

CHAPTER 10: ADJUSTING COSTS FOR INFLATION

What is inflation?

Money is a way of keeping track of the real resources consumed by a program or policy. But, because of inflation, money is an imperfect means for comparing resource use over time.

Remember this:

Total spending = price × quantity.

Inflation refers to changes in price only.

Sometimes you hear people refer to “inflation in health care costs” in the popular press. They are probably using “inflation” as a stand-in for “increases” rather than a technical term to describe increases in price levels.

The mechanics of adjusting for inflation

We are used to thinking about inflation in terms of an “inflation rate”, a number between 0 and 1, as in “The inflation rate is 3%.” However, for purposes of adjusting dollar amounts over time, it is more helpful to use the price index. The price index is constructed around an arbitrary base year where the index = 100.

If we want to transform \$1,000 in 1986 dollars to 2001 dollars, we perform the following calculation:

$$\frac{I_{2001}}{I_{1986}} \$1,000$$

Where I_y is the value of the price index in year y .

More generally, the formula to transform \$X dollars in year k to \$X dollars in year j is:

$$\$X_j = \frac{I_j}{I_k} \$X_k$$

Note that we can go backwards and forwards with this formula; you can transform 2001 dollars into 1986 dollars and vice versa.

Price indices

The Consumer Price Index (CPI) is the main measure of inflation in the United States. The Bureau of Labor Statistics in the Department of Labor is responsible for measuring and reporting the CPI.

The CPI is designed to answer the question: How much would consumers need to spend today to be just as well off as they were yesterday? There are two sources of data:

1) Consumer purchases: Bureau of Labor Statistics staff measure the goods and services consumers buy using the Consumer Expenditure Survey.

2) Prices: Each month, Bureau of Labor Statistics employees collect prices for approximately 71,000 goods and services from 22,000 outlets. For example, an employee might be charged with recording the price for Brand "X" fever thermometers for babies, model 41303, 4 3/10 inches long with plastic case, sold by "Y" Foods, Inc. in West Terre Haute Indiana. Approximately 20 percent of the product sample is rotated every year such that full rotation takes 5 years. Separately, Bureau of Labor Statistics employees collect pricing data from about 5,000 renters and 1,000 homeowners for the housing components of the CPI.

CPI items priced monthly everywhere¹

All food at home items
 Housing at school, excluding board
 Other lodging away from home,
 including hotels and motels
 Tenants' and household insurance
 Fuel oil
 Propane, kerosene, and firewood
 Electricity
 Utility (piped) gas service
 Used cars and trucks (secondary source)
 Gasoline (all types)
 Other motor fuels
 Tires
 Vehicle accessories other than tires
 State and local registration, license, and
 motor vehicle
 property tax
 Parking and tolls
 Newspapers and magazines
 Recreational books
 Postage
 Delivery services

Figure 3
 Composite Price Index 1750 to 2003,
 January 1974 = 100 (logarithmic scale)



¹ See <http://www.bls.gov/opub/hom/pdf/homch17.pdf>

Landline telephone services, local charges
 Landline telephone services, long-distance charges
 Wireless telephone services
 Cigarettes
 Tobacco products other than cigarettes

Medical care in the CPI

Medical care accounts for 7.4% of the CPI, but over 15% of GDP. Why? The CPI reflects consumer spending. Most health care costs are paid by government and employers.

Other indices

The producer price index (“the PPI”) measures changes in the prices that producers receive for the goods and services they sell.

The Gross Domestic Product (GDP) deflator is a broad index of price levels. The GDP deflator is not the same as the GDP. The GDP deflator is a measure of prices; the GDP is a measure of output (= price × quantity). The Consumer Price Index holds the types of goods purchased fixed. The GDP deflator does not.

The Medicare Economic Index and the Inpatient Prospective Payment System Hospital Market Basket measure the change in input prices (e.g., nurse wages) for physicians and hospitals.

Problems with the CPI (and other price indices)

Substitution bias: CPI is based on a fixed market basket of goods. The market basket is updated every decade, but in the intervening time period consumers may change their buying patterns.

| TABLE 1: HYPOTHETICAL EXAMPLE OF SUBSTITUTION BIAS | | | | | | | | |
|--|-------------------|----------------------|-------------------|----------------------|-----------------|-------|------------------|------|
| | | | | | Price Relatives | | Relative Weights | |
| | Price in Period 1 | Quantity in Period 1 | Price in Period 2 | Quantity in Period 2 | P2/P1 | P1/P2 | 1 | 2 |
| Beef | 1 | 1 | 1.6 | 0.8 | 1.6 | 0.63 | 0.5 | 0.43 |
| Chicken | 1 | 1 | 0.8 | 2 | 0.8 | 1.25 | 0.5 | 0.57 |

When comparing price levels over time for two or more goods, should we use consumers’ consumption at the beginning or the end of the period (see Table 1²)? They give different

² Toward A More Accurate Measure Of The Cost Of Living. Final Report to the Senate Finance Committee from the Advisory Commission To Study The Consumer Price Index December 4, 1996. See: <http://www.ssa.gov/history/reports/boskinrpt.html>.

answers. Consumers shift consumption in response to price increases, and we will calculate smaller changes in the level of a price index if we use consumption at the end of the period.

Substitution bias

| | Old quantities | | | New quantities | | |
|--------------------------|----------------|-------|-------|----------------|-------|-------|
| | Quantity | Price | Total | Quantity | Price | Total |
| Period 1 | | | | | | |
| Beef | 1.0 | 1.0 | 1.0 | 0.8 | 1.0 | 0.8 |
| Chicken | 1.0 | 1.0 | 1.0 | 2.0 | 1.0 | 2.0 |
| Total | | | 2.0 | | | 2.8 |
| Period 2 | | | | | | |
| Beef | 1.0 | 1.6 | 1.6 | 0.8 | 1.6 | 1.3 |
| Chicken | 1.0 | 0.8 | 0.8 | 2.0 | 0.8 | 1.6 |
| Total | | | 2.4 | | | 2.9 |
| Price index ^a | | | 120 | | | 103 |

^a120 = 100 × (2.4 ÷ 2.0)

Outlet substitution bias (i.e. the Costo bias): The Bureau of Labor Statistics samples a fixed set of establishments to record prices, but over time consumers shift to retailers with lower prices. This is probably a bigger problem than it used to be because of the proliferation of discount retailers like Costo and the Internet.

Quality change bias: The quality of many products has improved dramatically over time, making it difficult to compare prices between years in certain product categories (e.g., televisions).

New product bias: New products may be associated with large gains in consumer welfare, but are not included in the Consumer Price Index or included only they have been around for a long time.

Some recommendations for adjusting for inflation

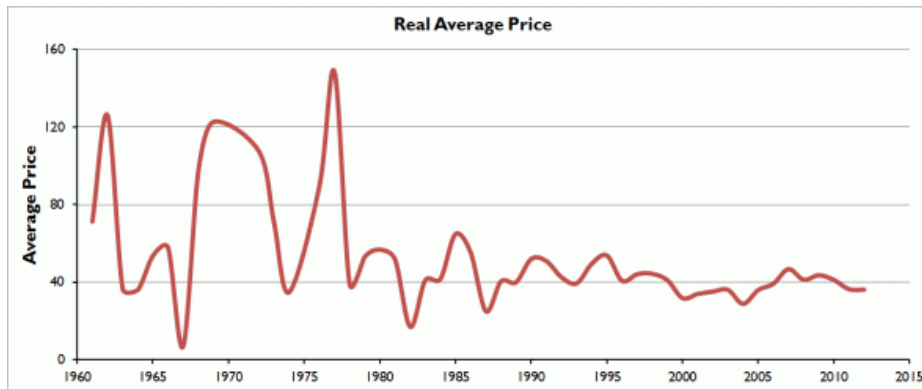
USING APPROPRIATE PRICE INDICES FOR ANALYSES OF HEALTH CARE EXPENDITURES OR INCOME ACROSS MULTIPLE YEARS

https://meps.ahrq.gov/about_meps/Price_Index.shtml

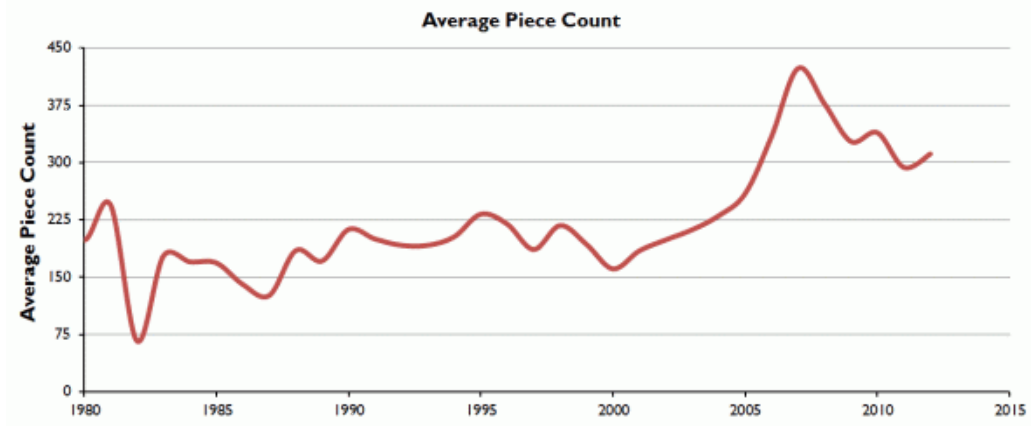
| TABLE 3: Estimates Of Biases In The CPI-Based Measure Of The Cost Of Living | |
|--|-----------------|
| (Percentage Points Per Annum) | |
| Sources of Bias | Estimate |
| Upper Level Substitution | 0.15 |
| Lower Level Substitution | 0.25 |
| New Products/Quality Change | 0.6 |
| New Outlets | 0.1 |
| Total | 1.10 |
| Plausible range | (0.80-1.60) |

Application to Lego

Price per set



Number of pieces in a set



Price per Lego piece



See http://www.realityprose.com/what-happened-with-lego/?utm_source=share&utm_medium=ios_app&utm_name=iossmf

