History of One-Family Price Index Methodology

The Census Bureau began publishing one-family price indexes in 1968. Since then, the methodology has changed several times. This section describes the reasons for methodology changes and the effects the changes have on the indexes. It also provides access to past methodology reports.

Reasons for methodology changes:

An index requires a set of house characteristics that explains the variation in house price. These characteristics must also be describable to respondents so reliable data may be collected for them. The best set of characteristics in one time period may not be the best in another time period because buyer preferences change. For example, in 1968 decks were not popular. In the 1990's, after they became popular, they were added as a characteristic.

Also, the understanding of and need for indexes has changed since the 1970's. At that time, Laspeyres indexes of houses sold were the only indexes being computed. Now Laspeyres and Fisher indexes are computed for houses under construction. Some other indexes were published in the past but have now been discontinued.

The base year of the indexes is changed every five to ten years. Although the change of a base year does not require a change in methodology, methodology changes were introduced at the time a base year was changed.

Whenever a new set of characteristics replaced an old set, the indexes for prior years were recomputed to the extent prior data were available. For this reason the user is cautioned that indexes appearing in old publications may have been revised and are not consistent with present series, even after adjusting for base year changes.

For certain indexes, publication tables were shortened some time in the past. Years for which historical data were not available to recompute the index using the latest set of characteristics were removed from tables. The indexes for these years have been restored.

Effects of methodology changes:

When methodology changes it may be decided that the earlier methodology is more appropriate for earlier years. In these cases the index for the earlier years will not be recomputed under the later methodology. Occasionally, data for earlier years are not available and the index for earlier years cannot be recomputed. When the base year changes, all years for which the latest methodology is appropriate are recomputed unless data are not available for some of those years.

When either the methodology or the base year is changed and the index for earlier periods is not recomputed, the earlier index is re-based so the series is consistent.

Consider the following example. From 1963 to 1979 an earlier methodology is used. From 1979 to 2005 a later methodology is used, and the base year is 1996. The series from 1963 to 1978 is not recomputed, it is re-based. The paragraphs below detail the procedures. The year 1979 is referred to as the bridge year since it is available under both methodologies. Note that the re-based index in the bridge year under the earlier methodology will equal the index for the bridge year under the later methodology. Also note that all period-to-period changes as appropriately measured are preserved with re-basing.

A Laspeyres type index is re-based as follows. For simplicity we consider a Laspeyres index as the ratio of a regressed price in the current period to the actual price in the base year.

$$L = R / A$$

Where:

L is a Laspeyres type index

R is a regressed price in the period of interest

A is the actual price in the base year.

When there is a change in methodology/base year the indexes for some time periods are not recomputed. For those time periods the regressed price under the new methodology/base year is not available. A re-based regressed price is used and is computed as follows:

$$Rr = R * Bl / Be$$

Where:

Rr is the re-based regressed price for the period of interest

R is the regressed price for the period of interest under the earlier

methodology/base year

Bl is the regressed price in the bridge year under the later methodology/base year

Be is the regressed price in the bridge year under the earlier methodology/base year.

The re-based index for the period of interest is:

$$Ir = Rr / Al$$

Where:

Ir is the re-based index

Rr is the re-based regressed price

Al is the actual price in the later base year.

In our example, for a re-based 1975 index, the 1975 regressed price would be multiplied by the ratio of the 1979 regressed price under the later methodology to the 1979 regressed price under the earlier methodology to provide the 1975 re-based regressed price. The 1975 adjusted regressed price would be divided by the actual price in 1996 to provide the 1975 re-based index.

Note that the process of dividing the earlier index by the index in the bridge year under the old methodology and then multiplying by the index in the bridge year under the new methodology accomplishes this re-basing procedure without the need to create a re-basing factor.

A Paasche index is re-based similarly. For simplicity we consider a Paasche index as the ratio of an actual price in the period of interest to the regressed price using base year data.

$$P = C / R$$

Where:

P is a Paasche type index

C is the price in the period of interest

R is the regressed price using base year data.

Again it is the regressed price that must be re-based when the methodology/base year change and it is re-based as follows:

$$Rr = R * Bl / Be$$

Where:

Rr is the re-based regressed price

R is the regressed price using base year data

Bl is the regressed price of the bridge year under the later methodology/base year

Be is the regressed price of the bridge year under the earlier methodology/base

year.

The re-based regressed price is used to compute the re-based index as follows:

Ir = C / Rr

Where:

Ir is the rebased index

C is the price in the period of interest

Rr is the re-based regressed price.

Each time there is a change of methodology or base year, later re-basing factors must be combined with earlier re-basing factors to derive the fully re-based index. To illustrate, if our example had one methodology from 1963 to 1979, another methodology from 1979 to 1989, and a third methodology from 1989 to 2005, a re-basing factor using 1979 as the bridge year multiplied by a re-basing factor using 1989 as the bridge year would be multiplied together to get the final re-basing factor. The simplest way to re-base a re-based series is to multiply by the ratio of the indexes in the later bridge year under the different methodologies.

Past methodology reports:

The one-family construction price indexes have been computed using different methodologies over the years. Reports on the methodologies for houses sold, which may be viewed, are as follows:

1. The original methodology report from May 1968.
2. The methodology report first appearing in the second quarter of 1977 when two characteristics were added to the original set.
3. The methodology report first appearing in the first quarter of 1990 when a stratified, multiplicative model was introduced.
4. The methodology report first appearing in the first quarter of 1997 when the characteristic set was revised.

The methodology report from 1997 was revised when documentation was made available on the Internet. That methodology report has been revised to its current format. No changes in methodology are reflected in these later documentation revisions.

For the houses under construction indexes, the regression models have always been essentially the regression models used for houses sold. The only exception to this rule is the use of an indicator distinguishing houses built for sale from houses built on contract.

For houses under construction, the index prior to 1979 was not based on houses under construction. It was based on houses sold. For those years the index was computed by taking the sales price of a house built for sale, subtracting the lot value to obtain the price excluding land, and then performing the regression. This procedure limited the series to quarterly and annual series referred to as the one-family index without land. A monthly series was produced from the quarterly series by the mathematical procedure referred to as linking to a monthly trend. The quarterly series was linked to the monthly trend of an index for another construction type.

Base year changes for both the sold indexes and the under construction indexes have occurred at the same time. These changes have been made at irregular intervals.