

# ASSESSING THE FACTS

WINTER 2009

## STATISTICALLY TESTING RESIDENTIAL APPRAISAL VALUES

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Article source: *Real Estate Finance, Statistics, and Valuation Modeling*, Appraisal Institute, Course Handbook, Chicago, Illinois, 2004.

If our 2008 assessment publication and its ensuing appeal period has taught me one thing this year (it has actually been illuminating on several fronts), it is that the appraisals being submitted by taxpayers as proof of value for January 1, 2008 need to be scrupulously reviewed. To that end, this issue of the newsletter will offer a couple tools that helped us facilitate that exercise, particularly when time is short.

As we looked at the value indications found on the appraisals, the question that kept popping into our minds was, "How confident can we and the Board of Review be in that value estimate?" We can look to inferential statistics for an answer.

Please keep on reading! Don't be put off by the fancy term! You all have had most of the statistics that we will be discussing and they are not all that difficult to understand. They just have formidable sounding names. Assessors actually use inferential statistics all the time. So let's do just a little review.

Recall that statistics is just a mathematical process or methodology concerned with extracting useful information from numerical data. Inferential statistics embodies that concept by allowing the analyst to take a look at a small body of data, known as a sample, and then to draw conclusions (make inferences) about the larger group or population. In a sense when assessors analyze the sales ratios of a small number of properties from a neighborhood and then increase or decrease assessments of all neighborhood properties, say 5% based on that sample, we are inferring that the trend of the sample is applicable to the entire population or all neighborhood properties. Similarly, appraisers infer things about the subject property they are appraising, such as its market value, based on the selling prices of three or four comparable properties. As you can see, inferential statistics is a key element of both single property appraisal and mass appraisal. We all are using it.

Remember our first concern about the value indications of the appraisals? How reliable is the value? That value, derived from a few sales comparables, may not be representative of the population. So, how can we find out if it is reasonable?

The two most familiar methods of establishing a degree of confidence in the value

See Statistics page 2

## STATISTICS (FROM PAGE 1)

are based on two statistical measures:

1. **Measures of central tendency** or where the data tend to group or “lump up” in the middle; the mean, median and mode. This is a point estimate.
2. **Measures of dispersion** or how the data is spread out from the middle; standard deviation. This is an interval estimate, a range of values within which a population parameter or occurrence is likely to be.

This article will concentrate on the standard deviation while throwing in a new twist to what you already know. The twist is something called *t-tables* which allow for more precise variability analysis when dealing with smaller sample sizes as appraisers and assessors often do.

*Note: As we proceed with the discussion, when we are talking about observations, occurrences, or pieces of data, think of that data as being sale prices.*

Standard deviation is a very useful statistic or measure of dispersion as it allows us to accurately determine where individual observations are located relative to the mean or average. When data is normally distributed, mean = median = mode, mathematicians have proven that we can make very precise predictions about individual occurrences. Specifically, 68% of the observations will fall within +/- 1 standard deviation (s) from the mean, 95% will fall within +/- 2s and 99% will fall +/- 3s from the mean. The suspicion about real estate markets is that they are not as normal as some markets because of their inefficiencies. Despite this, everyone still agrees that there is a great deal of normalcy within the market, that it is not pure chaos. Consequently, statistics like the standard deviation are still relevant. See the shaded sidebar.

The 68%, 95% and 99% intervals into which observations will fall are “rules” of statistics for normally distributed data. These remain, however, approximations that can and will be influenced by sample size. A *t-table*, available in most books on statistics and perhaps as part of spreadsheet software and more advanced calculators, helps us to determine a more precise standard deviation based on the size of the sample used. *t-tables* mathematically factor in sample size by using something called degrees of freedom, defined as the sample size less 1 (n-1). Standard deviations are then mathematically developed for various levels of confidence, say 99%, 95% or 90%. These tables help us answer the question, “What is the range or interval within which 95% of the observations will fall?” What we want to find out is, will the appraiser’s value indication fall within the range for a specific confidence level? If it doesn’t, we need to find out from the appraiser or alternatively review the report to find those circumstances that are present within the subject property that would have led the appraiser to find a value estimate that is unlike 95% of the properties in the neighborhood. Here’s how to do it.

Let’s say you look at all the sales occurring 12 months prior to the assessment

See Statistics page 3

## Central Tendency and market value

In the referenced material cited at the beginning of this article, the Appraisal Institute course has the following discussion: “The idea of the “central tendency” in statistics is consistent with the widely held definitions of market value. Those definitions typically refer to the market value as the most probable price paid or the expected price.

Technically, “most probable” refers to the mode while “expected” refers to either the mean or median. Because distributions of real estate prices typically vary somewhat from normal distribution, it is not surprising that there are differences in how the market value is defined, and *that estimates of value often fall into a range rather than a single point alone.*” (Emphasis added, from page 33)

## STATISTICS (FROM PAGE 2)

date and not just the 3 or 4 sales the appraiser selected. You discover that there were 15 sales with an average selling price of \$200,000 and a standard deviation of \$6,000. The question becomes, what is the price interval or range into which 95% of the observations or neighborhood properties would fall if they were to sell.

A small sample size is one that is defined as having 30 or less observations. With 15 sales in our neighborhood as our sample, we have a small sample. Therefore, we have to consult the *t*-tables for a more precise standard deviation and then calculate the range using the following methodology.

1. First, we need to calculate the standard deviation of the sample means. This insures that the standard deviation we will use will approximate that of the population where normal distributions tend to exist. We approximate the population standard deviation by using this formula:

Approximate population standard deviation = Sample standard deviation / square root of the sample size.

In our example:  $6,000 / \sqrt{15} = 6,000 / 3.873 = 1,549$

2. Determine the degrees of freedom (defined as the sample size less one):

In our example:  $15 - 1 = 14$

3. Find the appropriate *t*-score by consulting a *t*-table.

In our example: 95% confidence level, degrees of freedom 14, *t*-score is 2.145

4. Calculate the range within which 95% of the population will fall using the following formula:

Observed mean +/- *t*-score x standard deviation of the sample means.

In our example:  $\$200,000 \pm 2.145 \times 1,549$  or  $\$200,000 \pm 3,323$  for a range of  
\$196,677 - \$203,323

5. Analysis; If the appraiser determined the value of the property at \$190,000, he/she is indicating that the subject property, for some reason, falls outside the range within which we expect 95% of the population or neighborhood properties would fall if they were to sell. Clearly, there would have to be some reason, condition, lack of an expected amenity, or some other *significant* inferiority, that would explain why the subject of the appraisal would fall outside the statistical range. If the report indicates nothing abnormal about the property, then clearly, the value indication is inaccurate and too low. If, after your review of the appraisal, you find the appraiser discussed the highly inferior location of this property relative to most property in the neighborhood or that it has a serious insect infestation or other abnormality relative to the other neighborhood properties, then you would conclude that the indicated value found in the appraisal is reasonable. If the appraised value falls within this range, it is also a reasonable value.

However, even if the appraised value falls within the range, look at **where in the range** the appraiser has valued the property. If the value falls at the low end of the range, again look for some reason why it should be at the low end of the range versus the upper end of the range. If there is no characteristic that would justify a value closer to either end of the range, argue that precise point. In other words, you could at least argue that the value is more likely to fall near the middle or closer to the mean or median sale price if no characteristic, amenity, condition or other attribute logically justifies being at the lower or upper end of the statistical range for the given confidence level.

Performing these analyses can at least provide quantifiable data verifying either the reasonableness of the appraiser's value estimate or its inappropriateness.

## A Quick Appraisal Review Methodology

Because of the difficult times in the real estate market, our township received a record number of appeals. Most of these appeals were based on the market value of the property and most taxpayers hired licensed fee appraisers to determine the value as of January 1, 2008. Consequently, we needed a system that would allow us to quickly review the appraisals and, if necessary, to provide the Board of Review with facts that they should consider when judging the quality of the work. We developed a checklist of items we felt were indicative of quality work.

The form is available on TOI's website in the download section should you want to use this in the future under Appraisal Form Letter Appeal Response. We review the pertinent points herein.

1. **Sizes of comparables do not bracket the subject. Value indications for larger or smaller homes are not part of the appraisal analysis.** A quality comparable analysis should be made up of both smaller and larger homes than the subject to adequately judge the market's response to varying sizes of improvements. It's a bracketing issue.
2. **Single adjustment exceeds 10% of selling price** – This is a comparability issue. A single adjustment to make a comparable similar to the subject that exceeds 10% of the comparable's selling price is just too dissimilar to be included in the analysis. This rationale is also true for the net and gross adjustments that follow.
3. **Net adjustments exceed 15% of the selling price** - Net adjustments are determined by tallying all the dollar amounts of all adjustments paying attention to the negative and positive signs. This is endorsed by Fannie Mae.
4. **Gross adjustments exceed 25% of the selling price** - Gross adjustments are determined by adding the sum total of adjustments without regard to the signs or the direction of the adjustments. This also is endorsed by Fannie Mae.
5. **Comparable sale prices are universally adjusted upward and thereby fail to establish an upper limit of value for the subject.** This is a critical flaw in any appraisal. Without having a comparable that required a net downward adjustment to be comparable to the subject, the appraiser has failed to establish the upper range of value. The only conclusion that can be drawn from the value selected by the appraiser is that it represents the lowest possible value and that any higher value has NOT been disproved. An appraisal whose comparables are universally adjusted downward relative to the subject is not as critical but a good appraisal should have some comparables that require downward net adjustments and others requiring upward net adjustments in order to bracket the subject's value.
6. **The final value estimate is below the adjusted sale price of the most comparable property in the appraisal.** The Appraisal Institute does not prohibit appraisers from selecting a final indication of value that is anywhere within the range indicated by the comparables. I believe it is a major flaw for an appraiser to select a final value for the subject property that is below the most comparable property. In fact, the value developed from the comparable demonstrating the most similar characteristics, as determined by the comparable with the lowest gross adjustments, should be the value selected for the subject. After all, the adjusted selling price for the most comparable property is the most likely selling price for the subject, unless there is a detailed explanation offered as to why it should not be considered most indicative of the subject. Without this explanation and providing the adjustments adhere to the 10%, 15% and 25% rules, it should be argued that any value other than that developed from the most comparable property is speculative at best.
7. **Proximity of the comparables** - Another major flaw in an appraisal arises when appraisers select comparables that are located too far from the subject particularly if their selection overlooks other sales that occurred that were located closer to the subject. Obviously, if sales are scarce, the area of search needs to be expanded. If this was the case, there should be a discussion in the body of the report stating why comparables were used that were located some distance from the subject and how, if at all, the political, social and economic factors that create value have changed.