

Glossary

Acquisitions approach

An approach in which consumption is identified with the goods and services acquired by a household in some period (as distinct from those wholly or partially used up for purposes of consumption). See also *net acquisitions approach*.

Aggregate

A set of transactions (or their total value) such as the total purchases made by households on residential property in a certain period.

Aggregation

Combining, or adding, different sets of transactions to obtain larger sets of transactions. The larger set is described as having a higher *level* of aggregation than the (sub-) sets of which it is composed. The term “aggregation” is also used to mean the process of adding the values of the lower-level aggregates to obtain higher-level aggregates. In the case of price indices, it means the process by which price indices for lower-level aggregates are averaged to obtain price indices for higher-level aggregates.

Asking price

The price at which a property is offered for sale. The asking price can be adjusted during the process of buying and selling a house until the final transaction price is reached.

Assessed value or appraisal

Valuation of the market value of a property. Valuations may be needed to obtain a mortgage loan. In some countries assessments are performed on the government's behalf for (property) tax purposes. Assessed property values are also referred to as appraisals. See also *Sale Price Appraisal Ratio method*.

Axiomatic (test) approach

The approach to index number theory that determines the choice of index number formula, on the basis of its mathematical properties. A list of tests is drawn up, each test requiring an index to possess a certain property or satisfy a certain axiom. An index number may then be chosen on the basis of the number of tests satisfied. Not all tests may be considered to be equally important and the failure to satisfy one or two key tests may be considered sufficient grounds for rejecting an index.

Base period

The base period is usually understood to mean the period with which all the other periods are compared. The term may, however, have different meanings in

different contexts. Three types of base period may be distinguished:

- the *price reference period* – the period that provides the prices to which the prices in other periods are compared. The prices of the price reference period appear in the denominators of the price relatives, or price ratios, used to calculate the index;
- the *weight reference period* – the period for which the expenditures serve as weights for the index. If the expenditures are hybrid (i.e., if the quantities of one period are valued at the prices of some other period), the weight reference period is the period to which the quantities refer;
- the *index reference period* – the period for which the value of the index is set equal to 100.

It should be noted that, in practice, the duration of the weight reference period for an RPPI is often a year, whereas the RPPI is typically calculated monthly or quarterly, the duration of the price reference period being a month or quarter. Thus, the weight and price reference period may not coincide in practice, at least when an RPPI is first calculated, although the price and index reference periods frequently coincide.

Bias

A systematic tendency for the calculated RPPI to diverge from some ideal or preferred index, resulting from the method of data collection or processing or the index formula used. See also *sample selection bias*.

Chain index

An index number series for a long sequence of periods that is obtained by linking together index numbers spanning shorter sequences of periods. A chain index, computed according to some index number formula (such as the Fisher), is the product of period-on-period indices which are computed with the same formula. See also *Linking*.

Characteristics

The physical and economic attributes of a good or service that serve to identify it and enable it to be classified. For residential property these relate to both the structure (the building) and the location/land.

Characteristics prices hedonic approach

An hedonic regression method where the change in the estimated values of the parameters for the characteristics of the (average) property sold, i.e. the shadow prices of the characteristics, determines the residential property

price index. Under certain assumptions this approach is equivalent to the *hedonic imputation approach*.

Component

A set of the goods and services that make up some defined aggregate. Also used in the context of decomposing the price property price (index) into land and structures components.

Consistency in aggregation

An index is said to be consistent in aggregation when the index for some aggregate has the same value whether it is calculated directly in a single operation, without distinguishing its components, or whether it is calculated in two or more steps by first calculating separate indices, or sub-indices, for its components, or sub-components, and then aggregating them, the same formula being used at each step.

Consumer price index (CPI)

A monthly or quarterly price index compiled and published by an official statistical agency that measures changes in the prices of consumption goods and services acquired or used by households. Its exact definition, including the treatment of *owner-occupied housing*, may vary from country to country. In Europe, the Harmonised Index of Consumer Prices (HICP) currently excludes owner-occupied housing.

Coverage

The set of properties of which the prices are actually included in a price index. For practical reasons, coverage may have to be less than the ideal scope of the index. That is, the types of property actually priced may not cover all of the types that are sold or belong to the housing stock.

Current period, or comparison period

In principle, the current period refers to the most recent period for which the index has been compiled or is being compiled. The term is widely used, however, to mean the comparison period; that is, the period that is compared with the base period, usually the price reference or index reference period. It is also used to mean the later of the two periods being compared. The exact meaning is usually clear in the context.

Data cleaning

Procedures, often automated, used to delete entry errors in data sets, observations which are deemed implausible, or outliers.

Deflating

The division of the current value of some aggregate by a price index (in this context referred to as a *deflator*), in order to revalue its quantities at the prices of the price reference period.

Depreciation

The gradual and permanent decrease in the economic value of a structure or the housing stock through physical deterioration or obsolescence over time.

Domain

An alternative term for the scope of an index.

Drift

A chain index is said to drift if it does not return to unity when prices in the current period return to their levels in the base period. Chain indices are liable to drift when prices fluctuate over the periods they cover.

Durable consumption good

A consumption good that can be used repeatedly or continuously for purposes of consumption over a long period of time, typically several years. A house is an extreme form of a durable consumption good due to its very long expected lifetime. This has led to different approaches to the treatment of *owner-occupied housing* in economic statistics.

Economic approach

The economic approach to index number theory assumes that the quantities are functions of the prices, the observed data being generated as solutions to various economic optimization problems. While this approach is very relevant for the CPI as an approximation to a cost-of-living index, it seems less relevant for a residential property price index. See also *axiomatic or test approach*.

Editing

The process of scrutinizing and checking the prices reported by price collectors. Some checks may be carried out by computers using statistical programs written for the purpose. See also *data cleaning*.

Elementary aggregate

Usually defined as the lowest aggregate for which expenditure data are available and used for index construction purposes. Elementary aggregates also serve as strata for the sampling of items to be priced. The values of the elementary aggregates are used to weight the price indices for elementary aggregates to obtain higher-level indices.

In the context of a sales-based residential property price index, the term elementary aggregate is less appropriate. As every property is basically unique, the quantities are equal to 1, so that weights are available at the most detailed level.

Existing dwellings

The term “existing dwellings” is sometimes used to distinguish them from dwellings that are newly built (and added to the housing stock).

Fisher price index

The geometric average of the Laspeyres price index and the Paasche price index. The Fisher index is *symmetric* and *superlative*. Sales based residential property price indices can always be computed using the Fisher formula because the quantities are equal to 1 (as each dwelling is essentially a unique good).

Fixed weight indices

An abbreviated description for a series of weighted arithmetic averages of price relatives of price indices where the weights are kept fixed over time. In a residential property price index context, the weights can be sales (expenditure) weights or stock weights.

Geometric Laspeyres index

A weighted geometric average of the price relatives using the expenditure shares of the price reference period as weights.

Goods

Physical objects for which a demand exists, over which ownership rights can be established and for which ownership can be transferred between units by engaging in transactions on the market.

Hedonic regression

The estimation of a hedonic model, using regression techniques, that explains the price of the property as a function of its characteristics (relating to the structures as well as the location). See also *hedonic imputation approach* and *time dummy variable hedonic approach*.

Hedonic imputation approach

An approach to estimating a quality-adjusted residential property price index where “missing” prices are imputed using a hedonic regression model. The model parameters are re-estimated in each time period, which makes this approach more flexible than the time dummy variable hedonic approach.

Households

Households may be either individual persons living alone or groups of persons living together who make common provision for food or other essentials for living. Most countries choose to exclude groups of persons living in large institutional households (barracks, retirement homes, etc.) from the scope of their CPIs.

Housing stock

The total number of residential units available for non-transient occupancy. Depending on the particular definition used, the housing stock may or may not include mobile homes, etc.

Hybrid (repeat sales) models

A regression-based method to estimating residential property price indices which combines *repeat-sales* and *hedonic approaches*.

Identity test

A test under the axiomatic approach that requires that, if the price of each item remains the same between the periods compared, the price index must equal unity.

Imputed price

The price assigned to an item (e.g. a property) for which the price is “missing” in a particular period. This may be done using hedonic regression methods. See also *hedonic imputation approach*.

The term “imputed price” may also refer to the price assigned to a good or service item that is not sold on the market, such as a good or service produced for own consumption, including housing services produced by owner-occupiers measured by imputed rent. See also *rental equivalence*.

Index reference period

The period for which the value of the index is set at 100 (or, alternatively, 1).

Informal housing market

Residential areas where a group of housing units has been constructed on land to which the occupants have no legal claim, or which they occupy illegally, or unplanned settlements and areas where housing is not in compliance with current planning and building regulations.

Jevons price index

An elementary price index defined as the unweighted geometric average of the sample price relatives.

Laspeyres price index

A price index in which the quantities of the goods and services refer to the earlier of the two periods compared, the price reference period. The Laspeyres index can also be expressed as a weighted arithmetic average of the price relatives with the expenditure shares in the earlier period as weights. The earlier period serves as both the weight reference period and the price reference period.

Linking

Splicing together two consecutive series of price observations, or price indices, that overlap in one or more periods. If the two sequences overlap by a single period, the usual procedure is simply to rescale one or other sequence so that the value in the overlap period is the same in both sequences and the spliced sequences form one continuous series.

Lowe price index

A price index that measures the change between periods 0 and t in the total value of a set of goods and services at fixed quantities. The quantities do not necessarily have to consist of the actual quantities in some period. The class of indices covered by this definition is very broad and includes, by appropriate specification of the quantity terms, the Laspeyres and Paasche indices.

Lower-level index

An sub-index as distinct from an aggregate index.

Matched models approach

The practice of pricing exactly the same product, or model, in two or more consecutive periods. It is designed to ensure that the observed price changes are not affected by quality change. The change in price between two perfectly matched products is sometimes described as a pure price change.

Market value

The value of a property at a certain point of time, or the price that would result if the property would be sold in a “free market”.

Mean index

A price index that is calculated as the ratio of the sample means (*unit values*) of the properties sold in two periods.

Median index

A price index that tracks the change of the median property price over time. The median is the middle of a (sample) distribution: half the scores are above the median and half are below the median. The median is less sensitive to extreme scores than the mean and is often preferred to the mean as a measure of central tendency in highly skewed distributions.

Mix adjustment

A term used to describe procedures which attempt to remove or reduce the effect of changes in the mix (composition) of the sample of properties sold on the property price index.

Money outlays or payments approach

One of the three main approaches to including owner-occupied housing into a CPI. In the money outlays approach, the out of pocket expenses relating to home ownership are simply added up.

Net acquisitions approach

One of the three main approaches to including Owner Occupied Housing into a Consumer Price Index. Dwellings added to the owner occupied housing stock (in general mainly newly-built dwellings) are part of the coverage of the index; existing dwellings are excluded. See also *Acquisitions approach*.

Offer price

The price a potential buyer says he will be willing to pay for the property.

Outlier

A term that is generally used to describe any extreme value in a set of survey data. In an RPPI context, it is used for an extremely high or low property price or price relative, which requires further investigation and should be deleted when deemed incorrect.

Owner-occupied housing

Dwellings owned by the households that live in them. The dwellings are fixed assets that their owners use to produce housing services for their own consumption, these services being usually included within the scope of a CPI. The rents may be imputed by the rents payable on the market for equivalent accommodation or by user costs. See also *rental equivalence* and *User cost*.

Paasche price index

A price index in which the quantities of the goods and services considered refers to the later of the two periods compared. The later period serves as the weight reference period and the earlier period as the price reference period. The Paasche index can also be expressed as a weighted harmonic average of the price relatives that uses the actual expenditure shares in the later period as weights.

Payments approach

See *money outlays approach*.

Price reference period

The period of which the prices appear in the denominators of the price relatives. See also *Base period*.

Price relative

The ratio of the price of an individual product in one period to the price of that same product in some other period.

Products

A generic term used to mean a good or a service. Individual sampled products selected for pricing are often described as items.

Pure price change

The change in the price of a property of which the characteristics are unchanged or the change in the property price after adjusting for any change in quality (due to renovations, extensions and depreciation).

Quality change

A change in the (quality determining) characteristics of a good or service. In the case of a residential property this includes both depreciation of the structure and renovations, such as the modernisation of kitchens and

bathrooms, the introduction of improved insulation and central heating or air conditioning systems.

Quality adjustment

An adjustment to the change in the price of a property of which the characteristics change over time that is designed to remove the contribution of the change in the characteristics to the observed price change. In practice, the required adjustment can only be estimated. Different methods of estimation, including hedonic methods, may be used in different circumstances. These methods can also be used to control for compositional or quality mix changes over time in the samples of properties sold.

Rental equivalence approach

One of the three main approaches to including owner-occupied housing into a CPI Index. The imputed price for shelter costs should equal the price at which the dwelling could be rented.

Repeat sales method

A method to compile a residential property price index which compares properties that were sold twice or more in the data set at hand. It is a regression-based approach that only includes time dummy variables.

Representative property

A property, or category of properties, that accounts for a significant proportion of the total expenditures within some aggregate, and/or for which the average price change is expected to be close to the average for all properties within the aggregate.

Residential property

Property zoned for single-family homes, townhouses, multifamily apartments, condominiums, and coops.

Reweighting

Replacing the weights used in an index by a new set of weights.

Rolling window approach

An approach where a “window” of a fixed number of time periods is chosen to compute the initial (residential property) price index. The time series is subsequently updated by moving the window one period forward in time and linking the last period-on-period index change to the existing time series.

Sample

A (random or non-random) selection of elements from a finite population. In the housing context, the properties sold in some time period can be viewed as a sample from the housing stock. This sampling view is particularly relevant for a stock based residential property price index.

Sample selection bias

Bias in an index that can result when the sample is not representative of the population. In the housing context, the sample of properties may either not be representative of all sales (which is particularly relevant for a sales based index) or not be representative of the housing stock (which is relevant for a stock based index). In all sales are observed, there will be no sample selection bias in a sales based property price index.

Sampling frame

A list of the units in the universe from which a sample of units can be selected. The list may contain information about the units, which may be used for sampling purposes. Such lists may not cover all the units in the designated universe and may also include units that do not form part of that universe.

Scope

The set of products for which the index is intended to measure the price changes. The coverage of an index denotes the actual set of products included, as distinct from the intended scope of the index.

Seasonal goods

Seasonal goods are goods that either are not available on the market during certain seasons or periods of the year, or are available throughout the year but with regular fluctuations in their quantities and prices that are linked to the season or time of the year.

Selling (or transaction) price

The final transaction price of a property.

Specification

A description or list of the characteristics that can be used to identify an individual dwelling unit to be priced.

SPAR method

An acronym for Sale Price Appraisal Ratio method, an approach to constructing a residential property price index which combines current period selling prices with appraisals (assessed values) pertaining to some earlier base period.

Stratification method

Stratification and “re-weighting” of a sample is a general technique for obtaining more stable results or mitigating any bias due to sample selection problems, including non-response.

In the context of a residential property price index, the sample of properties sold is subdivided into a number of relatively homogeneous strata or cells, according to a (limited) number of price determining characteristics.

Average prices (unit values) or median prices can then be used to compute price indices for each stratum. In the second stage, these stratum indices are aggregated up using sales weights or stock weights. This method has frequently been used to adjust for compositional change of the samples, or changes in the quality mix of properties sold, and is also known as *mix adjustment*.

Stratification can also be used in conjunction with other methods to control for quality mix changes, for example with hedonic regression, repeat sales or SPAR methods.

Superlative index

Superlative indices are generally symmetric and have good properties from an index number theoretic point of view. Examples are the Fisher index and the Törnqvist index.

Symmetric index

An index that treats both periods symmetrically by attaching equal importance to the price and expenditure data in both periods. The price and expenditure data for both periods enter into the index formula in a symmetric way.

System of National Accounts (SNA)

A coherent, consistent and integrated set of macroeconomic accounts, balance sheets and tables based on internationally agreed concepts, definitions, classifications and accounting rules. Household income and consumption expenditure accounts form part of the SNA.

Time dummy variable (hedonic) approach

One of the main hedonic regression approaches to constructing a (residential property) price index. In the standard log-linear time dummy variable model, the characteristics coefficients are constrained to be fixed over time, and the price index numbers can be directly computed from the time dummy coefficients (through exponentiation).

Unit value or average value

The unit value of a set of homogeneous products is the total value of the purchases/sales divided by the sum of the quantities. It is therefore a quantity-weighted average of the different prices at which the product is purchased/sold. Unit values may change over time as a result of a change in the mix of the products sold at different prices, even if the prices do not change.

User cost

The cost incurred over a period of time by the owner of a fixed asset or consumer durable as a consequence of using it to provide a flow of capital or consumption services. User cost consists mainly of the depreciation of the asset or durable (measured at current prices and not at historic cost) plus the capital, or interest, cost.

Uses approach

An approach to CPIs in which the consumption in some period is identified with the consumption goods and services actually used up by a household to satisfy their needs and wants (as distinct from the consumption goods and services acquired). In this approach, the consumption of consumer durables in a given period is measured by the values of the flows of services provided by the stocks of durables owned by households. These values may be estimated by the user costs.

Value

Price times quantity. The value of the expenditures on a set of homogeneous products can be factored uniquely into its price, or unit value, and quantity components. Similarly, the change over time in the value of a set of homogeneous products can be decomposed uniquely into the change in the unit value and the change in the total quantities. There are, however, many ways of factoring the change over time in the value of a set of *heterogeneous products* into its price and quantity components.

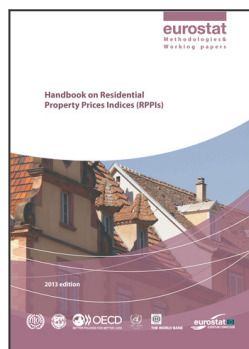
In a housing context, value may also refer to a single property. The “price” of a property is actually a value as it is made up of the price of the structures and the price of the land that the structure is built on.

Weight reference period

The period of which the expenditure shares serve as the weights or of which the quantities make up the set of properties for a Lowe index. There may be no weight reference period when the expenditure shares for the two periods are averaged, as in the Törnqvist index, or when the quantities are averaged, as in the Walsh index. See also *base period*.

Weights

A set of numbers summing to unity that are used to calculate averages. In an RPPI context, the weights are generally expenditure (sales) or stock value shares that sum to unity by definition. They are used to average price relatives for individual properties



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