

Definitions

ad valorem tax - in reference to property, a tax based upon the value of the property.

Adaptive Estimation Procedure (AEP) - A computerized, iterative, self-referential procedure using properties for which sales prices are known to produce a model that can be used to value properties for which sales prices are not known. Also called "feedback".

additive model - A model in which the dependent variable is estimated by multiplying each independent variable by its coefficient and adding each product to a constant.

adjustments - Modifications in the reported value of a variable, such as sale price. For example, adjustments can be used to estimate market value in the sales comparison approach by modifications for differences between comparable and subject properties. Note: Adjustments are applied to the characteristics of the comparable properties in a particular sequence that depends on the method of adjustment selected.

algorithm - A computer-oriented, precisely defined set of steps that, if followed exactly, will produce a pre-specified result, for example, the solution to a problem.

amenities - in reference to property, the intangible benefits arising out of ownership; amenity value refers to the enhancement of value attributable to such amenities.

appraisal - an estimate, usually in written form, of the value of a specifically described property as of a specified date; may be used synonymously with valuation or appraised value.

appraisal schedules - any standardized schedules and tables used in conjunction with a revaluation program, such as replacement cost pricing schedules, depreciation tables, land depth tables, etc.

Appraiser - one who estimates value. More specifically, one who possess the expertise to execute or direct the execution of an appraisal.

assessing - the act of valuing a property for the purpose of establishing a tax base.

assessment - the value of taxable property to which the tax rate is to be applied in order to compute the amount of taxes, may be used synonymously with assessed value, taxable value, and tax base.

Assessor - the administrator charged with the assessment of property for ad valorem taxes; his precise duties differ from state to state depending upon state statutes.

average deviation - in a distribution of values, the average amount of deviation of all the values from the mean value, equal to the total amount of deviation from the mean divided by the number of deviations. As applied to an assessment-to-sale ratio distribution, the average amount which all the ratios within the distribution deviate from the mean ratio.

base price - a value or unit rate established for a certain specified model, and subject to adjustments to account for variations between that particular model and the subject property under appraisal.

binary variable - (1) Binary variables are qualitative data items that have only two possibilities-yes or no (for example, corner location). (2) A variable for which only two values are possible, such as results from a yes-or-no question, for example, Does this building have any fireplaces? Used in some models to separate the influence of categorical variables. Also called a dichotomous variable or a dummy variable.

calibration - The process of estimating the coefficients in a mass appraisal model.

coefficient - (1) In a mathematical expression, a number or letter preceding and multiplying another quantity. For example, in the expression, $5X$, 5 is the coefficient of X , and in the expression aY , a is the coefficient of Y . (2) A dimensionless statistic, useful as a measure of change or relationship; for example, correlation coefficient. See also coefficient of dispersion and coefficient of variation.

coefficient of determination – See R squared.

coefficient of dispersion – the average deviation of a group of numbers from the median expressed as a percentage of the median.

coefficient of variation – a standard statistical measure of the relative dispersion of the sample data about the mean of the data; the standard deviation expressed as a percentage of the mean.

confidence interval - a range of values, calculated from the sample observations, that are believed, with a particular probability, to contain the true population parameter (mean, median, COD). The confidence interval is not a measure of precision for the sample statistic or point estimate, but a measure of the precision of the sampling process (see reliability).

confidence level - the required degree of confidence in a statistical test or confidence interval; commonly 90, 95, or 99 percent. A 95 percent confidence interval would mean, for example, that one can be 95 percent confident that the population measure (such as the median or mean appraisal ratio) falls in the indicated range.

continuous variable - A variable for which it is conceivable that, given any two observed values, a value lying between them may occur. For example, temperature and finished living area are continuous variables; quality class and number of fireplaces are not.

correlation – A statistical phenomenon (and a technique for estimating its strength) whereby knowledge of one fact about a thing implies some knowledge of a second fact about that thing. For example, because the volume and weight of water are correlated, knowing that a quantity of water is one gallon also means knowing that its weight is eight and one-third pounds. Linear correlation, the kind most often encountered, means that an increase in one factor in some proportion (say, a doubling) changes the other in the same proportion. With curvilinear correlation, as between the radius and the area of a circle, this is not true, despite the fact that the correlation may be very strong in the sense that knowledge of one fact tells you precisely the other fact. These are examples of variables perfectly correlated or nearly so; more often, correlation is only partial-for example, the correlation between the age and height of a child. The correlation coefficient gives the strength of the linear relationship between the two variables.

correlation coefficient - A statistic that characterizes two or more sets of numbers and, when squared and multiplied by 100, gives the percentage strength of the (linear) relationship between the two sets of numbers. For example, if the coefficient of correlation between measures of the height and weight of a group of people were 0.9, then one would deduce that knowing the height of someone (loosely speaking) would explain (or account for) 81 percent of the weight.

correlation matrix - The table of numbers used to display the correlation coefficients for each pair of variables when three or more variables are thought to be correlated.

cosmetic comps – A term that refers to a method of adjusting comps using the cost estimate or estimates (e.g. total value or land and building value). Comparability selection or weighting is done in the same manner as when the adjustments are derived from MRA or other method. This is not a true market method but can be quite useful when used as support for the cost approach and when there are an inadequate number of sales to develop adjustments.

cost approach - one of the three traditional approaches to determination of the value of a property; arrived at by estimating the value of the land, the replacement or reproduction cost new of the improvement, and the amount of accrued depreciation to the improvement. The estimated land value is then added to the estimated depreciated value of the improvements to arrive at the estimated property value. Also referred to as the "cost-to-market approach" to indicate that the value estimates are derived from market data abstraction and analysis.

deed - a written instrument which conveys an interest in real property. A quitclaim deed conveys the interest described therein without warranty of title. A trust deed conveys interest described therein to a trustee. A warranty deed conveys the interest described therein with the provisions that the freehold is guaranteed by the grantor, his heirs, or successors.

dependent variable - A variable, such as sale price, the value of which is predicted by the values of other variables, such as location and finished living area. Such a variable may be said to depend on the other (independent) variables.

discrete variable - A variable for which it is not conceivable that, given any two observed values, a value lying between them may occur. For example, the number of rooms in a house is a discrete variable, but the living area of the house is not. See also binary variable and continuous variable.

dispersion - The degree to which data are distributed either tightly or loosely around a measure of central tendency. Measures of dispersion include the average deviation, coefficient of dispersion, coefficient of variation, range, and standard deviation.

effective valuation date - in reference to a revaluation program, the date as of which the value estimate is applicable.

equalization program - a mass appraisal (or reappraisal) of all property within a given taxing jurisdiction with the goal of equalizing values in order to assure that each taxpayer is

bearing only his fair share of the tax load; may be used synonymously with a revaluation program.

equity -in reference to property taxes, a condition in which the tax load is distributed fairly or equitably; opposite of inequity which refers to a condition characterized by an unfair or inequitable distribution of the tax burden. Inequity is a natural product of changing economic conditions which can only be effectively cured by periodic equalization programs. In reference to value, it is that value of the property remaining after deducting all liens and charges against it.

error - The difference between the actual value of a variable and the expected value of the variable exclusive of sampling problems. Errors may be positive or negative, although in common speech taking the absolute value of the errors is sometimes implied. In multiple regression analysis, the term "error" is often used loosely to mean residual.

Euclidean Distance Metric - A measure of distance between two points "as the crow flies." In property valuation, it is used to find the nearest neighbor or similar property based on an index of dissimilarity between property location or attributes. When using multivariate selection, the squared difference is divided by the standard deviation of the variable so as to normalize the differences.

F test - a measure of what we are referring to when we speak of the "statistical significance" of the coefficient for a factor. The F statistic is a ratio of that part of the sum of the squares accounted for by the regression equation to the residual (that part of the sum of the squares not accounted for by the regression equation). The number of factors also is included in the calculation

Goodness of Fit statistics - Statistics used in multiple regression analysis and other kinds of statistical modeling to express the amount, and hence the importance, of the errors or residuals for all the predicted and actual values of a variable.

hybrid model – A model that incorporates both additive and multiplicative components. See also additive model and multiplicative model.

intercept - Graphically, the point at which a line, such as a regression line, intersects the axis on which the dependent variable is represented; the value of the predicted variable when the value of all the other values in the model is zero; the constant.

iteration - One repetition or repeated cycle in a process of estimating values as close as possible to actual values by repeated approximations. The results of each approximation are used in the next one.

linear regression - A kind of statistical analysis used to investigate whether a dependent variable and a set of one or more independent variables share a linear correlation and, if they do, to predict the value of the dependent variable on the basis of the values of the other variables. Regression analysis of one dependent variable and only one independent variable is called simple linear regression, but it is the word simple (not linear) that distinguishes it from multiple regression analysis with its multiple independent variables

market approach - one of the three traditional approaches to determination of the value of a property; arrived at by compiling data on recently sold properties which are comparable to the subject property and adjusting their selling prices to account for variations in time, location, and property characteristics between the comps and the subject property.

market value - the price an informed and intelligent buyer, fully aware of the existence of competing properties, and not compelled to act, would be justified in paying for a particular property.

mass appraisal - appraisal of property on a mass scale - such as an entire community, generally for ad valorem tax purposes, using standardized appraisal techniques and procedures to accomplish uniform equitable valuations with a minimum of detail, within a limited time period, and at a limited cost...as opposed to a fee appraisal which is generally used to refer to a rather extensive, detailed appraisal of a single property or singularly used properties for a specified purpose.

model - For purposes of appraisal, a representation (in words or an equation) that explains the relationship between value or estimated sale price and variables representing factors of supply and demand.

model calibration - The development of adjustments, or coefficients based on market analysis, that identifies specific factors with an actual effect on market value.

model specification - The formal development of a model in a statement or equation, based on data analysis and appraisal theory.

multicollinearity - The phenomenon of two or more variables being correlated. If the two correlated variables are both independent variables (note that if they are correlated they are not truly independent in the relationship sense) used to predict the value of some other, dependent, variable, then modeling problems will arise. If the multicollinearity is perfect, the multiple regression algorithms simply will not work; if the multicollinearity is serious but imperfect, the coefficients generated by the algorithm will be individually meaningless (although the model as a whole may still be useful).

multiplicative model - A mathematical model in which the coefficients of independent variables serve as powers (exponents) to which the independent variables are raised or in which independent variables themselves serve as exponents; the results are then multiplied to estimate the value of the dependent variable.

multiple regression analysis – A particular statistical technique, similar to correlation, used to analyze data in order to predict the value of one variable (the dependent variable), such as market value, from the known values of other variables (called "independent variables"), such as lot size, number of rooms, and so on. If only one independent variable is used, the procedure is called simple regression analysis and differs from correlation analysis only in that correlation measures the strength of relationship, whereas regression predicts the value of one variable from the value of the other.

Neighborhood - a geographical area exhibiting a high degree of homogeneity in residential amenities, land use, economic and social trends, and housing characteristics.

outliers - Observations that have unusual values, that is, they differ markedly from a measure of central tendency. Some outliers occur naturally; others are due to data errors.

parcel - piece of land held in one ownership.

partial F test - The partial F test has essentially the same significance as the F test, except that in this case we are trying to assess the significance of a single term in the model rather than all the terms taken together. The critical factor here is the difference or increase in the sum of the squares accounted for by the regression as a consequence of adding one term to the regression equation.

partial correlation – a measure of how closely the value of the independent variable or factor (such as number of full baths), is related to the dependent variable (usually the sales price). The dependent variable is adjusted so that all of the other factors in the model are “taken out” of the values in order for us to have a measure of how closely this particular variable is related to the remaining dependent variable. Mathematically, its maximum absolute value is one.

property class - a division of like properties generally defined by statutes and generally based upon their present use. The basis for establishing assessment ratios in a classified property assessment system.

property record card - a document specially designed to record and process specified property data; may serve as a source document, a processing form, and/or a permanent property record.

qualitative variable - Something that can be appreciated but not objectively reduced to an unambiguous scale. For example, view is a qualitative variable.

quantitative variable - Pertaining to the objective nature of some variable of interest, that is, something that can be measured or counted with little ambiguity. For example, number of bathrooms is a quantitative variable.

R squared - The R squared statistic (coefficient of determination) is a ratio related to how well the data (sales prices) are fit by the regression equation. It is equal to the complement of the residual sum of squares divided by the total sum of squares corrected for the mean, where the total sum of squares is the sum of the squares of the sales prices minus their mean value, and the residual sum of squares is the sum of the squares of the differences between the actual sales prices and those predicted by the regression equation. It is apparent that the closer R squared is to 1, the better we have fit the data.

real estate - the physical land and appurtenances affixed thereto; often used synonymously with real property.

real property - all the interests, benefits, and rights enjoyed by the ownership of the real estate.

reconciliation - The final step in the valuation process wherein consideration is given to the relative strengths and weaknesses of the three approaches to value, the nature of the property appraised, and the quantity and quality of available data in formation of an overall

opinion of value (either a single point estimate or a range of value). Also termed "correlation" in some texts.

regression coefficient - The **coefficient** calculated by the regression algorithm for the data supplied that, when multiplied by the value of the variable with which it is associated, will predict (for simple regression) or help to predict (for multiple regression) the value of the dependent variable. For example, in the equation, $\text{Value} = \$10,000 + \$5,000 + \text{number of rooms}$, \$5,000 is a regression coefficient.

regression line - The line on a graph that represents the relationship defined by the regression coefficients. For example, the line from the relationship given in the definition of regression coefficient would cross the y-axis at the value \$10,000 and would go up \$5,000 for each movement of 1 to the right. This example illustrates one of the subtleties required in understanding regression analysis: in fact, there is no line, because the independent variable is not a continuous variable, but it is easier to talk about the relationship by pretending that the variable is continuous and represent the relationship by a line rather than the more nearly correct series of vertical bars on a bar chart.

residual - The difference between an observed value and a predicted value for a dependent variable.

sales file - A file of sales data.

sales ratio study - a statistical analysis of the distribution of assessment or appraisal-to-sale ratios of a sample of recent sales, made for the purpose of drawing inferences regarding the entire population of parcels from which the sample was abstracted.

slope - The change in the dependent variable associated with a change of one in the independent variable of interest. The slope is given by the coefficient of the independent variable.

standard deviation – the statistic calculated from a set of numbers by subtracting the mean from each value and squaring the remainders, adding together all the squares, dividing by the size of the sample less one, and taking the square root of the result. When the data are normally distributed, one can calculate the percentage of observations within any number of standard deviations of the mean from normal probability tables.

standard error - a measure of the precision of a measure of central tendency; the smaller the standard error, the more reliable the measure of central tendency. Standard errors are used in calculating a confidence interval about the arithmetic mean and the weighted mean.

standard error of the estimate - The square root of the mean square residual gives us the standard error of the estimate. In this application, this number gives us an idea of the average amount by which the regression equation "misses" the actual sales prices. In a somewhat more precise statistical sense, we expect that roughly 2/3 of the regression estimates should be within one standard error (either high or low) of the actual sales price. In general, the smaller this number is the better. As we noted, this not only takes account of

how well the data are fit, but also of how efficiently (using the smallest number of factors) we have performed the fit.

step-wise regression analysis - A kind of multiple regression analysis in which the independent variables enter the model, and leave it if appropriate, one by one according to their ability to improve the equation's power to predict the value of the dependent variable.

subjective data - Subjective data are items for which the proper value is a matter of judgment and more difficult to verify. Examples include construction class, condition, effective year built, neighborhood desirability, and view.

uniformity - as applied to assessing, A condition wherein all properties are assessed at the same ratio to market value, or other standard of value depending upon the particular assessing practices followed.

use value - the actual value of a commodity to a specific owner, as opposed to its value in exchange or market value.

variable – an item of observation that can assume various values, for example, square feet, sales price or sales ratios.

variance – a measure of dispersion equal to the standard deviation squared.

view - the scene as viewed from a property.