher Education Price Index (HEPI) measures price levels from a designated reference year in which budget weights are assigned. This base year is FY1983 and is assigned a price value of 100.0 for index compilation.[1] Comparing one year's index value with that of another year reflects relative change. An index value of 115.0, for example, represents a 15 percent price increase over 1983 values. This change can also be expressed in monetary terms so that the price of $100 worth of goods and services purchased in 1983 in this example would have risen to $115. Movements of the index from one year to another are usually expressed as percent changes by dividing a later year's value by that of any earlier year and subtracting 1.00. Thus, an increase in index values from 125.6 in 1987 to 134.4 in 1988 would be a yearly increase of 134.4/125.6 = 1.07 minus 1.00, or 7 percent. The HEPI in this study represents fiscal year (July 1 to June 30) average values. Values are compiled by computer and reported to the nearest tenth, which properly suggests the degree of accuracy involved.

Since FY2002 the Higher Education Price Index (HEPI) has been based on a regression formula. The eight regression components employed represent 79.6 percent of the HEPI weighted whole in 1990. The regression-based index values are essentially equal to those resulting from complete data. The R-square value of the regression is .999997809 based on 41 observations. Regression-calculated HEPI values are not likely to vary from fully compiled values by more than 0.1 parts out of 200.0 or ±0.05 percent. The regression analysis is shown below the table.

## Price Index Theory and Design

A price index measures the effects of price change and price change only, as reflected by differences in the overall price level of a fixed group of items. The procedure in calculating the index is to measure the price level of purchased items each year, comparing the aggregate amount paid to that of the base period. The amount and quality of the selected commodities that make up the market basket being indexed must remain constant so that only the effects of price changes are reflected. The quantities represent not only annual consumption of the specific sample items actually priced by the index, but also consumption of related items for which prices are not obtained, so that the total cost of the market basket represents total spending for goods and services. Under these restrictive conditions, the change in price index values from year to year may be interpreted as the change in dollars required to offset the effects of inflation in buying the same kinds and amounts of goods and services previously purchased.

What makes a price index so valuable is that by reporting only price increases, without quality or quantity changes, the series documents the additional revenues required for continuation of "business as usual." Few financial supporters can deny that funding should at least maintain the status quo, if not improve it. Thus, price indices reliably report increased funding requirements that can be defended as essential if the same services are to be maintained. If quality changes were to be included, then the force of the argument would be lost, since justification of the added costs to improve operations is seldom obvious.

To achieve its intended purpose of reporting only price changes, a price index attempts to hold constant all other factors. A persistent and nearly irresolvable problem in this regard is eliminating the effect on prices of quality changes in purchased goods and services. When possible, a process of "linking" is used whereby the price of a new item is tied to the price of an old item by factoring out the price difference due to the change in quality involved. For personnel services, quality is fixed by specific job descriptions. Improvements in training and growth in individual talents brought to professional positions are considered constant in the sense that the present mix of new practitioners and senior personnel consistently represents the current average "state-of-the-art" in training and tenure.

[1]Once compiled, index values can be converted to any year equal to 100 simply by dividing all indices in the series by the subject year's value. Thus, a price series with the base year 1983=100.0 and 2001=195.0 can be converted to a 2001=100 base year with 1983 then equal to 100.0/195.0=51.3. Converting index values to the current (2001) base year places all adjusted figures in the most recent (2001) dollars, which is a useful, recognized point of reference.

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A price index holds constant the mix of purchases and, implicitly, the mix of their general use by a single type of consumer. This consistency is accomplished by designing and fix-weighting the index components according to the buyer's budget composition. The price series for each component must be set equal to 100 in the base year for which the budget weights are established. (FY1983 is the base year for the HEPI in this report.) Each year the price changes or price relatives (ratio of following to previous year price) for the various items being priced are weighted according to this base year expenditure pattern. The budget percentages (weights) represent the actual physical count mix of items involved. The index must not be re-weighted unless there is a substantial change in the consumer's buying pattern, which results in a different mix in the actual physical count of goods and services purchased.

To the extent that college faculty, university researchers and school teachers use different pedagogy, analyses, instruments, equipment and materials from year to year—or that institutions employ different mixes of personnel and capital to accomplish their objectives—the use of a fixed-weight index fails to price current actual practices. Also, a price index does not account for changes in the mix of students; for example, in the higher education community an increase over time in the proportion of handicapped or graduate students and the associated higher overall per-student costs would not be reflected in a price index series. Re-weighting the index is required when such changes result in large differences in the physical count proportions involved.

## HEPI Uses

The most frequent use colleges and schools make of the HEPI is in projecting future budget increases required to preserve purchasing power. If next year's inflation affecting current operations is expected to be 6 percent, the budget must be increased by this amount if the same level and quality of goods and services are to be purchased.

The basic nature of price indices in reflecting yearly percent changes, however, cannot be projected in the traditional manner. Incremental changes seldom exhibit trends on which an extrapolation can be based. A two- or three-year average increase in annual percentage changes is not predictive that this phenomenon will continue into the future.

HEPI can also serve the following additional uses:

- Index values may be projected into the future to estimate the degree of change in expenditures that will be necessitated by anticipated price changes. If price increases are expected, the projected index value are used to inflate expected real resource needs to equal future funding requirements in actual dollars. Usually, these real resource needs are expressed in user unit terms, e.g., constant (inflation-adjusted) dollars per full-time-equivalent student. Budget requests based on a projected HEPI account only for inflation, i.e., provision of additional funding sufficient to purchase the same resources as acquired in the previous year. Additional funding for greater student load, program expansion, and improvements in quality would need to be separately requested and justified.

- Past expenditures may be compared with movements in a price index to ascertain whether spending has kept pace with price level changes. Adjusting expenditures by an appropriate price index to convert actual or current dollars to constant dollars permits comparison over time of the real purchasing power of funding levels.

- Similarly, dollar incomes may be deflated by a price index to identify trends in the level of real purchasing power of funding by various sources.

- Price indices may be used to provide automatic inflation adjustment of various administrative and contractual transactions. The price charged for a particular service, for example, may be tied to input prices or the cost of labor as measured by an appropriate price index.