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# Washington Department of Revenue Property Tax Division

## **Valid Sales Study Chelan County 2016 Sales for 2017 Ratio Year**

Sales from May 1, 2015 through April 30, 2016



*April 2017*

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## Executive Summary

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### About this Review

To provide uniform taxation statewide, the Department of Revenue (Department) implements an annual study of property in each of the state's 39 counties. This piece of the 2017 ratio year study measures how closely Chelan County's 2016 single-family residence assessed values compare to market values. The study consists of two analyses where the Department selects a random sample of 60 sales from Chelan County's valid single-family residential sales report. These sales are then compared to comparable non-selling properties to determine if selling and non-selling properties are being assessed similarly.

The third and fourth sections of this report utilizes all valid single family sales in Chelan County. In the third section we look at the concentration of sales around a central tendency. The fourth section looks and the overall level of assessment and the uniformity of assessment both vertically and horizontally.

Mary Burket did the initial data screening and collection. Mark Studer performed the statistical analysis and wrote the concluding report.

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### What we found

1. Chelan County's level of assessment is 0.894, outside the International Association of Assessing Officers (IAAO) recommended range of 0.90 to 1.10.
  2. Chelan County's coefficient of dispersion (COD) at 13.02, is within the IAAO recommended range of 5 to 15 for urban residential areas and the 5 to 20 range for rural residential areas. Overall, Chelan County is a rural county.
  3. Chelan County's Price-Related Differential (PRD) at 1.008, is within the IAAO recommended standard of .98 to 1.03. The more sensitive Vertical Equity Index (VEI), at 8.17 also indicates acceptable vertical equity.
  4. The 10% concentration of ratios within  $\pm 2$  percent of the median is within IAAO's "Standard on Ratio Studies"<sup>1</sup> standards of the less than 32%.
  5. The sales group and non-sales group assessed values appear to change at similar rates and appear to be assessed at a similar rate per square foot.
  6. Based on the weight of the overall evidence, the assessor appears to treat selling and non-selling properties similarly.
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### Results

**Based on 2016 reported single-family residential valid sales, Chelan County overall median ratio for single-family residential property is below the IAAO standard. Chelan County meets or exceeds all other IAAO standards that were tested in this study.**

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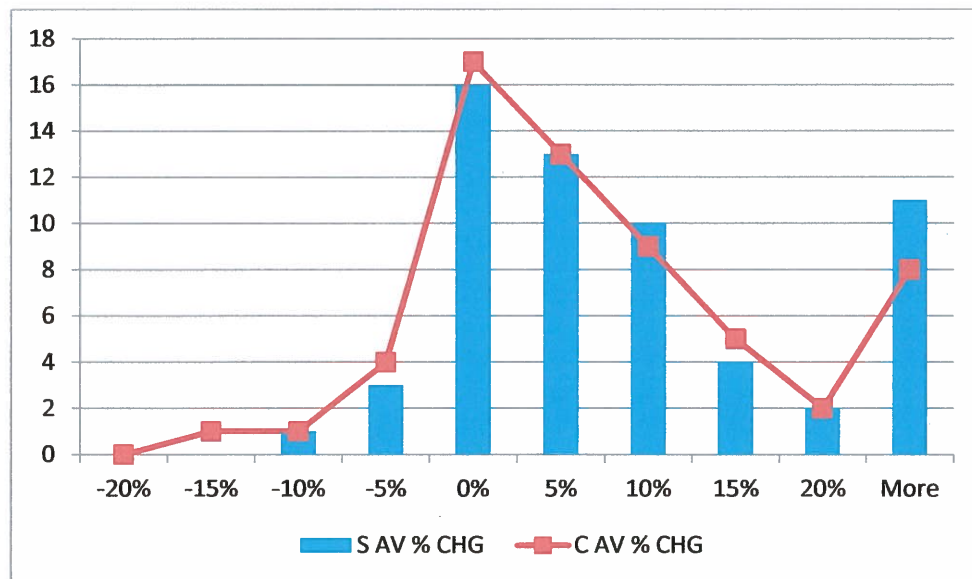
<sup>1</sup> IAAO "Standard of Ratio Studies" dated April 2013

## Method: E.1 Comparison of Average Value Changes

**Parameters** A comparison of the average value change for selling versus non-selling properties was performed as prescribed by the IAAO. We drew a random sample of 60 single-family residential properties from the 2016 Chelan County valid sales report submitted to the Department. The Department’s appraiser used the county’s GIS Internet application to select an additional 60 non-sale properties that are adjacent or near the sale property.

**Objective** Determine if there is any notable difference in the change in assessed value between selling and non-selling properties.

**Data** The chart below shows visually the percent change of the sample properties in both groups. Visually it appears that both selling and non-selling properties changes at similar rates.



Additional statistical tests were also used to determine if selling and non-selling properties’ assessed values changed at different rates and proportions. As shown in the table to follow, the average percent change analysis confirms the visual observation. The selling and the non-selling properties’ mean assessed values changed by 9.63% and 7.97% respectively. A difference of 1.66%. The selling and the non-selling properties’ median assessed values changed by 5.20% and 5.00% respectively. A difference of 0.02%. The IAAO recommends establishment of a reasonable tolerance, such as 3%, before concluding that a meaningful problem may exist.

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	<b>Sale AV % CHG</b>	<b>Non-Sale AV % CHG</b>	<b>Difference</b>
<b>Mean</b>	9.63%	7.97%	1.66%
<b>Median</b>	5.02%	5.00%	0.02%

## Method: E.2 Comparison of Average Unit Value

**Parameters** A comparison of the average unit value for selling versus non-selling properties was performed as prescribed by the IAAO. We drew a random sample of 60 single-family residential properties from the 2016 Chelan County valid sales report submitted to the Department. The Department’s appraiser used the county’s GIS Internet application to select an additional 60 non-sale properties that are adjacent or near the sale property.

**Objective** Determine if there is any notable difference in the assessed unit value (value per SqFt) between selling and non-selling properties.

**Data** The chart below shows visually the value per square foot for the sample properties in both groups. Visually it appears that both selling and non-selling properties unit values are similar.



As shown in the table below, the selling properties’ mean assessed value is \$164.51 per square foot, while the non-selling properties have a mean assessed value of \$163.68 per square foot. The median assessed value for selling properties is \$153.87 per square foot, while the median assessed value for non-selling properties is \$154.63 per square foot. The IAAO recommends establishment of a reasonable tolerance, such as 3%, before concluding that a meaningful problem may exist. The mean and median difference between the two groups is 0.50% and 0.49% respectively.

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	<b><i>Sale AV / SF</i></b>	<b><i>Non-Sale AV / SF</i></b>	<b><i>Difference</i></b>
<b>Mean</b>	\$164.51	\$163.68	0.50%
<b>Median</b>	\$153.87	\$154.63	0.49%

## Method: E.4 Comparison of Observed versus Expected Distribution of Ratios

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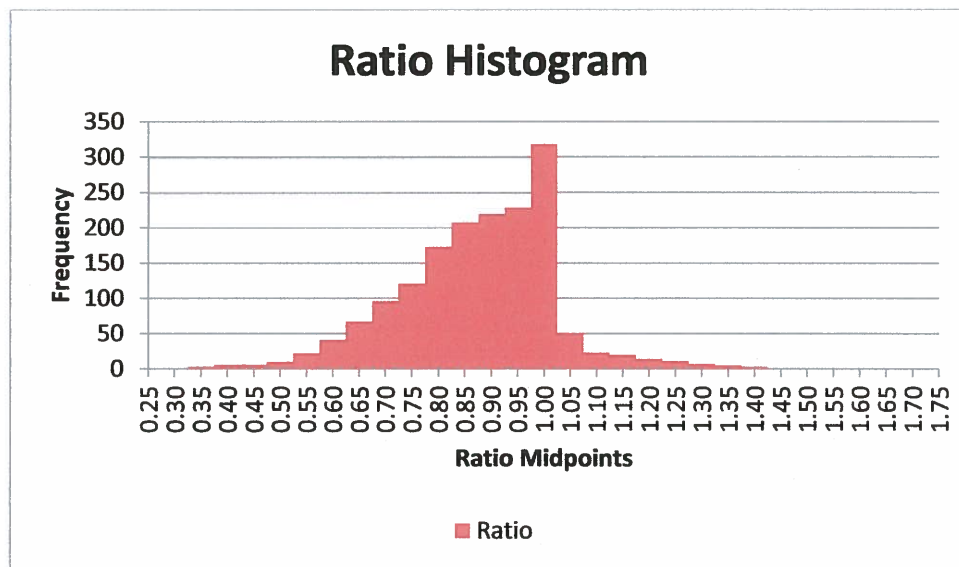
**Parameters** A comparison of the observed versus expected distributions of ratios. This section utilizes all valid single-family residential sales in Chelan County. Expected; IAAO suggests that the percentage of ratios within 2% of any central tendency should not exceed 32%. IAAO states “finding such a high concentration of ratios (above 32%) around any measure of central tendency is a strong indicator of sales chasing or of a non-representative ratio study.”

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**Objective** Determine the concentration of ratios around a central tendency.

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**Data** Observed; An analyses of all valid single family sales in Chelan County resulted in a finding of a 10% concentration within 2% of the median ratio, well within the IAAO standard. This is displayed visually in the histogram below.



On a histogram each ratio contributes to the length of a bar representing the range in which the ratio falls. Good uniformity is indicated when the highest bars are near the median (approximately the same number of observations on each side) with the bars decreasing in length the farther they are from the median (forming the shape of a bell). The graph shows that the top of the bell is in the range of 1.00, but the median ratio is only .893. This is a result of ratios being skewed to the left (lower ratios) and the sharp drop off of ratios on the right side of the bell. Chelan County, with a median ratio of .893, does not meet the IAAO recommended standard for median ratio between 0.90 and 1.10.



## Horizontal and Vertical Uniformity

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**Parameters** All valid single-family sales are analyzed to determine the uniformity in assessment.

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**Objective** Apply statistical measures designed to provide an indication of property tax assessment equity/uniformity. Measures such as coefficient of dispersion (COD) for horizontal equity, Price-Related Differential (PRD), Quintile Mean Ratios (QMR), and Vertical Equity Index (VEI) for vertical equity.

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**Horizontal Equity** The most generally useful measure of variability or horizontal uniformity is the COD. The COD measures the average percentage deviation of the ratios from the median ratio. The sales sample has a COD of 13.02; within IAAO recommended range of five to 20 for rural residential properties. The COD is also within IAAO recommended range of five and 15 for urban areas. Overall Chelan County as a whole would be considered a rural area.

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**Vertical Equity** PRD measures the regressivity or progressivity of the assessments. Assessments are considered regressive if high-value properties are under appraised relative to low-value properties. The most desirable PRD would be 1.00. A PRD greater than 1.00 is an indication that appraisals in a particular county are regressive. According to IAAO guidelines, a PRD should be between .98 and 1.03. In Chelan County, the PRD for valid single family sales sample is 1.008, well within the IAAO standard range.

QMR is another useful measure of vertical equity. QMR is the average of the assessed value to sale price ratios (AV/SP) for each one-fifth (quintile) grouping of the ratios being investigated, after the ratios have been sorted from lowest sale price to highest sale price and divided into equal quintile sale price groups. The mean ratio for each quintile is below. QMR is probably the easiest vertical equity measure to understand, as it visually shows the level of assessment throughout the value range of properties.

Quintile	Mean Ratio
1	0.922071
2	0.850318
3	0.860153
4	0.886839
5	0.872305

The PRD at 1.008 indicates nearly perfect vertical equity; however, the QMRs show that the first quintile has a higher ratio than the other quintiles.

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Overall the spread in QMRs is relatively small.

Vertical Equity Index (VEI) is a method of scoring the QMR's shown above. Noted assessment expert, J. Wayne Moore proposes computing a VEI using quintile ratios. Dr. Moore believes "VEI may be more sensitive to differences in vertical equity than the PRD." As a guideline, VEI values above 14.0 indicate vertical inequity; values between 14.0 and 7.0 indicate acceptable vertical equity; values below 7.0 indicate good vertical equity, with those below 3.5 indicating excellent vertical equity. The valid sales sample has a VEI of 8.17, indicating acceptable vertical equity.

## Ratio Standards:

“If sold and unsold properties within a specified group are appraised in the same way, their appraised values should reflect similar average percentage changes from year to year. Accordingly, changes in appraised values for sold and unsold parcels are compared to determine whether sold parcels have been selectively appraised.”<sup>2</sup> “For example, if sold parcels are considered representative of a stratum and appraised values increased an average of 10 percent while appraised values for unsold parcels in the same stratum increased an average of only 2 percent, “sales chasing” is a likely conclusion.”<sup>3</sup> The IAAO recommends establishment of a “reasonable tolerance, such as 3 percentage points (e.g., a change of 6 percent for sold properties and 3 percent for unsold properties), before concluding that a meaningful problem may exist.”<sup>4</sup>

If the 3-percent tolerance is exceeded, a second test, two sample t-test, is performed to determine whether the differences are statistically significant. The “P(T<=t) two-tail” result is the key to inferring whether or not the greater than 3-percent tolerance result is either random chance or highly probable. If the “P(T<=t) two-tail” number is less than .05 then it is highly probable that repeating the study will yield similar results.

“Assuming the ratio studies are based on sales that have been properly adjusted for time and other factors, a strong indication of the likelihood of “sales chasing” can be obtained by computing the proportion of ratios that would be expected to fall within a particular narrow range of the mean given the lowest likely standard deviation (although this depends somewhat on the assumption of a normal distribution). For example, with a standard deviation of 5 percent given a normal distribution, about 32 percent of the ratios would be expected to fall within  $\pm 2$  percent of the mean (for example, between 98 and 102 percent, given a mean of 100 percent). Except in highly constrained or well-behaved real estate markets, many appraisers consider such a low standard deviation, corresponding approximately to a COD of 4 percent, to be unachievable. Regardless of the distribution of the ratios, the likelihood is extremely low that there would be a sufficiently representative sample with more than this proportion of ratios in such a narrow range. If such is the case, “sales chasing” is a likely conclusion.”<sup>5</sup>

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<sup>2</sup> Standard on Ratio Studies-2013, Appendix E.1

<sup>3</sup> Standard on Ratio Studies-2013, Appendix E.1

<sup>4</sup> Standard on Ratio Studies-2013, Appendix E.1

<sup>5</sup> Standard on Ratio Studies-2013, Appendix,E.4