Measuring Real Property Appraisal Performance in Washington's Property Tax System 2007

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April 23, 2008

Table of Contents

	Page
Preface	i
Measuring Real Property Appraisal Performance	1
Summary of Findings	3
Detailed Findings	
Level of Assessment	
Assessment Level by County	5
Assessment Level by Major Class of Property	7
Uniformity of Assessments	
Uniformity by Major Class of Property	10
Coefficient of Concentration	13
Median Percentage Deviation	15
Coefficient of Dispersion	19
Vertical Equity	
Median Ratio by Value Quartile	22
Price-Related Differential	27
Background on Washington's Assessment System	30
Appendix A – County Revaluation Cycles	32
Appendix B – Frequency Distribution of Ratios by County	33

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Preface

This report is an evaluation of the performance of the property tax appraisal system in Washington. It is fairly technical in nature. It uses statistics related to assessed values and market values. The report uses charts of these statistics to illustrate how well the appraisal system is working in Washington. This preface answers some general questions related to property taxes, assessed values, and appraisal performance.

How important are property taxes in public finance in Washington?

The state government and many local governments including school districts, cities, counties, fire districts, library districts, and hospital districts impose property taxes. Property taxes are the second largest source of state and local taxes (about 30 percent of the total). Only state and local sales taxes have a larger share. Property taxes are more important for local governments than for the state government. They make up about 65 percent of local government tax revenue.

Who is responsible for setting assessed values for property tax purposes?

County assessors are responsible for assigning assessed values of most properties within their respective counties. Multi-county utility properties are valued by the Department of Revenue. Utility values only represent about 2 percent of the total value of real and personal property in the state. These assessed values are used for all property taxes imposed by the various jurisdictions.

How often are assessed values updated?

State law requires regular revaluation of properties. Eighteen counties update property values annually based on appropriate statistical data. State law requires properties to be physically inspected at least once every six years in counties that annually update assessed values. Other counties (21 counties) revalue on two, three, or four year cycles. These counties physically inspect and revalue each property once during the cycle and the value is not changed until the next cycle: two, three or four years later.
See Appendix A.

What is the valuation standard for assessed values?

Property is assessed and taxed at market value. In Washington statutes, market value is called true and fair value (RCW 84.40.030).

How is market value determined?

Market value is the price a buyer of property, willing but not obligated to buy, and a seller of property, willing but not obligated to sell, would agree on after taking into consideration all uses to which the property is adapted and might in reason be applied (WAC 458-07-030). There are three approaches used to estimate market value: the sales approach (comparable sales), the cost approach (replacement cost), and the income approach (capitalized income potential).

Assessor offices utilize a mass appraisal process to value property. Mass appraisal is the process of valuing a group of properties. This approach is sometimes contrasted with more familiar single-property appraisals (sometimes called fee appraisal). Fee appraisal is the process of valuing a particular property. Both are systematic approaches to establishing property value. However, they differ in scope and method of evaluation. Mass appraisal systems are designed to value many properties and are evaluated by statistical methods. Single-property appraisals are concerned with one property and are evaluated by a comparison to comparable properties.

What discretion does the assessor have in setting assessed values?

State law is very specific that property is to be assessed at market value (true and fair value), so the assessor has no discretion to choose a different assessment standard.

Since most properties do not sell regularly, determining market value for a particular property is not always an easy process and disagreements may arise about the correct market value. The state law is clear that the comparable sales, replacement cost, and the capitalization of income approaches are the proper methods to estimate market value. But appraisers using these methods may come to different conclusions about a property's market value. In these situations state law allows property owners to appeal the assessor's estimate of market value to the county and state boards of equalization as well as the court system.

Are there any exceptions to assessing at market value?

Yes. The state constitution authorizes, and current law provides, that the true and fair value of farm and agricultural land, forest lands, and open space lands may be based on their current use rather than their market value.

Why check on appraisal performance?

Property taxes are allocated to property owners in proportion to the value of their property. Uniform and accurate assessments are the foundation of fair property taxation. This principle is established in the Washington Constitution. Article VII, Section 1 states that: "All taxes shall be uniform upon the same class of property within the territorial limits of the authority levying the tax..."

What method is used to measure appraisal performance?

This report uses the ratio study method to measure appraisal performance. A ratio study is a statistical analysis that compares the assessed value established by the assessor's office with the market value of the property. It is called a ratio study because the assessed value is divided by the market value and the resulting ratio is used for evaluation. In ratio studies, market value is generally established by observing the price for which a property sells in the open market.

Where do the data come from for a ratio study?

The assessed values are set as of January 1 of each year. Property sales that occur between August 1 and March 31 provide market sales information used in the analysis. In addition, where insufficient sales occur, the Department of Revenue does appraisals independent of the county assessor's valuation. These sales and appraisals are compared to the assessed values established by the assessor's office.

What is considered good appraisal performance?

Mass appraisal systems are generally judged on the basis of the level of assessment and the uniformity of assessment. Level of assessment refers to how close assessed values are to the legally required assessment standard. Uniformity of assessment refers to how closely different properties are assessed in relation to each other.

Other than requiring assessment at 100 percent of market value, Washington has not established appraisal performance standards in state law or by administrative rule. However, the International Association of Assessing Officers (IAAO) suggests performance standards for the level of assessments and the uniformity of assessments. This report uses IAAO standards as benchmarks to evaluate Washington's performance.

What are the assessment performance standards?

There are a number of statistics used by IAAO to judge assessment performance. The two most important are discussed in this preface (see the full report for a discussion of others).

For level of assessment the IAAO suggests looking at the median ratio. As stated above, the ratio for a property is the assessed value divided by the market value. If the assessed value is greater than the market value, the ratio is greater than one. If the assessed value is less than the market value, then the ratio is less than one. When the ratios for all the properties are arrayed from the smallest to the largest, the ratio in the middle is the median ratio. The IAAO standard requires the median ratio to fall in the range of 0.90 and 1.10.

For uniformity of assessment the IAAO looks at a statistic called the coefficient of dispersion (COD). It measures, on average, how far each property's ratio deviates from the median ratio. It is expressed as a percentage of the median. A smaller COD indicates more uniform assessment. Residential property should have a COD of less than 15 percent and nonresidential property 20 percent or less.

How well did Washington do?

For assessment year 2007, on a statewide basis, Washington did not satisfy the IAAO standards for median ratio (statewide median ratio = 0.89). The state did meet standards for the coefficient of dispersion for residential property (COD = 14 percent) but not for nonresidential property (COD = 24 percent).

At the county level, 16 counties had median ratios within the IAAO standard of 0.90 to 1.10. Twenty-three counties were not within the IAAO standard.

Sixteen counties had a residential property coefficient of dispersion of less than 15 percent and met the IAAO standard. Twenty-two counties had coefficients of dispersion for residential properties greater than 15 percent. Data by class of property is not available for Garfield County.

Twenty counties were within the IAAO suggested coefficient of dispersion for nonresidential property of 20 percent or less while eighteen counties failed to reach this standard. Data by class of property is not available for Garfield County.

For more information, see Summary of Findings (page 3) and Table 1 (page 4).

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This report is an evaluation of assessment practices in the Washington property tax system. The report is based on 2007 assessment year data and only covers real property. It is a continuation of similar reports covering each assessment year from 1997 to 2006.

Property Tax Assessment Performance

Assessment systems are generally judged on the basis of the level of assessment and the uniformity of assessment.

Level of assessment refers to how close assessed values are to the legally required assessment standard. Washington statutes specify the assessment standard for the property tax system. Except for farm, forest, and other open space lands, the standard of assessment is 100 percent of market value.

Uniformity of assessment refers to how close the assessments are in relation to each other. Uniformity is important because property taxes are distributed in proportion to assessed value. If there is a low degree of uniformity, then some properties are paying more than their appropriate share of property taxes while other properties with similar market values are paying less than their appropriate share.

Ratio Study Method

This report uses the ratio study method to determine the level of assessments and uniformity of assessments. The ratio study is the most common evaluation method used for mass appraisal performance. A ratio study compares the assessed value established by the assessment authority with the market value of the property. It is called a ratio study because the assessed value is divided by the market value and the resulting ratio is used for evaluation. Market value is generally established by observing the price for which a property sells in the open market.

When the assessed value is greater than the market value, the ratio is greater than one. When the assessed value is less than the market value, the ratio is less than one. Properties with ratios greater than one are over-assessed and properties with ratios less than one are under-assessed. In practice, average or median assessment ratios are typically less than one. For example, the median assessment ratio for Washington State in 2007 was 0.89. This means that half the properties had a ratio of assessed value to market value greater than 0.89 and half the properties had a ratio of assessed value to market value less than 0.89.

Why is the Ratio Important?

To illustrate the importance of the ratio, consider an example of two properties with a market value of $200,000. Assume one property is assessed at 90 percent of market value ($180,000) and the other at 110 percent of market value ($220,000). At the state average tax rate of $10.48, the first property has a tax bill of $1,886 and the second property has a tax bill of $2,306 -- a 20 percent difference.

Standards of Review

Other than requiring assessment at 100 percent of market value, Washington has not established appraisal performance standards in state law or by administrative rule. However, the International Association of Assessing Officers (IAAO) publishes a standard on ratio studies. The IAAO Standard on Ratio Studies[1] suggests performance standards for the level of assessments and the uniformity of assessments. The IAAO standards are advisory and compliance is voluntary. This report uses IAAO standards as benchmarks to evaluate Washington's performance.

[1]Standard on Ratio Studies, International Association of Assessing Officers, July 1999

Summary of Findings

Level of Assessment

The IAAO standard suggests that the level of assessment be evaluated by using the median assessment ratio for each jurisdiction being reviewed. The IAAO standard states that the median ratio should be between 0.90 and 1.10.

When evaluating residential and nonresidential property together, 16 counties are within the IAAO standard for overall county assessment level. Twenty-three counties are not within IAAO standards.

Separate data is available for residential and nonresidential property for 38 counties. For residential property, 17 counties are within IAAO standards for the assessment level and 21 are not. For nonresidential property, 16 counties are within IAAO standards for the assessment level, and 22 are not.

Uniformity of Assessments

The IAAO standard suggests that median ratios for residential and nonresidential properties fall within 5 percent of the median ratio for all properties. Thirty-seven counties with data by use classification satisfy this test for residential property, one does not. For nonresidential property three counties do not meet the test.

The coefficient of dispersion (COD) is the most commonly used measure of appraisal uniformity. It measures, on average, how far each property's ratio is away from the median ratio. It is expressed as a percentage of the median. A smaller COD indicates more uniform assessment.

The IAAO standard suggests that residential properties have a coefficient of dispersion less than 15 percent. Sixteen counties meet this standard. Twenty-two counties have coefficients of dispersion for residential properties greater than 15 percent. The IAAO suggested coefficient of dispersion for nonresidential property is 20 percent or less. Twenty counties are within this standard while eighteen counties fail to reach this standard.

Another aspect of assessment uniformity is the treatment of properties of different values. The price-related differential is a statistic used to measure whether high-value properties and low-value properties are assessed at the same ratio to market value. The IAAO Standard on Ratio Studies suggests that the price-related differential should fall between 0.98 and 1.03. Twenty-seven counties have price-related differentials within this range. Twelve counties do not meet this standard.

Table 1 summarizes the results.

Table 1

Measuring Real Property Appraisal Performance
2007

	Level of Assessment			Uniformity of Assessment				
County	**Overall County Assessment Ratio between 0.90 to 1.10**	**Residential Property Assessment Ratio between 0.90 to 1.10**	**Nonresidential Property Assessment Ratio between 0.90 to 1.10**	**Residential Property within 5% of county median**	**Nonresidential Property within 5% of county median**	**Coefficient of Dispersion for Residential Property below 15%**	**Coefficient of Dispersion for Nonresidential Property below 20%**	**Price Related Differential between 0.98 and 1.03**
Adams	X	X	X	X	X		X	
Asotin			X	X			X	X
Benton	X	X	X	X	X	X	X	X
Chelan				X	X			X
Clallam				X		X		X
Clark	X	X	X	X	X	X	X	X
Columbia	X	X	X	X	X	X	X	X
Cowlitz				X	X			X
Douglas				X	X		X	X
Ferry	X	X	X	X	X			
Franklin	X	X		X	X	X		X
Garfield	X	*	*	*	*	*	*	X
Grant				X	X			
Grays Harbor				X	X			X
Island	X	X	X	X	X	X	X	X
Jefferson	X	X	X	X	X	X	X	X
King				X	X	X	X	X
Kitsap				X	X	X		X
Kittitas				X	X			X
Klickitat				X	X			
Lewis				X	X			X
Lincoln	X	X		X	X	X	X	
Mason				X	X			
Okanogan		X		X	X			
Pacific				X	X			
Pend Oreille				X	X			
Pierce				X	X	X	X	X
San Juan	X	X	X	X	X		X	X
Skagit	X	X	X	X	X		X	X
Skamania				X	X		X	X
Snohomish	X	X	X	X	X	X	X	X
Spokane	X	X	X	X	X	X	X	X
Stevens				X	X			
Thurston	X	X	X	X	X	X	X	X
Wahkiakum	X	X	X	X	X		X	
Walla Walla		X						X
Whatcom				X	X			
Whitman			X	X	X	X	X	X
Yakima			X	X	X	X	X	X
	16	17	16	37	35	16	20	27

* Residential v. Nonresidential data not available for Garfield County.

A county is assumed to satisfy the IAAO standard for level of assessment unless there is a smaller than 5% chance that the county satisfies the standard.

DETAILED FINDINGS

Level of Assessment

According to the IAAO Standard on Ratio Studies, the median is the appropriate measure of central tendency for monitoring appraisal performance. The IAAO standard states that the median ratio for all assessments in a jurisdiction (the overall level of assessment) should be between 0.90 and 1.10.

The median ratio for the state is 0.89. This means that half the properties have a ratio of assessed value to market value greater than 0.89 and half the properties have a ratio of assessed value to market value less than 0.89. This is not within the IAAO standard of 0.90 to 1.10.

Assessment Level By County

The median ratio by county is shown in Chart 1. The median ratios range from 0.52 in Pend Oreille County to 0.98 in Adams and Island Counties. Twenty-six counties have median ratios below 0.90. The remaining (13) have ratios between 0.90 and 1.00.

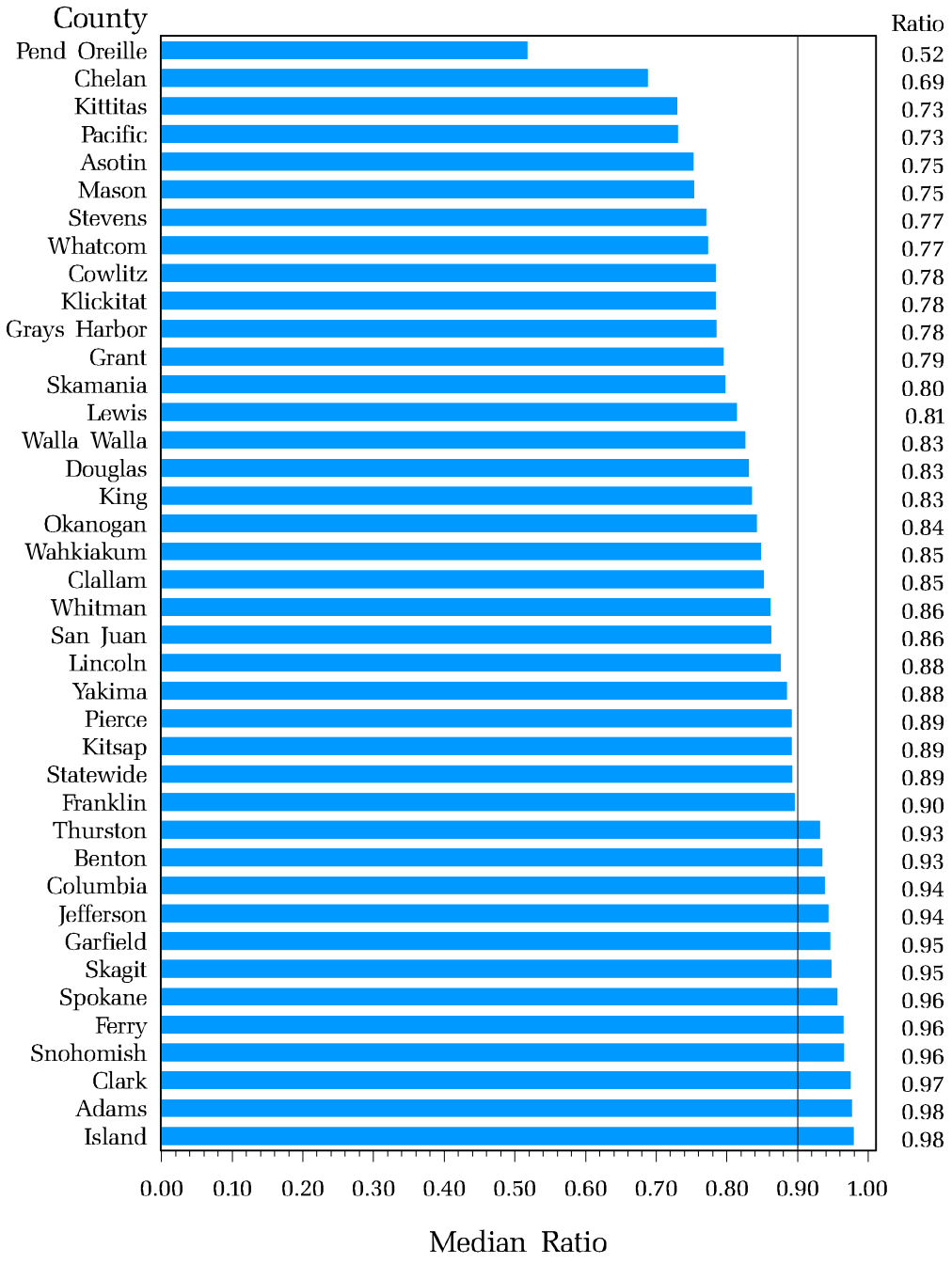
Since this study is based on a sample and not the universe of properties, it is not possible to say with certainty that the study's median ratio estimate is the same as the true median ratio for a county. In other words, there is some probability that the true median ratio for all properties in a county would be at least 0.90, even if the study estimate was less than 0.90. For the 26 counties with estimated ratios below 0.90, a standard statistical test (the binomial test) was performed to determine the chance that the true median ratio was 0.90 or greater. This test indicates that the true median ratio is indeed almost certainly less than 0.90 for Asotin, Chelan, Clallam, Cowlitz, Douglas, Grant, Grays Harbor, King, Kitsap, Kittitas, Klickitat, Lewis, Mason, Okanogan, Pacific, Pend Oreille, Pierce, Skamania, Stevens, Walla Walla, Whatcom, Whitman and Yakima Counties. The likelihood is less than 5 percent that the true median is greater than 0.90 for these counties. Lincoln, San Juan and Wahkiakum Counties have a median ratio below 0.90 but the statistical test indicates there is some possibility (Prob > 5 percent) that the true median ratio may be at least 0.90 and therefore within the IAAO standards. Therefore, it appears that 16 counties satisfy the IAAO standard for the assessment level and 23 do not.

CHART 1

2007 Median Ratio

Ratio of Assessed Value to Sales Value

The median ratio should be between 0.90 and 1.10



Level of Assessment

Assessment Level By Major Class of Property

The IAAO standard states that assessment ratios for each major class of property should be between 0.90 and 1.10. Data is available by land use classification for all counties except Garfield. Based on this information the data was divided between residential and nonresidential property. The median ratio was calculated for each class. On a statewide basis, the median ratio for residential property was 0.9 and the median ratio for nonresidential property was 0.86.

The median ratios for residential and nonresidential property by county are listed on Chart 2 and Chart 3. The ratio for residential property ranges from a low of 0.57 in Pend Oreille County to a high of 0.98 in Adams, Clark, Columbia and Island Counties. The median ratio for nonresidential property ranges from a low of 0.47 in Pend Oreille County to a high of 0.97 in Ferry County.

Twenty-four counties have sample residential median ratios below the IAAO suggested standard of 0.90. The binomial test supports the hypothesis that the residential median ratio is less than 0.90 for 21 Counties (Asotin, Chelan, Clallam, Cowlitz, Douglas, Grant, Grays Harbor, King, Kitsap, Kittitas, Klickitat, Lewis, Mason, Pacific, Pend Oreille, Pierce, Skamania, Stevens, Whatcom, Whitman and Yakima). Okanogan, San Juan and Wahkiakum Counties have residential median ratios below 0.90 but the statistical test indicates there is some possibility (Prob > 5 percent) that the true residential median ratio may be at least 0.90 and therefore within the IAAO standards.

Twenty-six counties have sample nonresidential median ratios below the IAAO standard of 0.90 (Chelan, Clallam, Columbia, Cowlitz, Douglas, Franklin, Grant, Grays Harbor, King, Kitsap, Kittitas, Klickitat, Lewis, Lincoln, Mason, Okanogan, Pacific, Pend Oreille, Pierce, San Juan, Skamania, Stevens, Thurston, Walla Walla, Whatcom and Yakima Counties). The binomial test supports the conclusion that all but Columbia, San Juan, Thurston and Yakima Counties have median ratios for nonresidential property less than 0.90.

In summary, 17 counties satisfy the IAAO standard for the assessment level of residential property, 21 do not. Sixteen counties satisfy the IAAO standard for the assessment level of nonresidential property, and twenty-two do not.

CHART 2

2007 Median Ratio for Residential Property

Ratio of Assessed Value to Sales Value

The median ratio should be between 0.90 and 1.10

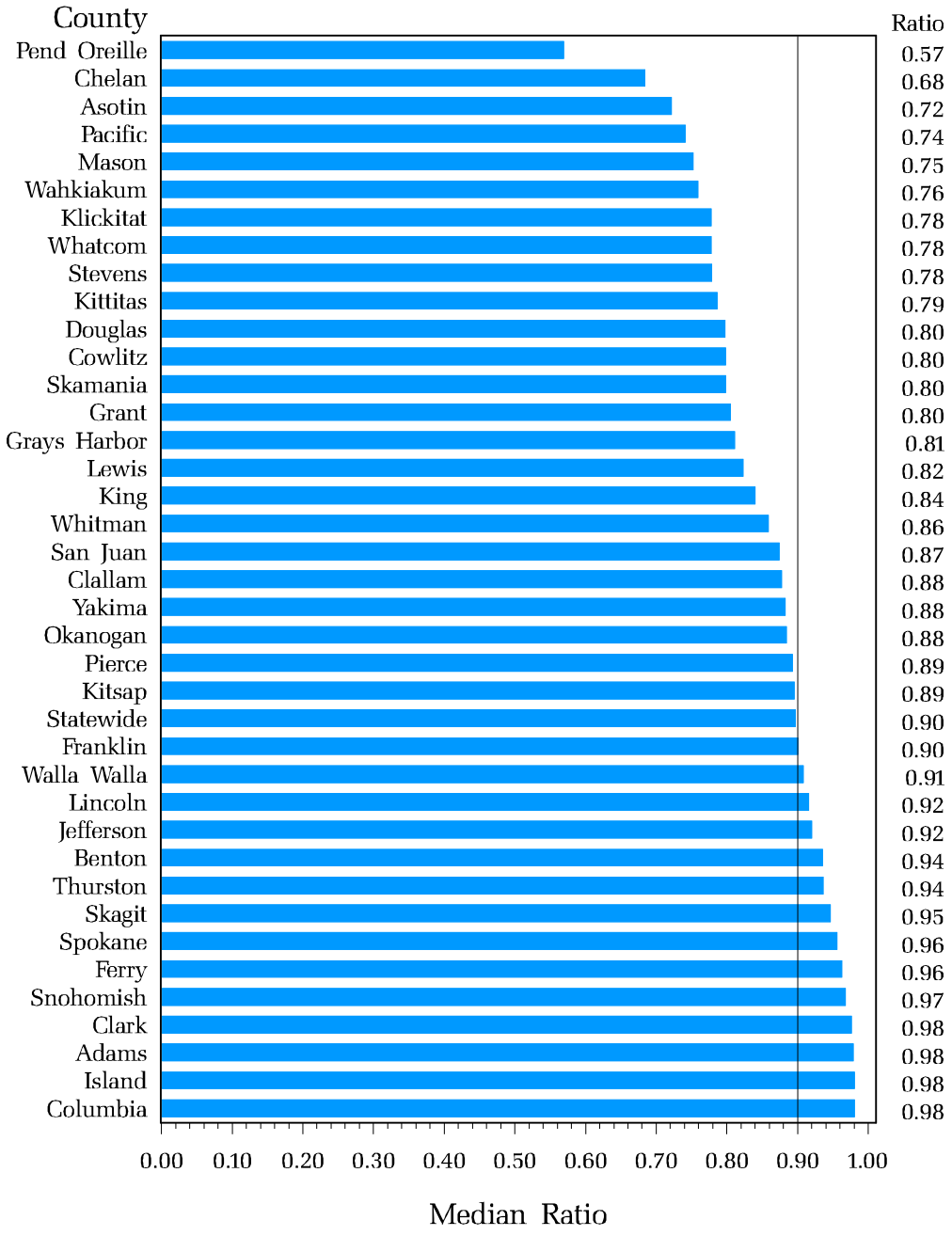
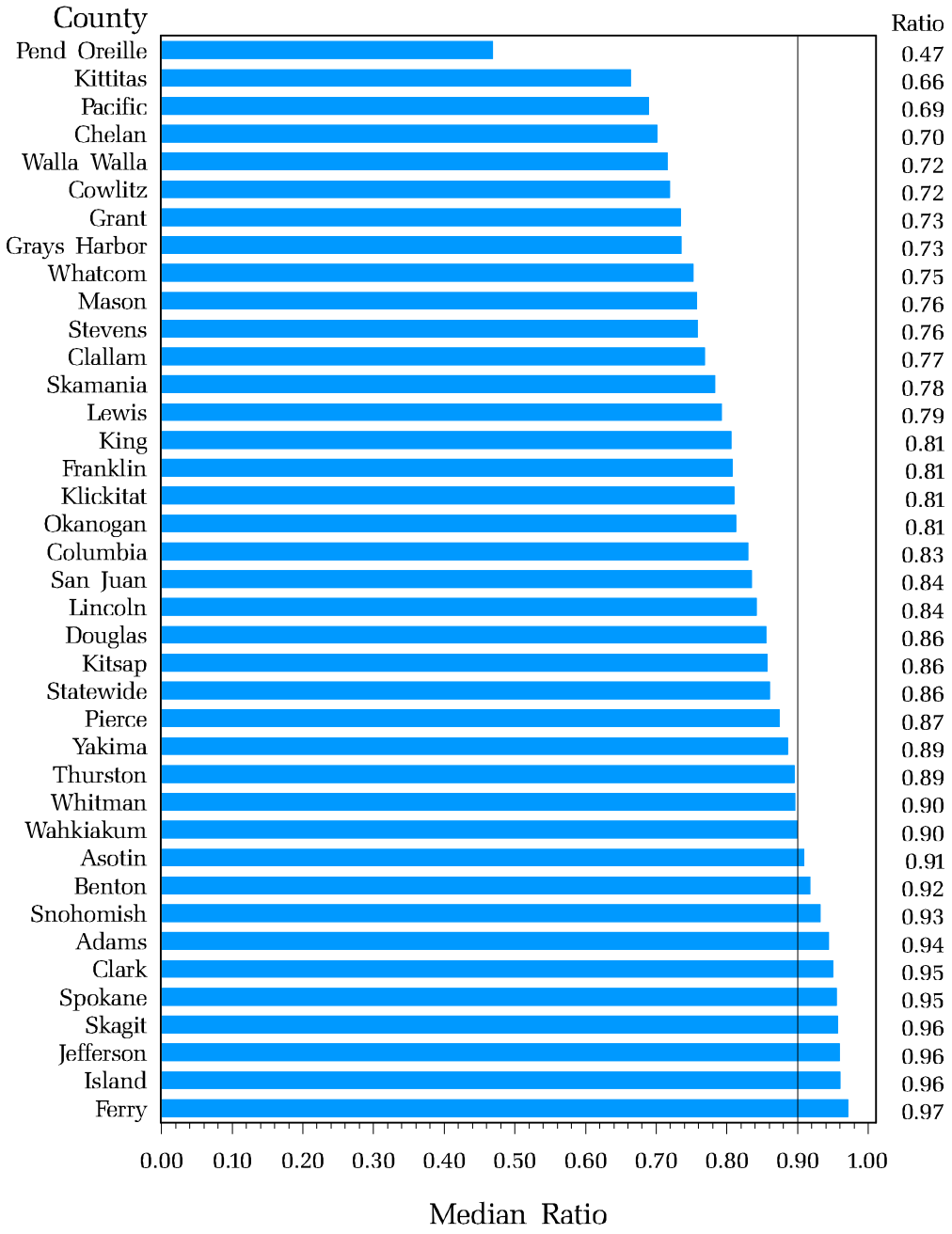


CHART 3

2007 Median Ratio for Nonresidential Property

Ratio of Assessed Value to Sales Value

The median ratio should be between 0.90 and 1.10



Uniformity of Assessments

This report looks at the uniformity of assessments in three ways. First, the median ratio for residential property and the median ratio for nonresidential property are compared to the overall median ratio for the county. The IAAO standard recommends that the ratio for each class of property be within 5 percent of the overall level of assessment for the county.

The second test of uniformity measures the spread of the ratios of assessed value to market value. This report uses three methods to describe this spread: the coefficient of concentration, the median percentage deviation, and the coefficient of dispersion. The definitions of these statistics will be explained in the sections below. The IAAO Standard on Ratio Studies does not contain suggested performance standards for the median percentage deviation or the coefficient of concentration. They are included in this report because they provide useful illustrations of uniformity. The IAAO performance standard for the coefficient of dispersion (the average deviation from the median expressed as a percent of the median) is less than 15 percent for residential properties and 20 percent or less for income properties.

The third test of uniformity measures vertical equity in assessments. Vertical equity refers to the consistency at which lower valued properties are assessed compared to higher valued properties. For a graphical view of vertical equity, the data is sorted from the lowest market value property to the highest market value property. The data is then divided into four equal groups. The median ratio is calculated for each group and graphed (See Chart 9). The IAAO standard suggests a statistic called the price-related differential (explained on page 27) be used to measure vertical equity. The price-related differential is calculated and compared to the IAAO standard.

Uniformity by Major Class of Property

Chart 4 shows the percentage difference between the countywide median ratio and the median ratios for residential and nonresidential properties for each county. Of the 38 counties with data available for residential and nonresidential property, four counties (Kittitas, Pend Oreille, Wahkiakum and Walla Walla Counties) have a sample residential median property ratio that is not within 5 percent of the county median ratio. After performing the binomial test only Walla Walla County does not seem to fall within the IAAO standard.

Twelve counties (Asotin, Clallam, Columbia, Cowlitz, Franklin, Grant, Grays Harbor, Kittitas, Pacific, Pend Oreille, Wahkiakum and Walla Walla) have sample nonresidential median property ratios that are not within 5 percent of the county median ratio. The percent difference is close enough to 5 percent to conclude after performing the binomial test that Columbia, Cowlitz, Franklin, Grant, Grays Harbor, Kittitas, Pacific, Pend Oreille and Wahkiakum Counties fall within the IAAO standard. However, Asotin, Clallam and Walla Walla Counties do not meet the standard.

On this basis, 35 of the 38 counties with data available for residential and nonresidential property meet the IAAO standard for having median ratios for nonresidential property within 5 percent of the countywide median ratio. And 37 counties met the IAAO standard for having median ratios for residential property within 5 percent of the countywide median ratio.

CHART 4

2007

Percent Difference between Residential and Nonresidential Median Ratios and the County Median Ratio

The difference should be within 5 percent of countywide median ratio

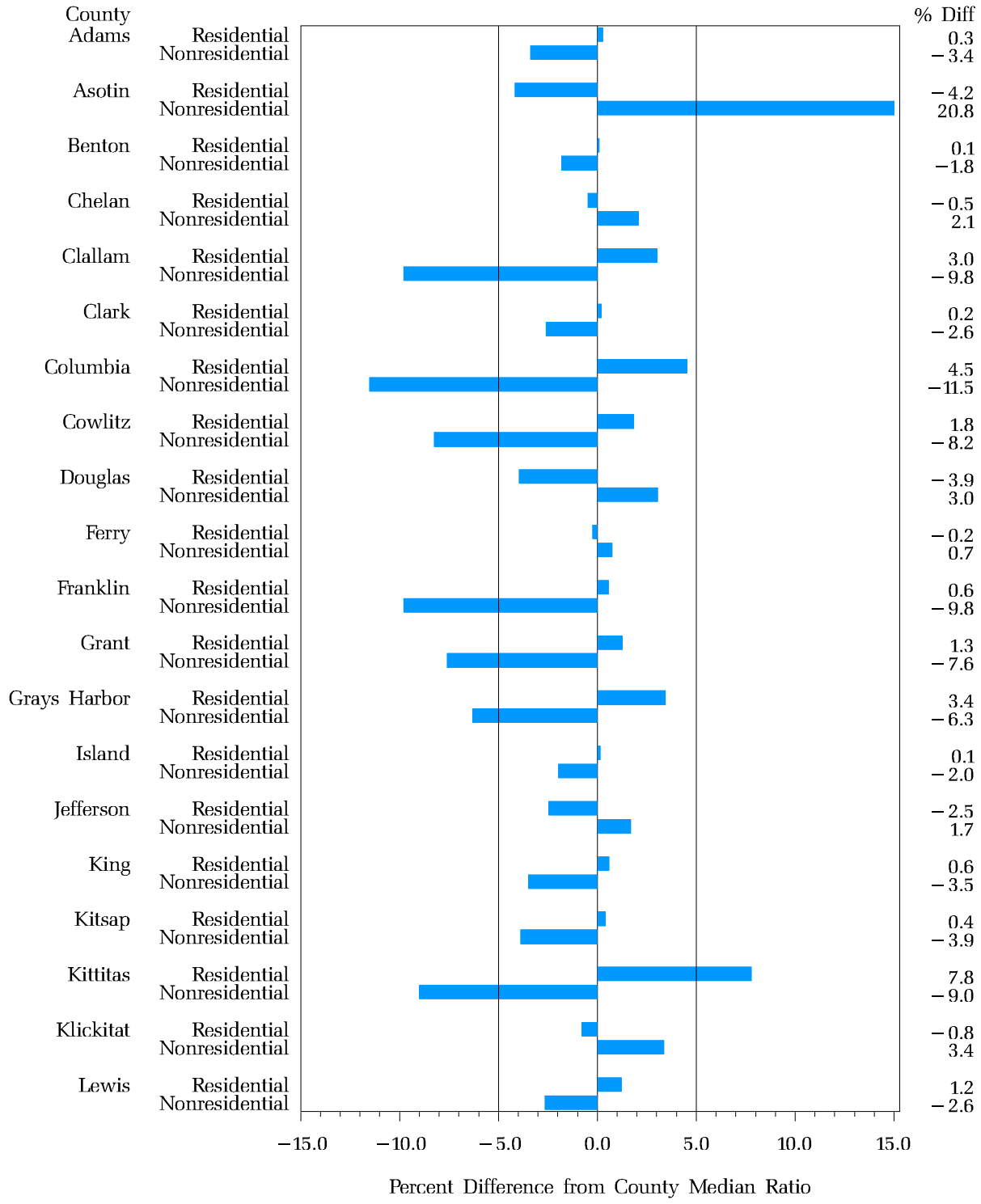
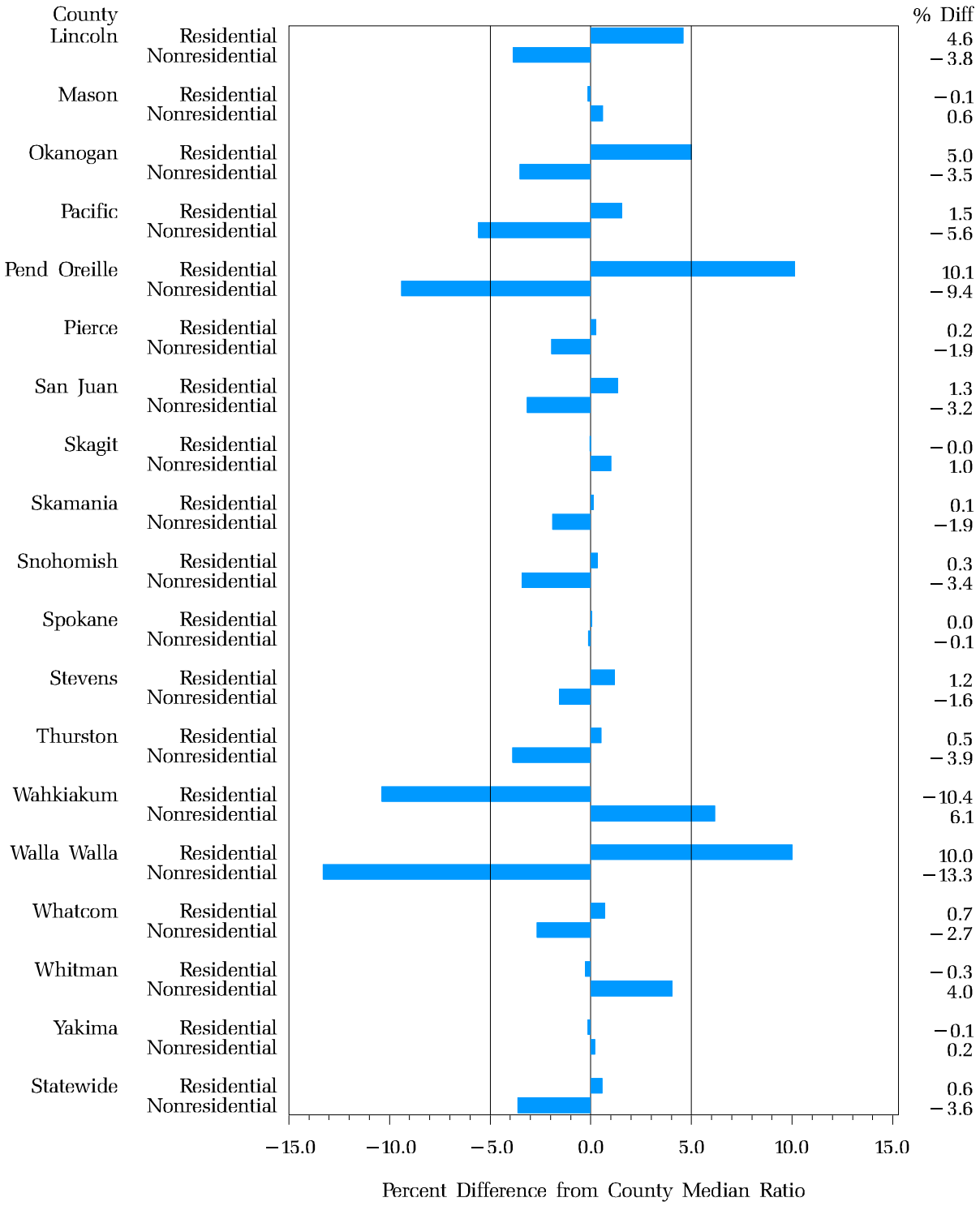


CHART 4 (Continued)

2007

Percent Difference between Residential and Nonresidential Median Ratios and County Median Ratio

The difference should be within 5 percent of countywide median ratio



Uniformity of Assessments

Coefficient of Concentration

Each property in the assessment jurisdiction is assessed at a different ratio to market value. As explained above, half the properties have a ratio greater than the median ratio and half the properties have a ratio below the median ratio. If the ratios for properties that are above and below the median are close to the median ratio, then one can conclude that the assessments are uniform. If they are not close, then the assessments are not uniform.

The coefficient of concentration measures the percentage of properties with ratios that fall close to the median ratio. To illustrate the spread of assessments, the percentage of properties that fall between 15 percent below the median ratio and 15 percent above the median ratio is calculated. A large coefficient of concentration means that most properties are assessed close to the median.

Chart 5 shows the results of this calculation. The coefficient of concentration for the state is 65 percent. This means that 65 percent of the properties have ratios of assessed to market value within plus or minus 15 percent of the statewide median ratio.

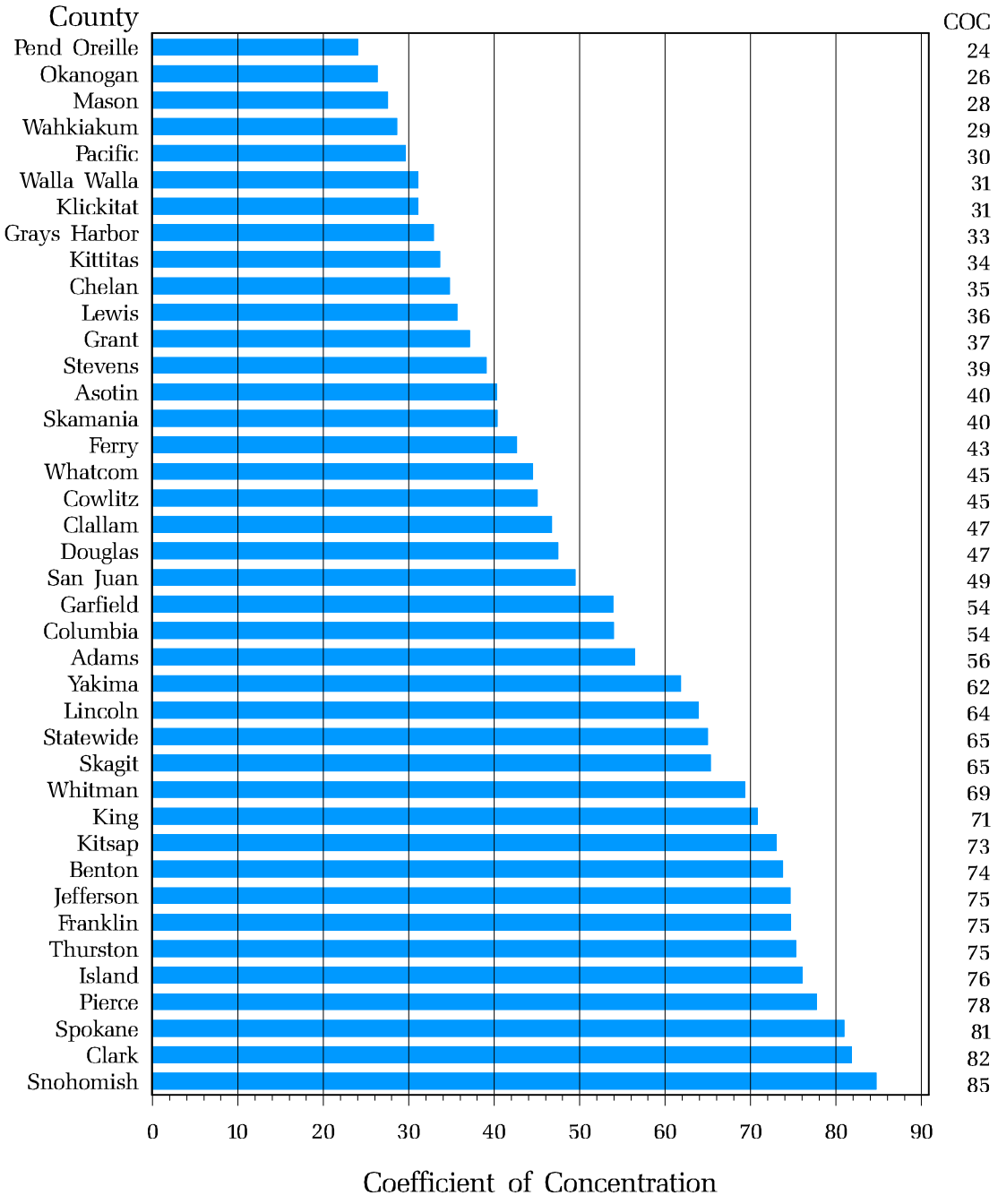
The coefficient of concentration is also calculated for each county. Each county's coefficient is calculated in relation to the county's median ratio. These coefficients range from a low of 24 percent in Pend Oreille County to a high of 85 percent in Snohomish County.

CHART 5

2007 Coefficient of Concentration

Percent of Properties with Ratios within 15 percent of Median Ratio

Large COC values indicate more properties are within 15% of median



Uniformity of Assessments

Median Percentage Deviation

The median percentage deviation is another measurement of how close properties are assessed to one another. It is calculated by first taking the difference between the ratio for each property and the median ratio (ignoring the positive and negative signs); this difference is called the "deviation." The median deviation is the amount for which half the properties have a smaller deviation and half have a larger deviation. Dividing this "typical" deviation by the median ratio expresses the result as a percent. The smaller the median percentage deviation, the closer the assessments of properties are to one another.

The median percentage deviation for the state is 11 percent. One way of interpreting this number is that the "typical" property is assessed at a ratio to market value that is different from the state median property by 11 percent.

Chart 6 shows the median percentage deviation for real properties within each county. The median percentage deviation ranges from a low of 5 percent in Snohomish and Spokane Counties to a high of 34 percent in Pend Oreille County.

On a statewide basis the median percentage deviation for residential property is 10 percent and for nonresidential property is 17 percent. Chart 7 shows the results for residential and nonresidential property by county. Generally the median percentage deviation is greater for nonresidential property. For residential property the median percentage deviation ranges from a low of 4 percent in Snohomish County to a high of 24 percent in Chelan, Pacific and Pend Oreille Counties. The lowest median percentage deviation for nonresidential property is 5 percent in Jeffereson County, and the highest is 37 percent in Pend Oreille County.

CHART 6

2007 Median Percentage Deviation

The smaller the MPD the closer properties are assessed to each other

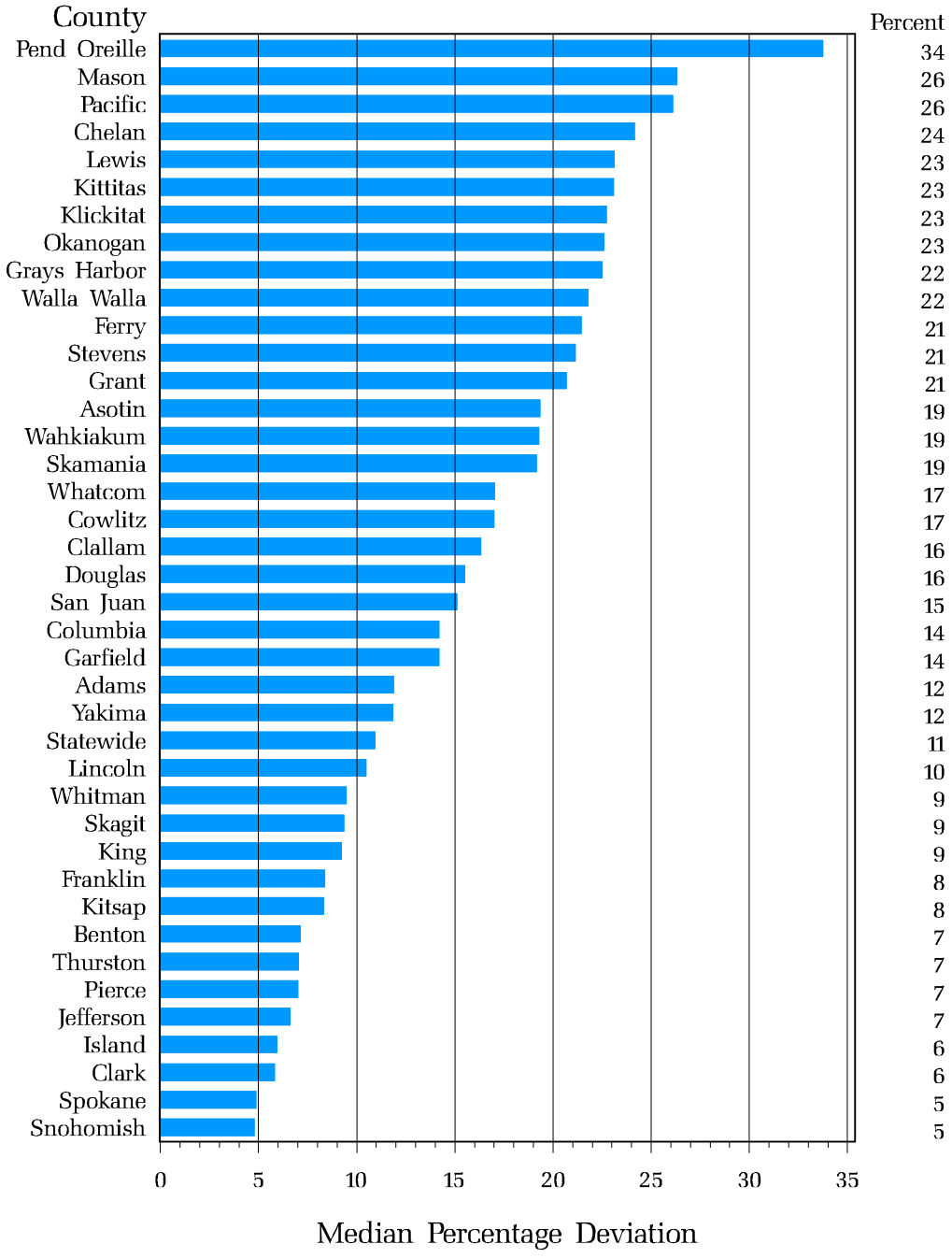


CHART 7

2007 Median Percentage Deviation

The smaller the MPD the closer properties are assessed to each other

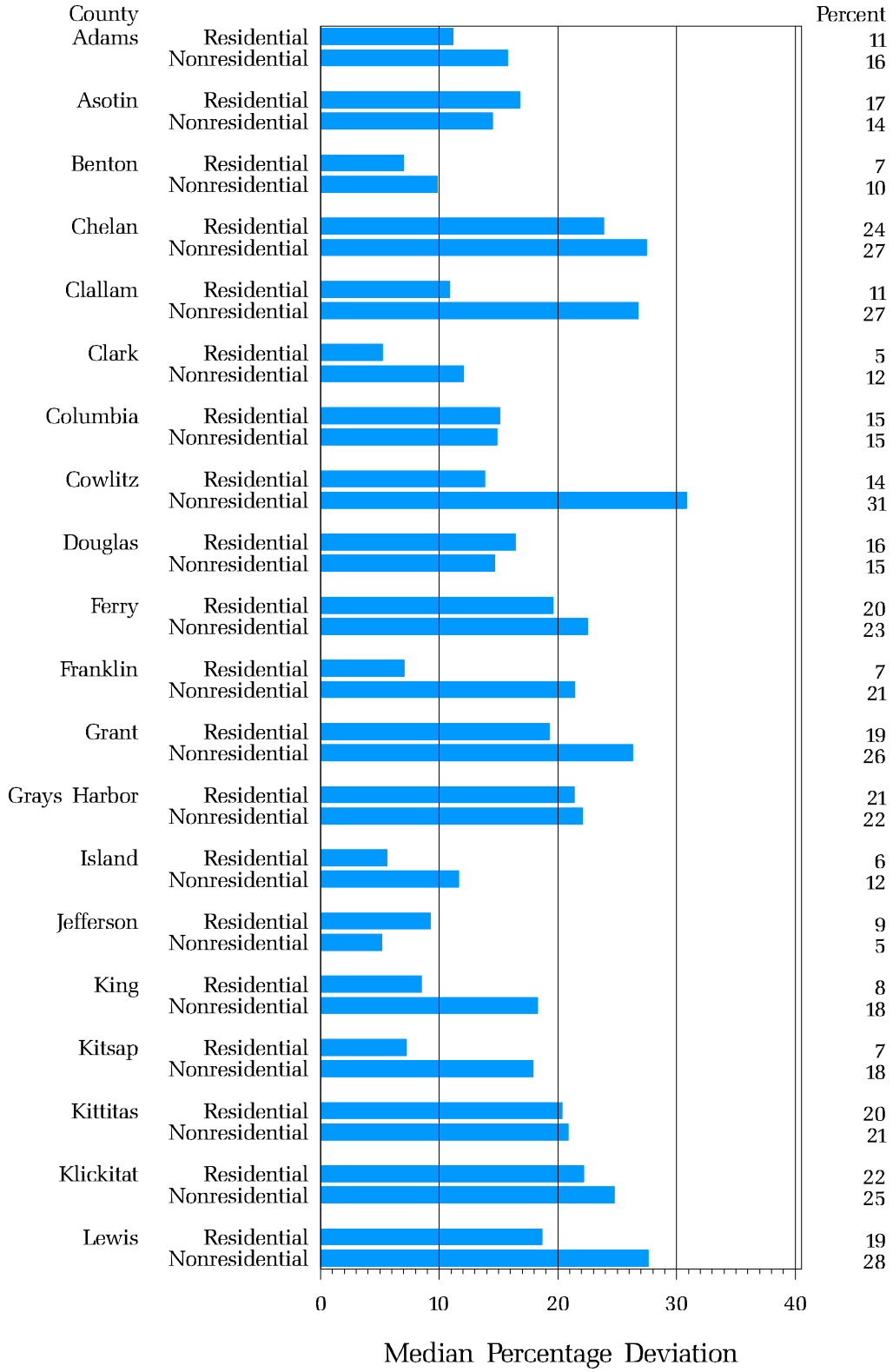
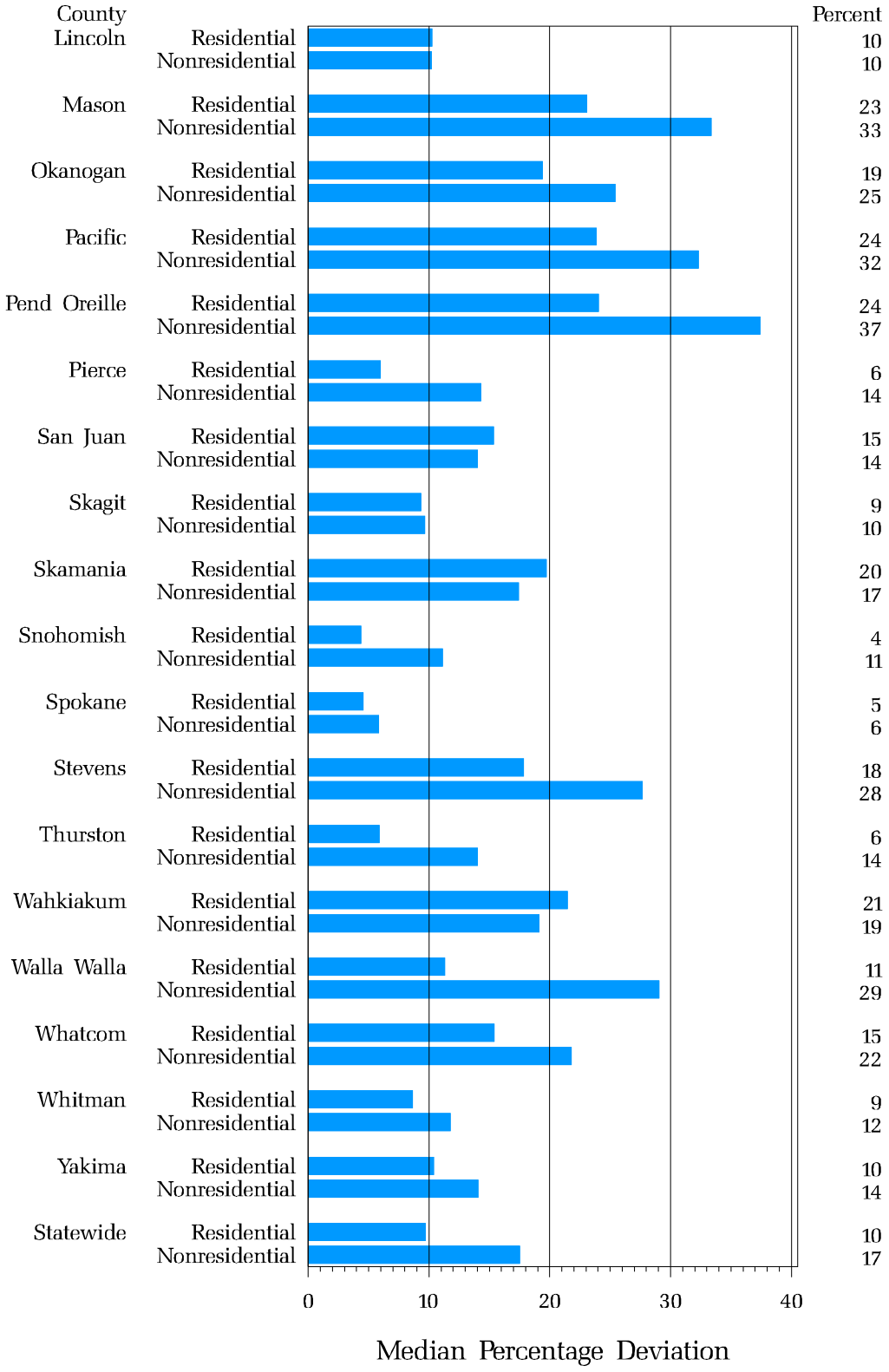


CHART 7 (Continued)

2007 Median Percentage Deviation

The smaller the MPD the closer properties are assessed to one another



Uniformity of Assessments

Coefficient of Dispersion

The IAAO Standard on Ratio Studies publishes uniformity standards using the coefficient of dispersion (COD). The COD is calculated by taking the difference between the ratio for each property and the median ratio (ignoring the positive and negative signs), adding these differences, and dividing by the number of properties. This determines the average deviation from the median. This amount is divided by the median to express the result as a percent of the median; this result is the COD. For example, a COD of 15 percent means that properties have ratios that on average deviate by 15 percent from the median ratio.

The COD and the median percentage deviation are calculated in a similar manner. However, the median percentage deviation uses the median deviation while the COD uses the average deviation. In calculating the median deviation it only matters whether a property's ratio is above or below the median. How far it is above or below the median does not matter. But when calculating the average deviation, the amount the property's ratio is above or below the median matters. Ratios that are far above or below the median have more influence than properties with ratios near the median. This means the COD will tend to be larger than the median percentage deviation.

Chart 8 shows coefficients of dispersion for residential and nonresidential properties by county. The IAAO Standard on Ratio Studies suggests that residential properties have a coefficient of dispersion less than 15 percent. Fifteen counties have CODs for residential properties less than 15 percent and twenty-three counties are above. The IAAO suggested coefficient of dispersion for nonresidential property is 20 percent or less. Seventeen counties have CODs below 20 percent and twenty-one counties are above.

Since this study is based on a sample, it is possible that some of the counties with CODs close to the IAAO standards may, with some probability, satisfy the IAAO standard. The coefficient of dispersion does not lend itself to straightforward statistical tests. However, a confidence interval for the COD can be constructed by using a repeat sampling or "bootstrap" methodology.[2] Under this methodology repeated samples are drawn from the original data and CODs are calculated for each sample. These calculated CODs are distributed from the lowest to the highest. The confidence interval is then constructed so that the lower limit of the interval is the value at which only 5 percent of the calculated CODs in the distribution are smaller. The hypothesis that the IAAO standard is met cannot be rejected if the confidence interval contains the 15 percent COD standard for residential property or 20 percent COD standard for nonresidential property.

After conducting the repeat sampling procedure it appears that Columbia County, with a nominal residential COD above 15 percent, is close enough to satisfy the IAAO standard for COD on residential property. Three counties with nominal nonresidential CODs above 20 percent (King, Skamania and Wahkiakum) have CODs close enough to 20 percent to meet the IAAO standard for COD for nonresidential property. In conclusion, 16 counties met the standard for residential property, and 20 counties met the standard for nonresidential property.

2. See Efron B., and Tibshirani R. (1993), An Introduction to the Bootstrap, Chapman and Hall.

CHART 8

2007 Coefficient of Dispersion

The COD for residential property should be below 15%
The COD for nonresidential property should be below 20%

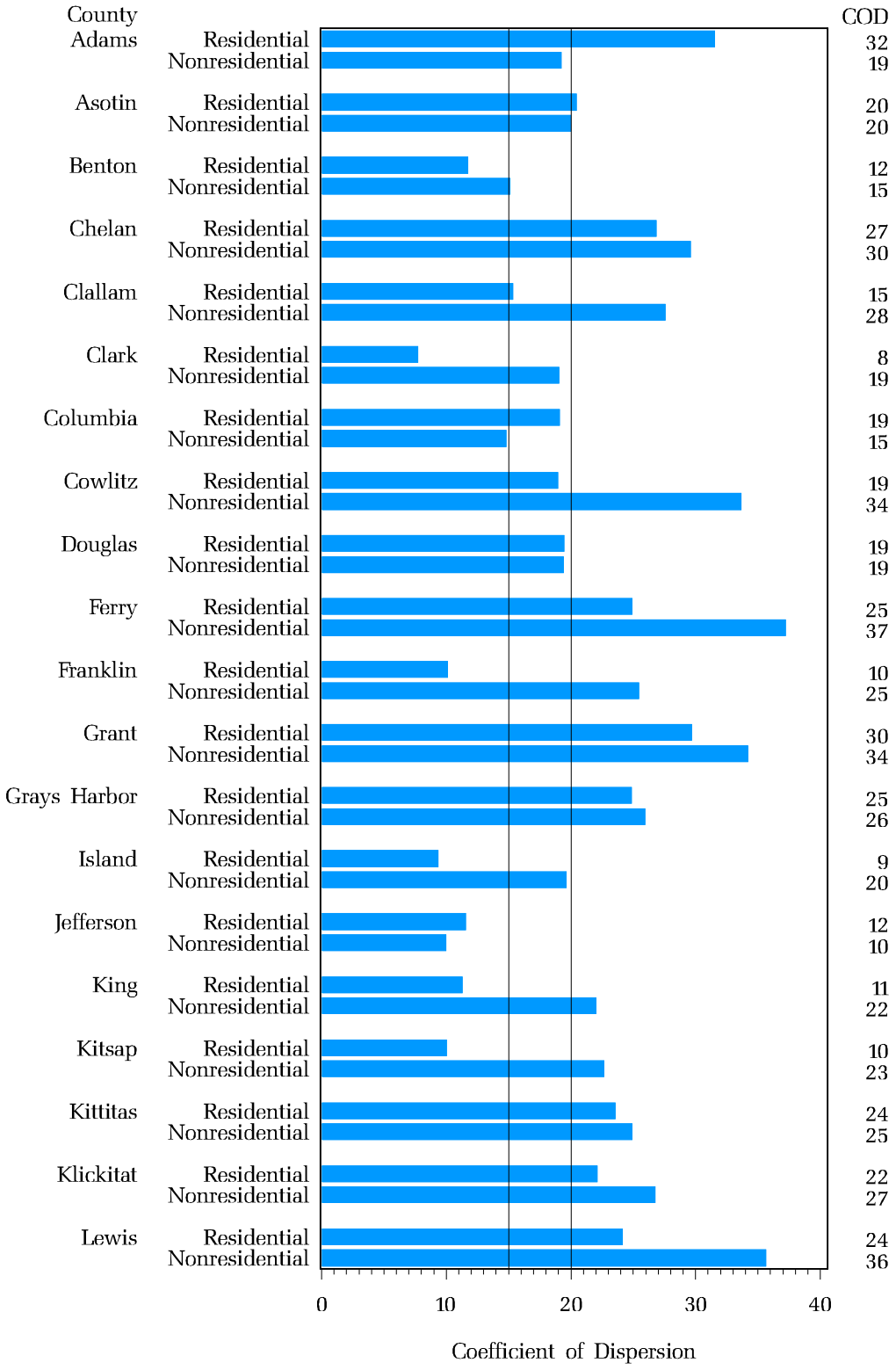
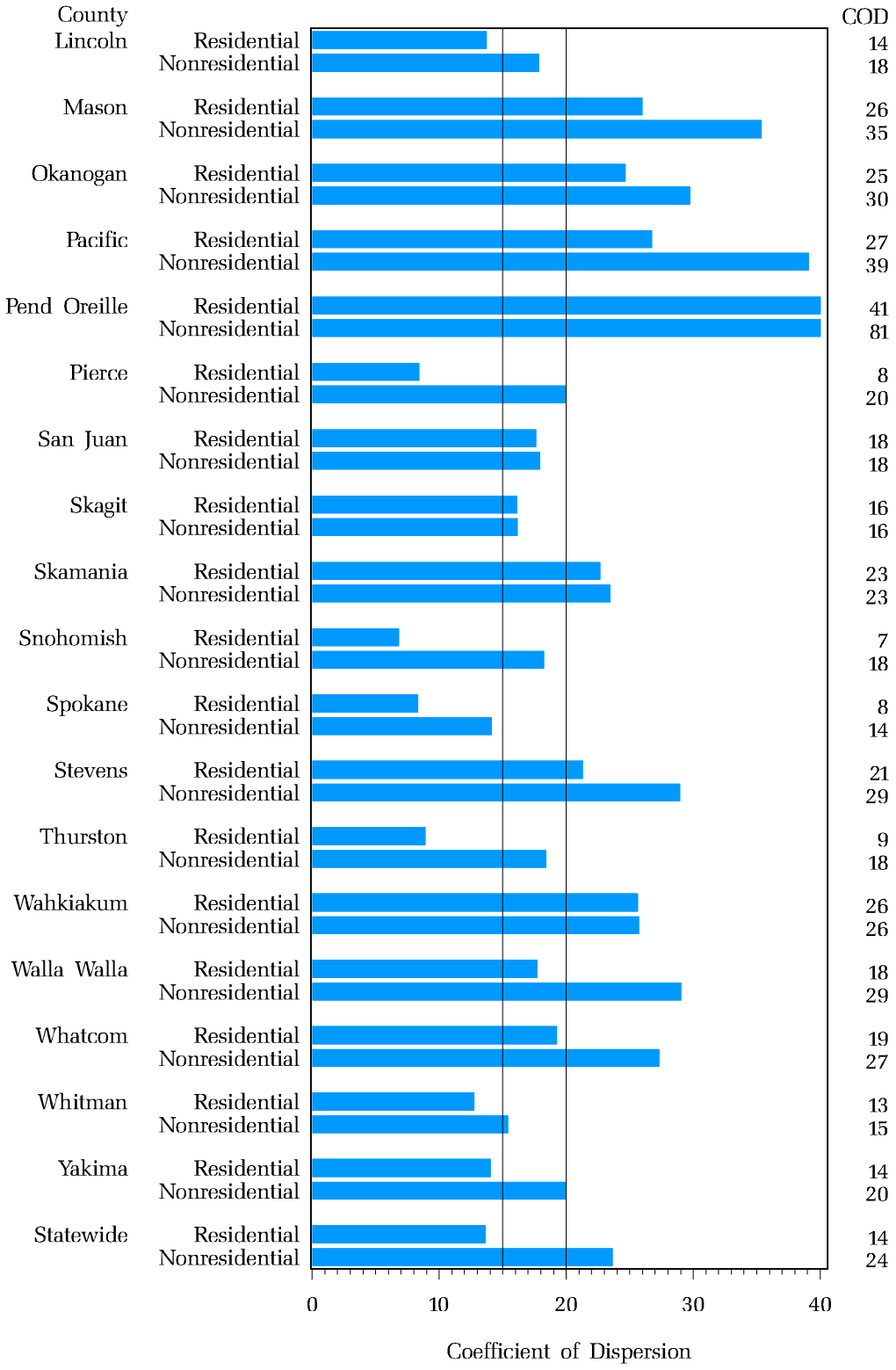


CHART 8 (Continued)

2007 Coefficient of Dispersion

The COD for residential property should be below 15%
The COD for nonresidential property should be below 20%



Uniformity of Assessments

Vertical Equity in Valuation

The next two sections look at the question of whether lower value properties and higher value properties are assessed at the same ratio to market value.

Median Ratio by Value Quartile

This section employs a graphical method to view vertical equity. The data are sorted from the lowest market value property to the highest market value property. The data are then divided into four groups of equal numbers of properties (quartiles). The median ratio is calculated for each quartile. The results are displayed in Chart 9.

CHART 9

2007

Median Ratios of
Properties divided into Sales Value Quartiles

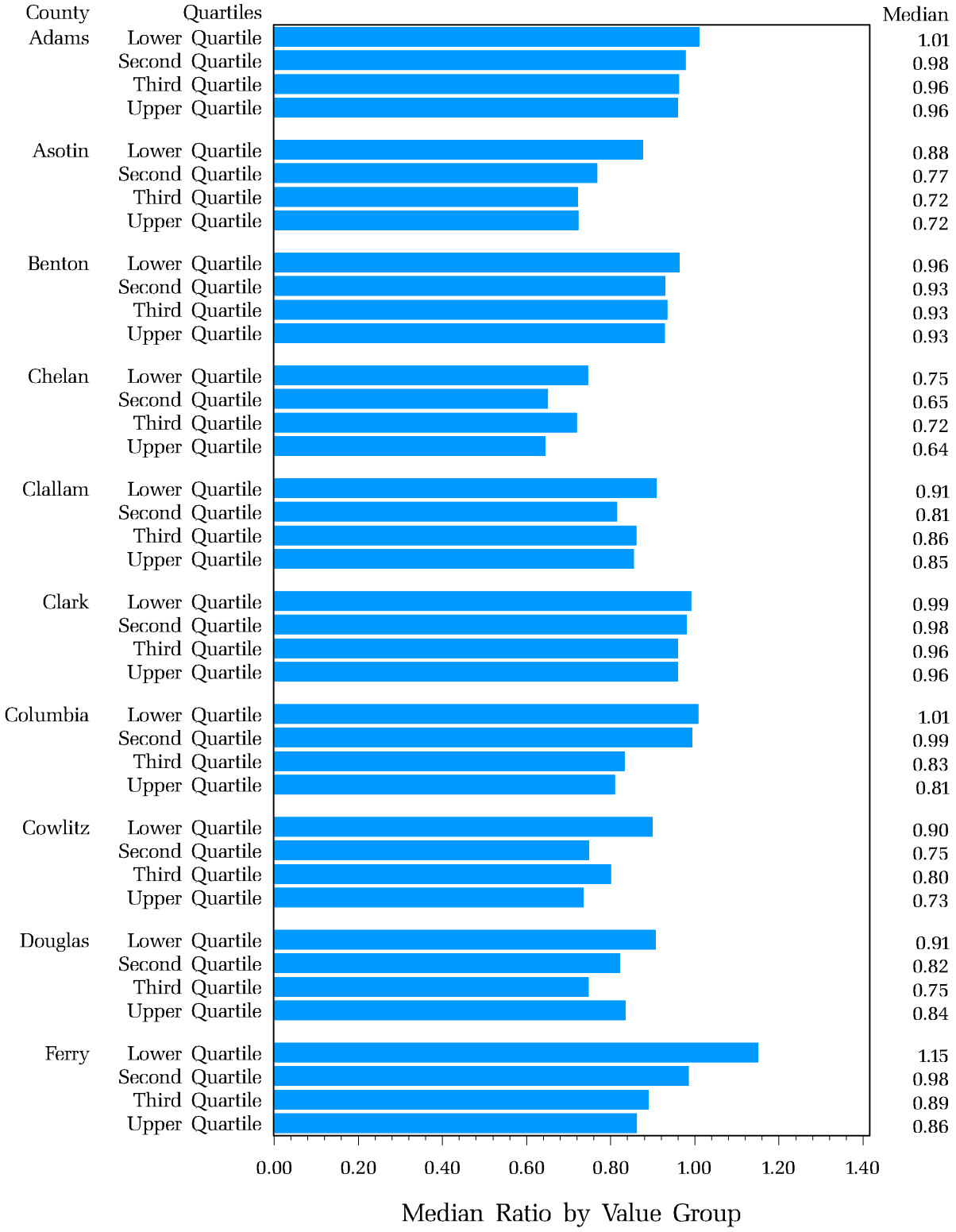


CHART 9 (continued)

2007

Median Ratios of
Properties divided into Sales Value Quartiles

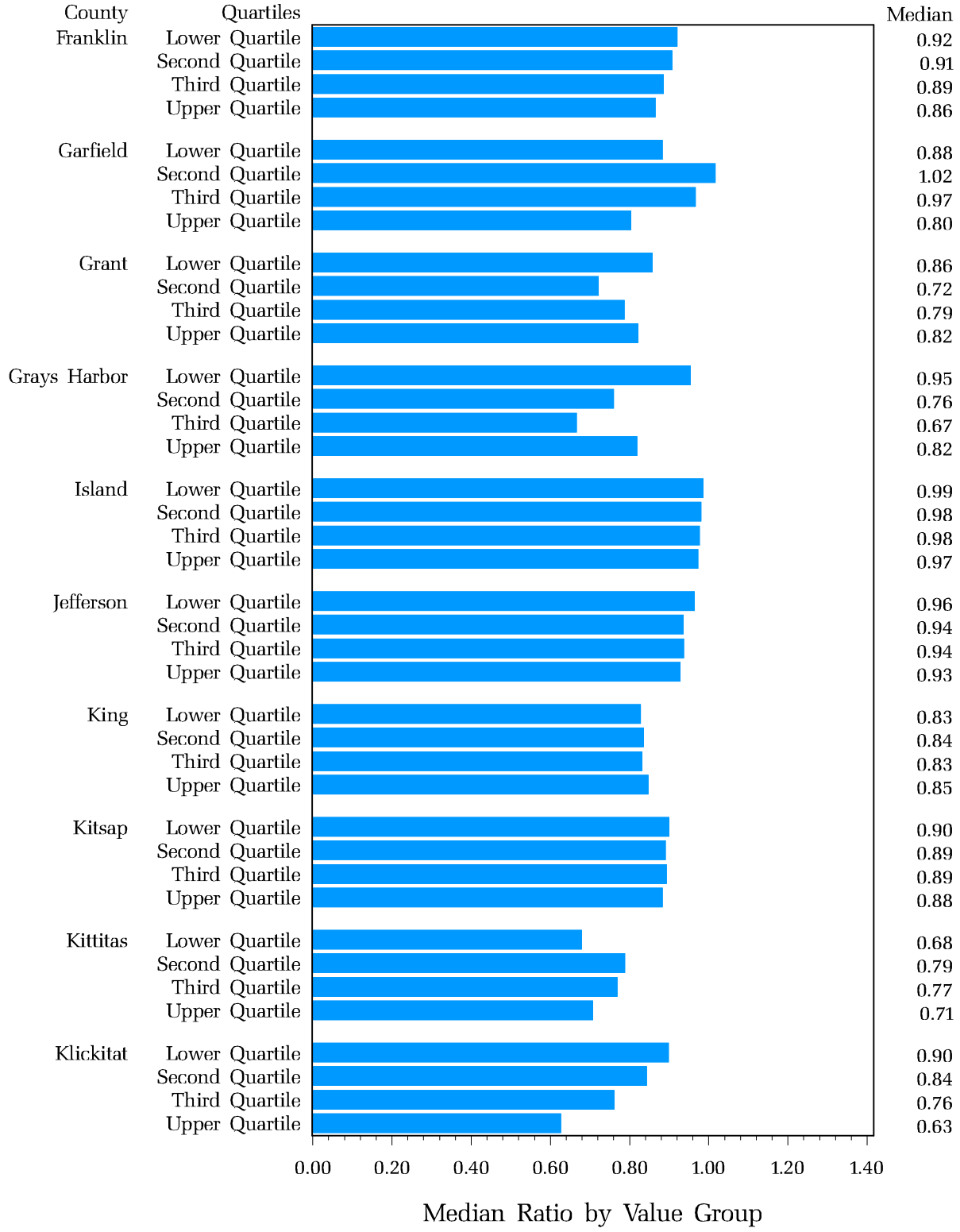


CHART 9 (Continued)

2007

Median Ratios of
Properties divided into Sales Value Quartiles

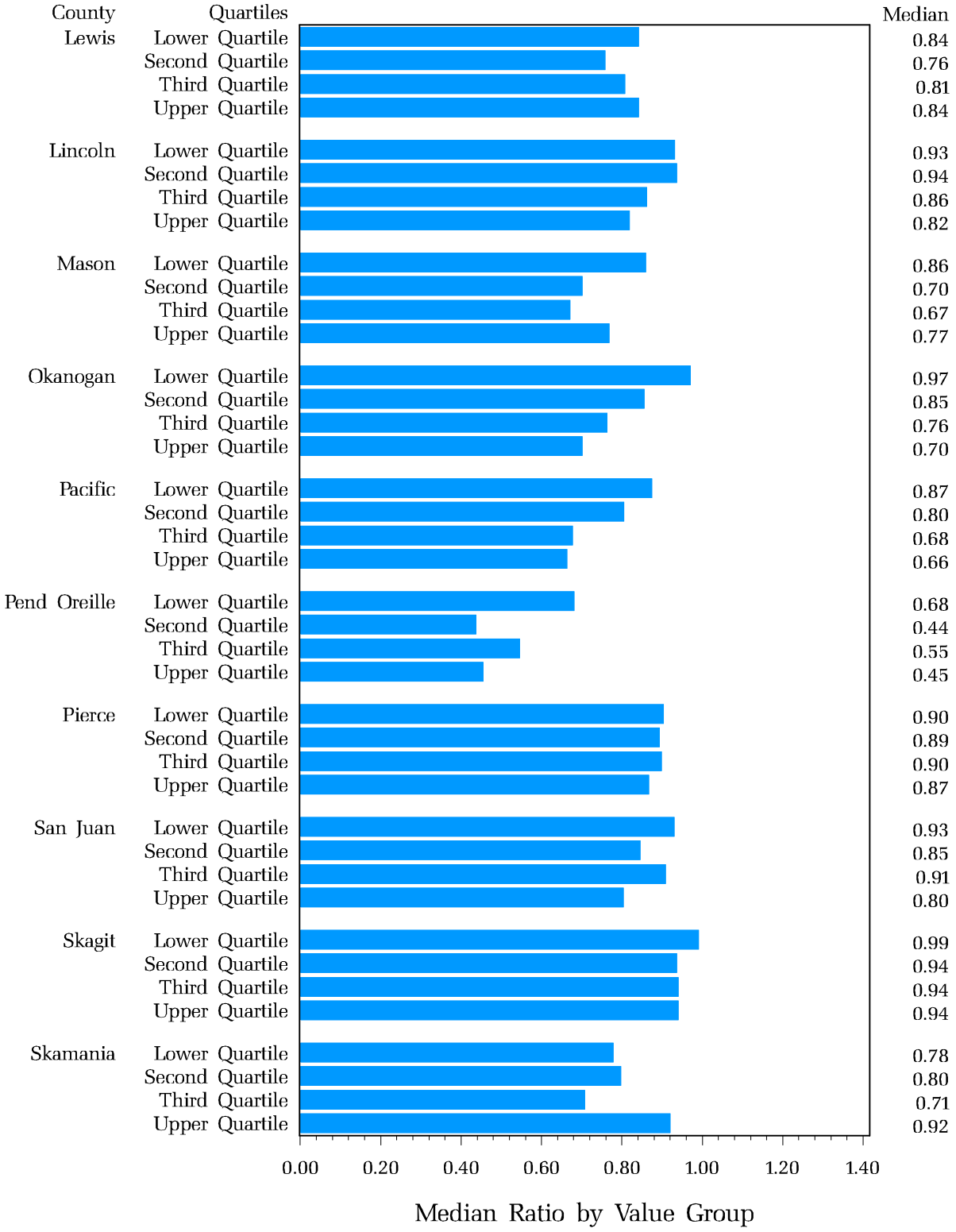
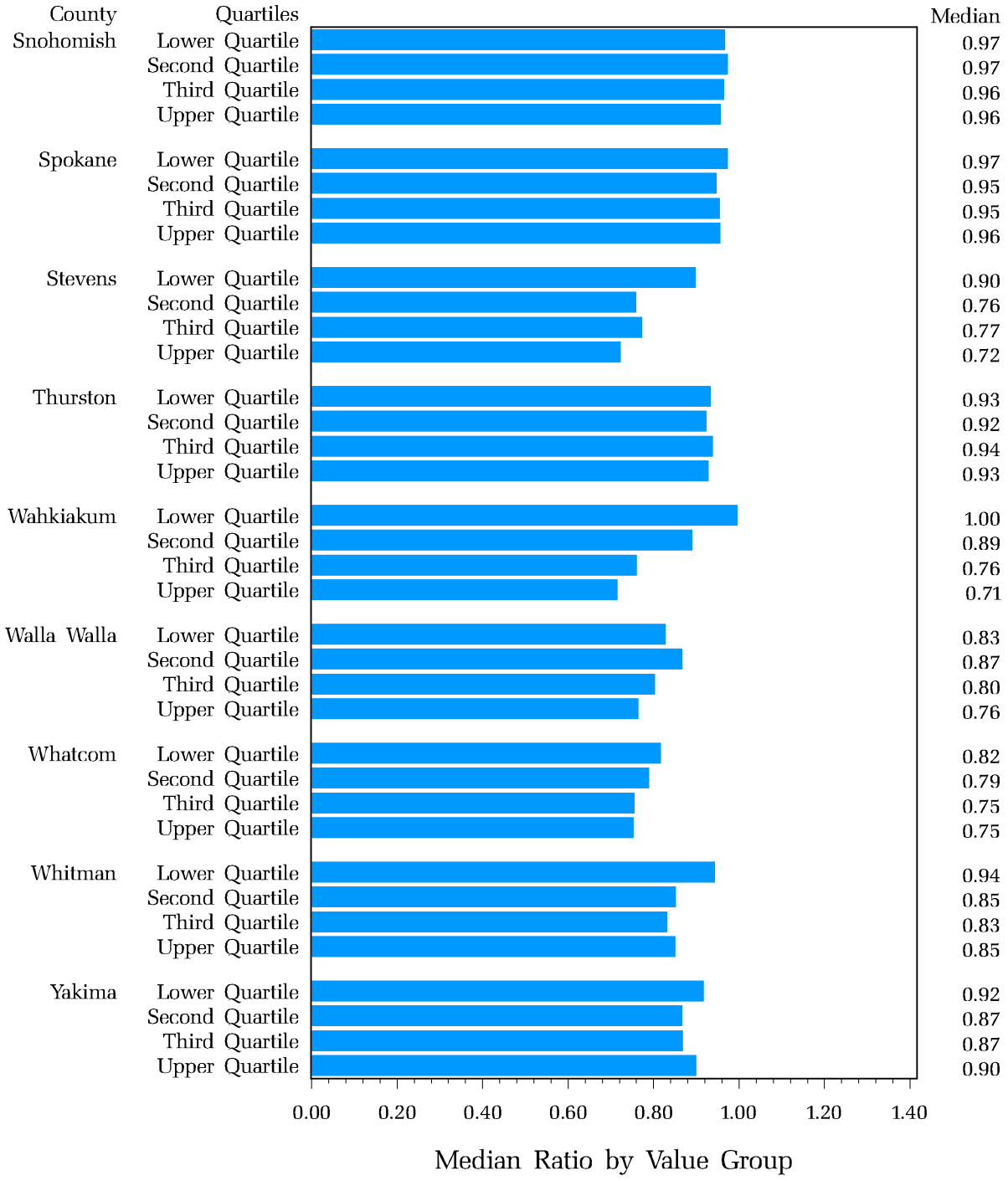


CHART 9 (Continued)

2007

Median Ratios of
Properties divided into Sales Value Quartiles



Uniformity of Assessments

Price-Related Differential

The price-related differential (PRD) is a statistic used for measuring the relationship between assessment levels for low value property and high value property. The PRD is calculated by dividing the average ratio by the weighted average ratio.

Price-related differential = average ratio / weighted average ratio

The average ratio is the sum of the individual ratios divided by the number of properties. This is called an unweighted average. In the calculation of the weighted average ratio, each ratio is counted in proportion to the value of the property. So the ratio of a property with twice the value of another will count twice as much in the weighted average. This means that properties with higher values contribute more to the calculation of the weighted average ratio than do properties of lower value.

If higher valued properties are assessed at a lower ratio to market value, the weighted average will be less than the unweighted average. In this case, the PRD will be greater than one. This result is called assessment regressivity. The PRD will be close to one if higher and lower valued properties are assessed at the same ratio to market value. If higher valued properties are assessed at a higher ratio to market value, then the weighted average will be greater than the unweighted average and the PRD will be less than one. This is called assessment progressivity.

The IAAO Standard on Ratio Studies suggests that the PRD should fall within the range of 0.98 to 1.03. Chart 10 shows the results of the PRD calculations by county. No counties have a PRD at or below 0.98.

The following 21 counties have PRDs greater than 1.03: Adams, Chelan, Clallam, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Klickitat, Lincoln, Mason, Okanogan, Pacific, Pend Oreille, San Juan, Stevens, Thurston, Wahkiakum, Walla Walla and Whatcom Counties. For these counties the PRD indicates that higher value properties are assessed at lower ratios to market value than are lower value properties.

The PRD uses information from all the observations in the data set. The PRD can be influenced by observations with extreme ratios, especially if the sample size is small. So it is appropriate to conduct statistical tests to support the PRD calculations before concluding that a county does not meet the IAAO standard. Since this study is based on a sample, it is possible that some of the counties with PRDs close to the IAAO standards may, with some probability, satisfy the IAAO standard.

The PRD does not lend itself to straightforward statistical tests. However, a confidence interval for the PRD can be constructed by using a repeat sampling or “bootstrap” methodology. Under this methodology repeated samples are drawn from the original data and PRDs are calculated for each sample. These calculated PRDs are distributed from the lowest to the highest. The confidence interval is then constructed so that the lower limit of the interval is the value at which only 5 percent of the calculated PRDs in the distribution are smaller. The hypothesis that the IAAO standard is met cannot be rejected if the PRD standard of 1.03 is contained within the confidence interval.

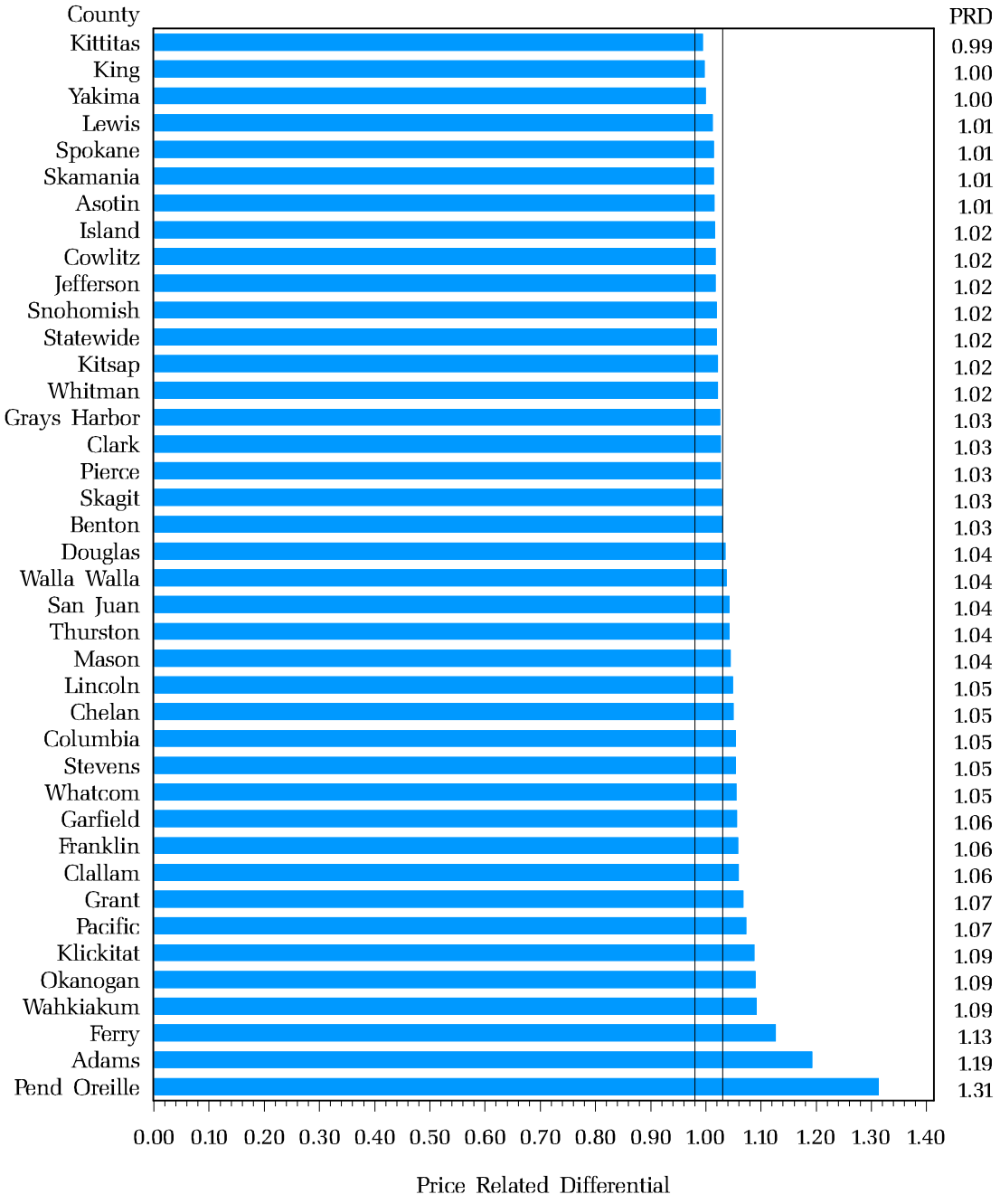
After conducting the repeat sampling procedure it appears that nine counties (Chelan, Clallam, Columbia, Douglas, Franklin, Garfield, San Juan, Thurston and Walla Walla Counties) with nominal residential PRDs above 1.03 are close enough to satisfy the IAAO standard for PRD.

Therefore, it appears that 27 counties satisfy the IAAO standard, and 12 counties have PRDs above 1.03.

CHART 10

2007 Price – Related Differential

The PRD should be between 0.98 and 1.03



Some Background on Washington's Assessment System

County assessors are responsible for determining the market value of properties within their respective counties. However, multi-county utility properties are valued by the Department of Revenue.

State law requires regular revaluation of assessed values. Eighteen counties update property values annually based on appropriate statistical data. State law allows properties to be physically inspected once every six years in counties that annually update assessed values. Other counties (20 counties) revalue on two, three, or four year cycles. These counties revalue each property once during the cycle and the value is not changed until the next cycle: 2, 3 or 4 years later. See Appendix A for a listing by county of revaluation cycles.

Data

The data on assessed values and market values used in this report to evaluate the performance of the state's property tax appraisal system come from the Washington Department of Revenue. The data are for the 2007 assessment year (January 1, 2007 valuation date). Annually the Washington Department of Revenue conducts a study to estimate the relative market value of each county. These estimates are used to equitably apportion the state property tax among the counties. The Department of Revenue uses a ratio study technique to estimate the market value of each county.

The statistics used in the Department of Revenue ratio study are different than those of this report since the purpose of the Department of Revenue study is not the same. The purpose of the Department of Revenue study is to estimate the market value of each county whereas the purpose of this study is to evaluate assessment performance. The most useful statistic for estimating overall county market value is the average ratio weighted by the value of the properties. In contrast, the standard statistic used for evaluation of assessment performance is the median ratio.

The data available for this study include 77,065 real property parcels which were sold during the study period. The sales data was screened to obtain valid transactions.[3] For most counties, the data is coded by land use classification. In addition to sales price information, the data set includes 35 independent real property appraisals performed by the Department of Revenue. These appraisals were done in land use classifications in counties with insufficient sales.

This study is based on a sample of all real properties subject to property tax in Washington. Since it is a sample, rather than the entire universe of properties, the study is subject to the usual problems associated with samples. The statistics developed from the sample are subject to some error. However, with a sample as large as 77,100 observations, these errors should be quite small. For statistics calculated for counties or use classes within a county, the error is larger than for the statewide statistics.

[3]Washington Administrative Code section 458-53-080 lists the reasons a sale would be excluded from the data.

Another source of error or bias comes from the way in which the sample is drawn. The primary source of data is the real estate excise tax affidavit that is filed when properties sell. Ideally, when a statistician develops a sample, each property will have an equally likely chance of being included in the sample. This is not the case here. Except for the 35 appraisals, properties included in the sample are only those that sold during the study period. This can bias the results of the study. For example, if the assessing jurisdiction is more likely to revalue properties that sell, then the study results will show a higher and more uniform level of assessment than is true for all properties (including those that have not sold).

What this report does not include

This report does not include data on personal property. It also does not include data on certain classes of real property: tax exempt properties, timber and timber land, homes eligible for the senior property tax relief program, multi-county utility properties assessed by the Department of Revenue, and current use farm land.

Appendix A
COUNTY REVALUATION CYCLES
2007 Assessment Year

CYCLICAL COUNTIES		ANNUAL COUNTIES
4 YEAR	3 YEAR	
ASOTIN	SAN JUAN	ADAMS
CHELAN		BENTON
COLUMBIA		CLALLAM
FERRY	2 YEAR	CLARK
FRANKLIN	DOUGLAS	COWLITZ
GRANT		GARFIELD
GRAYS HARBOR		ISLAND
JEFFERSON		KING
KITTITAS		KITSAP
KLICKITAT		LINCOLN
LEWIS		PIERCE
MASON		SKAGIT *
OKANOGAN		SKAMANIA *
PACIFIC		SNOHOMISH
PEND OREILLE		SPOKANE
STEVENS		THURSTON
WAHKIAKUM		WHITMAN
WALLA WALLA		YAKIMA
WHATCOM		

SUMMARY

Revaluation Cycle	Number of Counties	Inspection Cycle 1 / 2 yrs	Inspection Cycle 1 / 3 yrs	Inspection Cycle 1 / 4 yrs	Inspection Cycle 1 / 5 yrs	Inspection Cycle 1 / 6 yrs
Annual	18			2*	0	16
2 Year	1	1				
3 Year	1		1			
4 Year	19			19		

Appendix B

Frequency Distribution of Ratios by County

Washington has approximately 2.95 million real property parcels. Due to the high volume of assessments, county assessors must use mass appraisal techniques to determine assessed values. Each property has unique characteristics and it is not possible for assessing officials to fully capture the influence of all these characteristics on the market value. As a result, the ratio of assessed value to market value will vary from property to property. Generally, most properties will have similar ratios of assessed to market value. However, some properties will have ratios to market value that differ somewhat from the typical ratio. If most ratios are close together with a few ratios falling some distance from the center, then a picture of the distribution of ratios will look somewhat like the familiar bell curve.

Appendix B contains a frequency distribution of ratios for the state and each county. These frequency distribution charts show the relative number of properties that have ratios within specified intervals. The first chart in Appendix B shows the frequency distribution of ratios on a statewide basis. A chart for each county follows.

The vertical axis on each chart is divided into ratio intervals. Each interval is .05 wide. For example, the bar centered on 0.90 represents properties with ratios between 0.875 and 0.925. The horizontal axis on each chart shows the percentage of properties that fall within the interval. So, the bar labeled 0.90 on the chart for the state distribution indicates that 13.85 percent of the properties have ratios between 0.875 and 0.925.

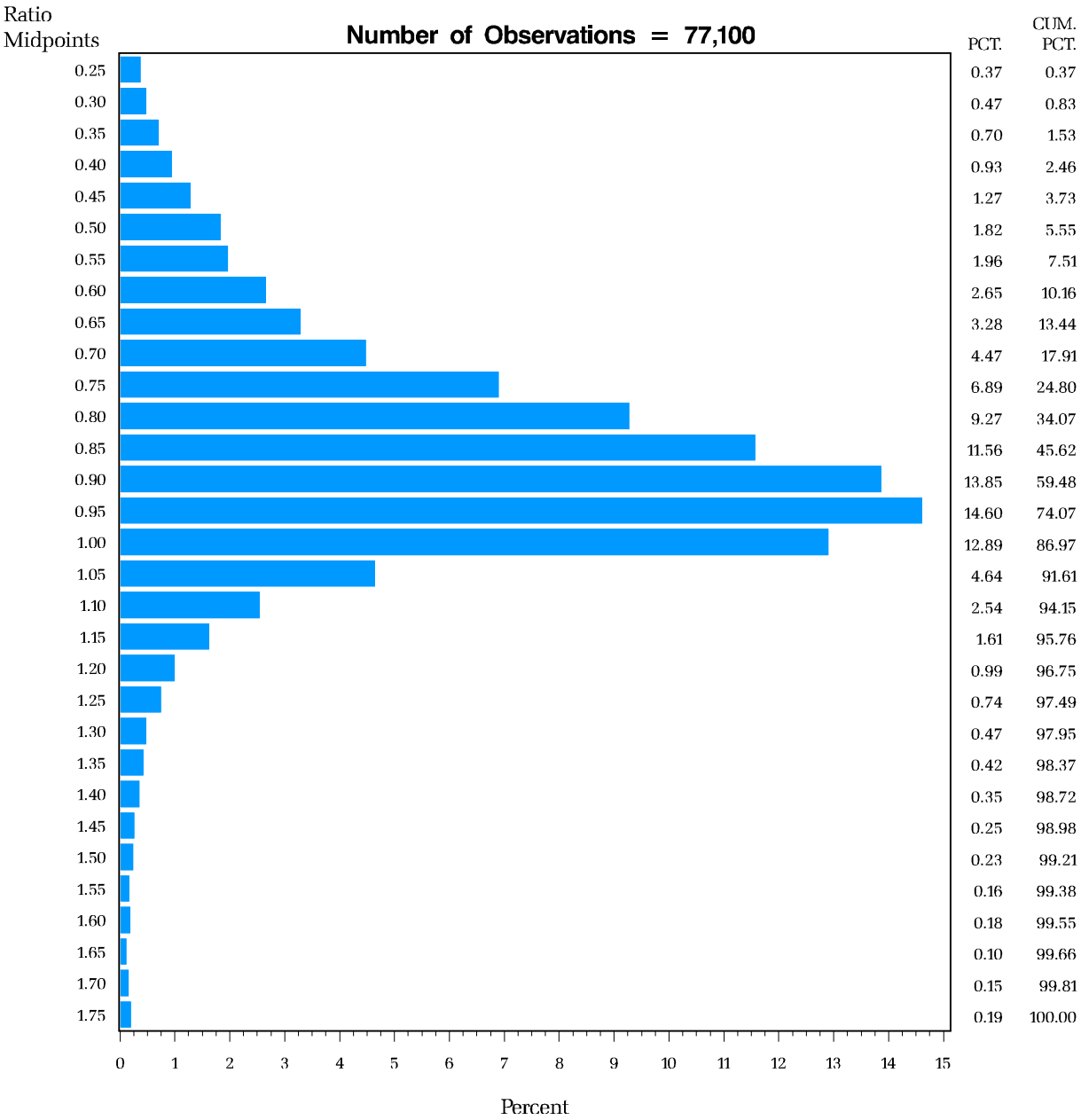
Each chart includes the number of observations in the analysis for each county. The counties with a large number of observations generally have symmetric distributions centered on the median ratio for the county. However, the distributions for the smaller counties are based on many fewer observations. For example, see the distributions for Columbia, Garfield, and Wahkiakum Counties. This study is primarily based on property sales, and there are few property sales in these counties. Their distributions are not as neat and tidy as those for the larger counties.

These small sample sizes present two problems. First, for purposes of this analysis, a small sample size makes it difficult to tell if a county satisfies or fails to satisfy the IAAO standards when the nominal calculation of the median, coefficient of dispersion, or other statistic is close to the IAAO standard. Second, good arms-length sales are the best indication of a property's market value. Appraisers in counties lacking a supply of qualified sales face a significant challenge when estimating market values for all properties in a county.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for the State

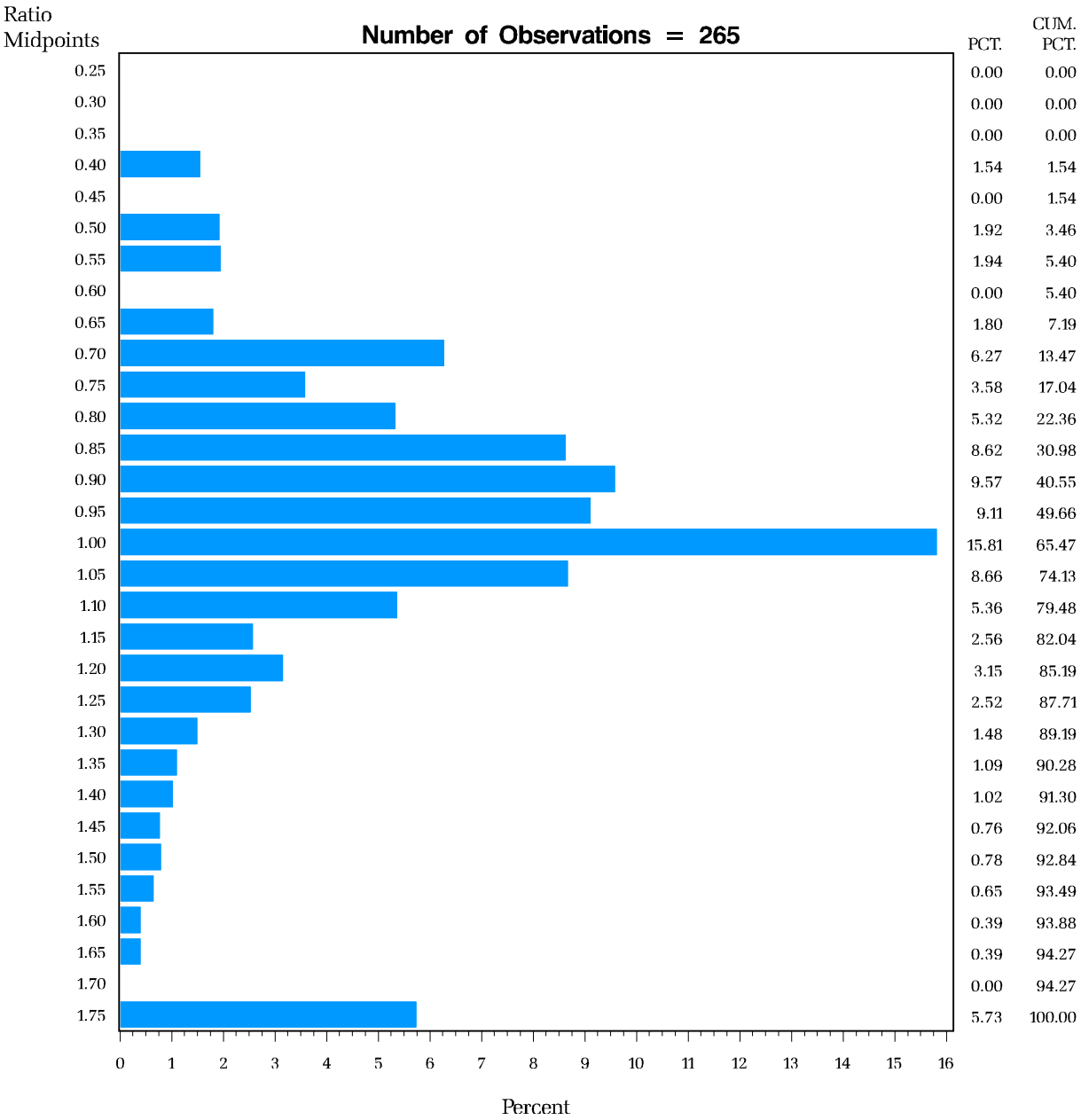


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals. The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide. For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Adams County

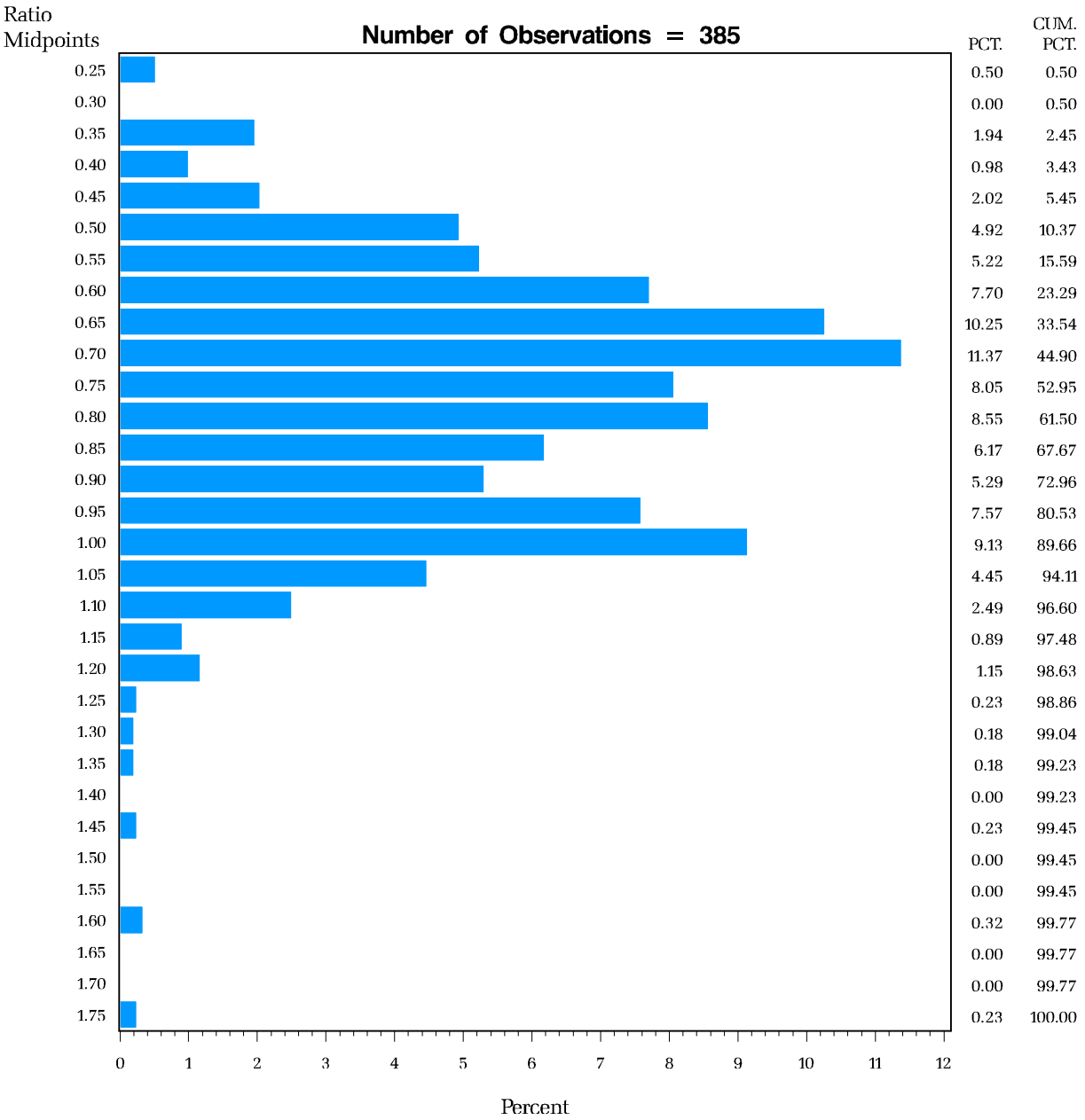


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Asotin County

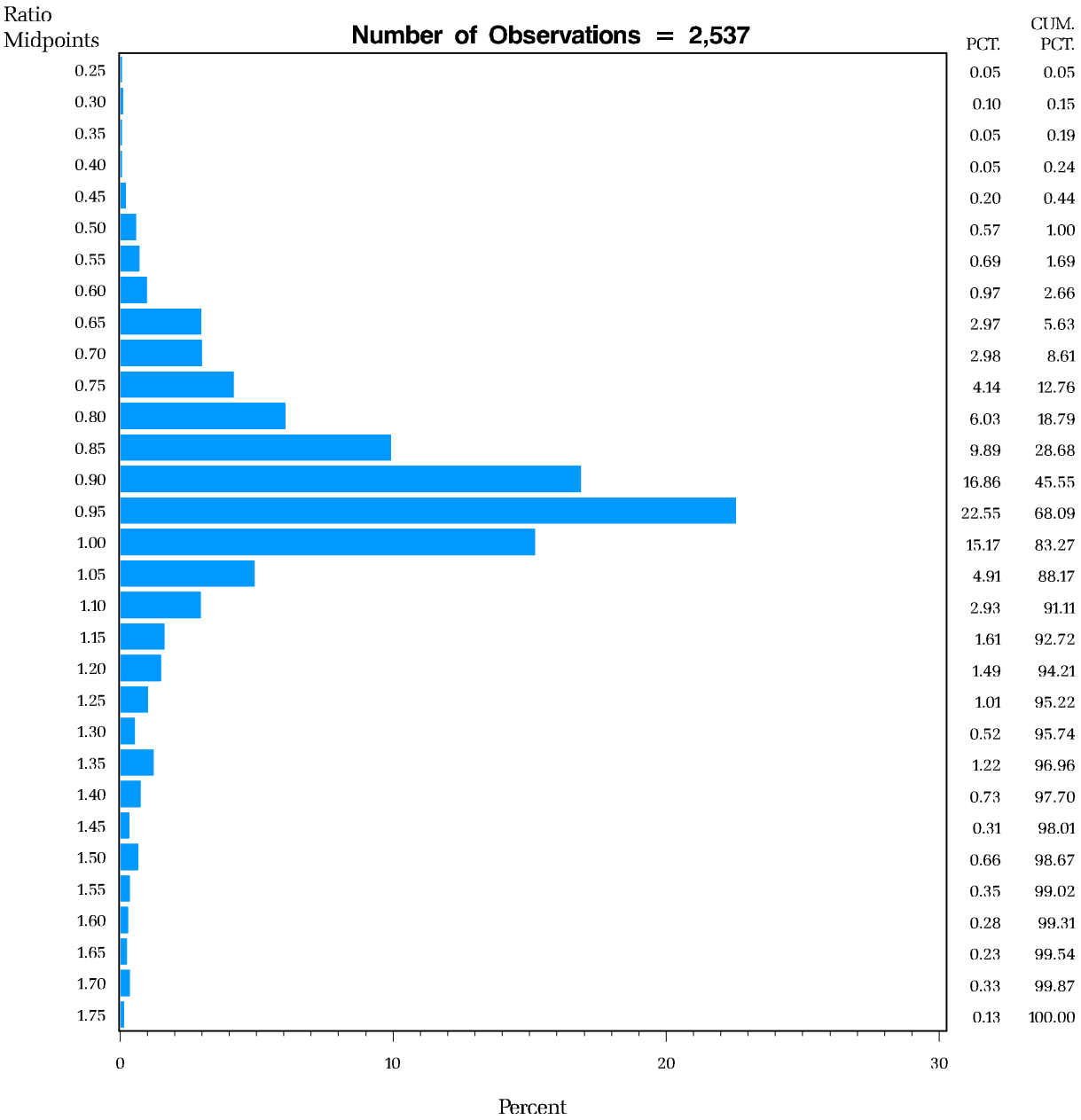


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals. The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide. For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Benton County

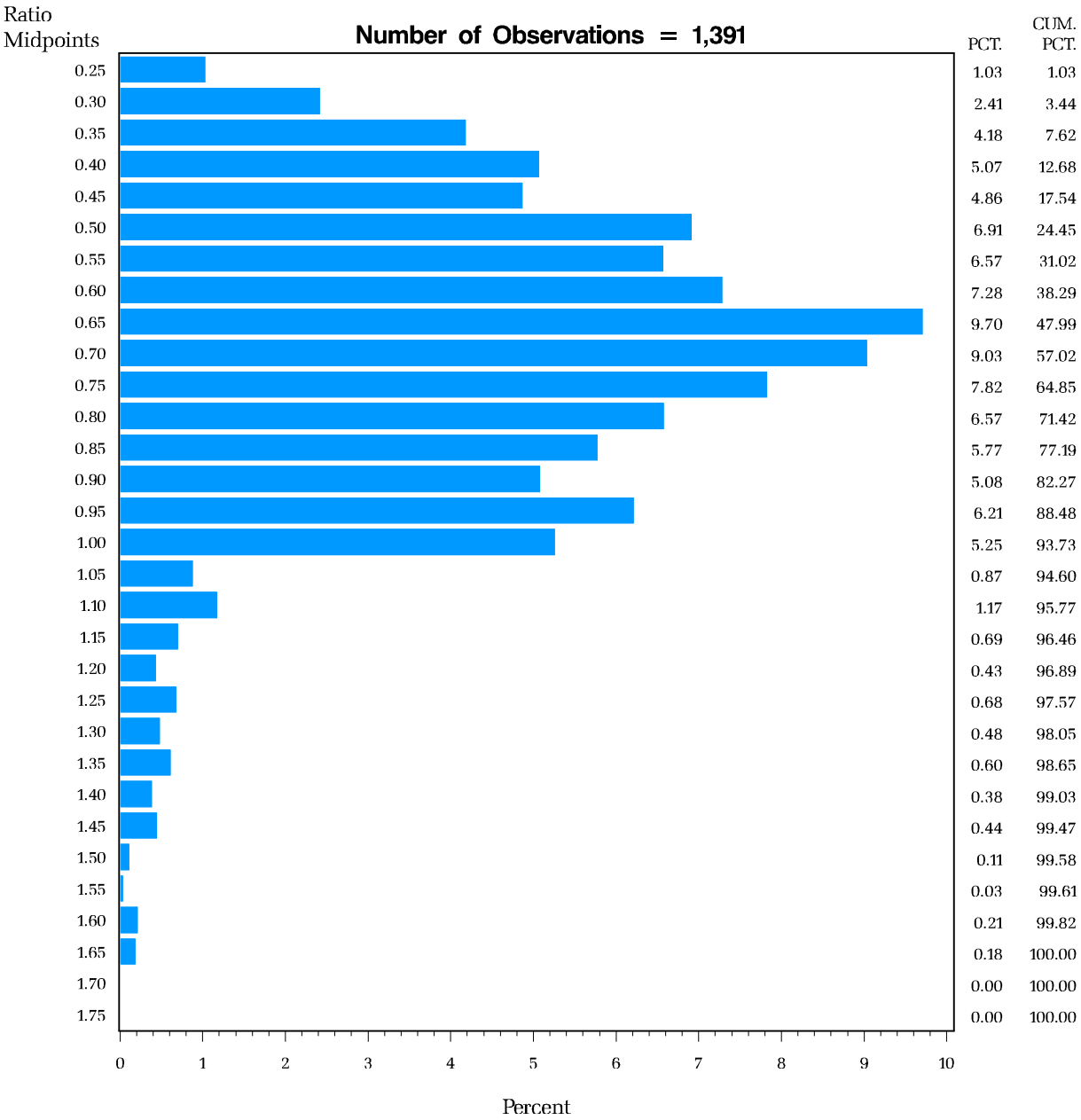


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals. The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide. For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Chelan County

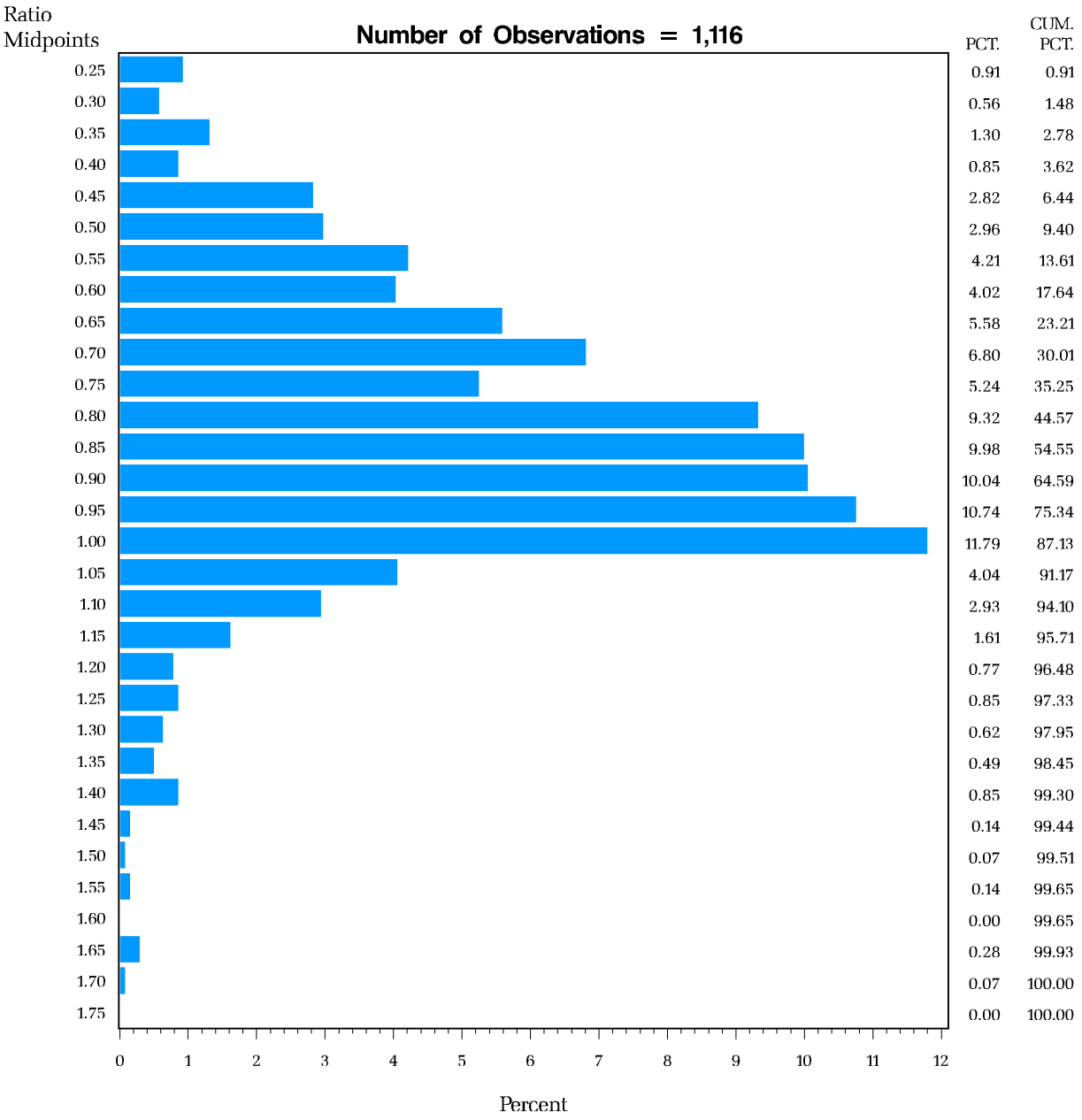


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals. The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide. For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Clallam County

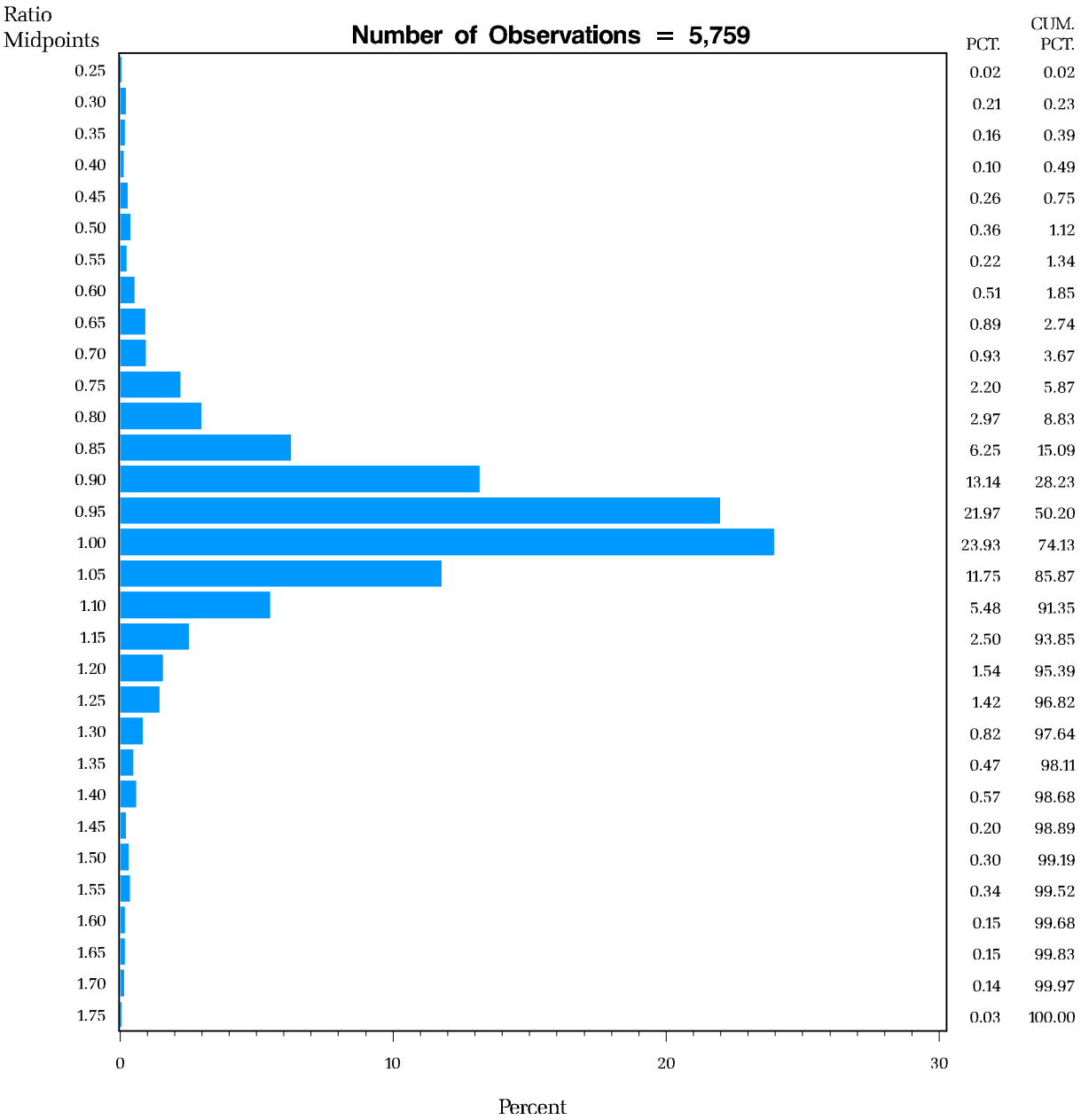


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals. The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide. For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Clark County

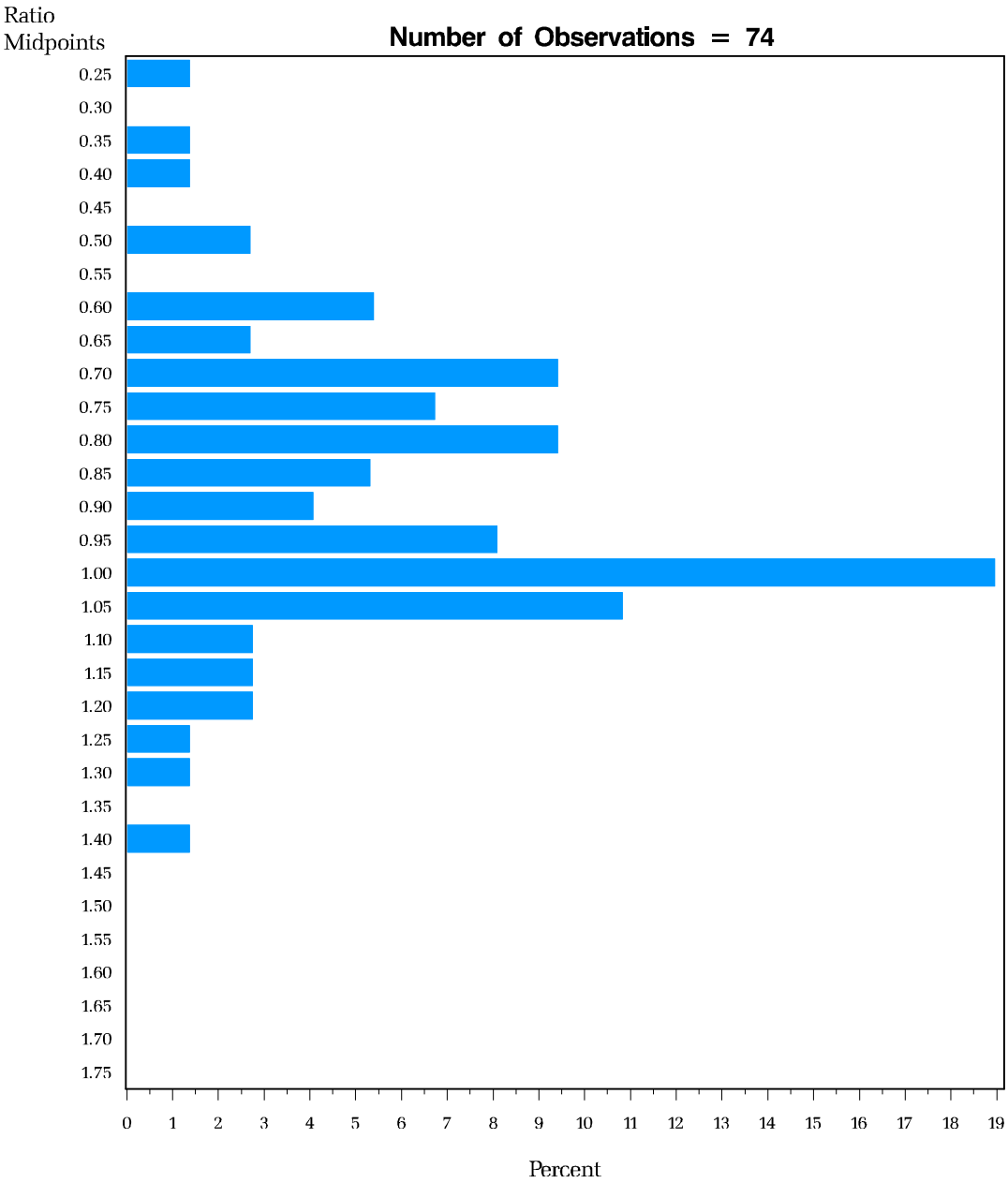


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals. The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide. For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Columbia County



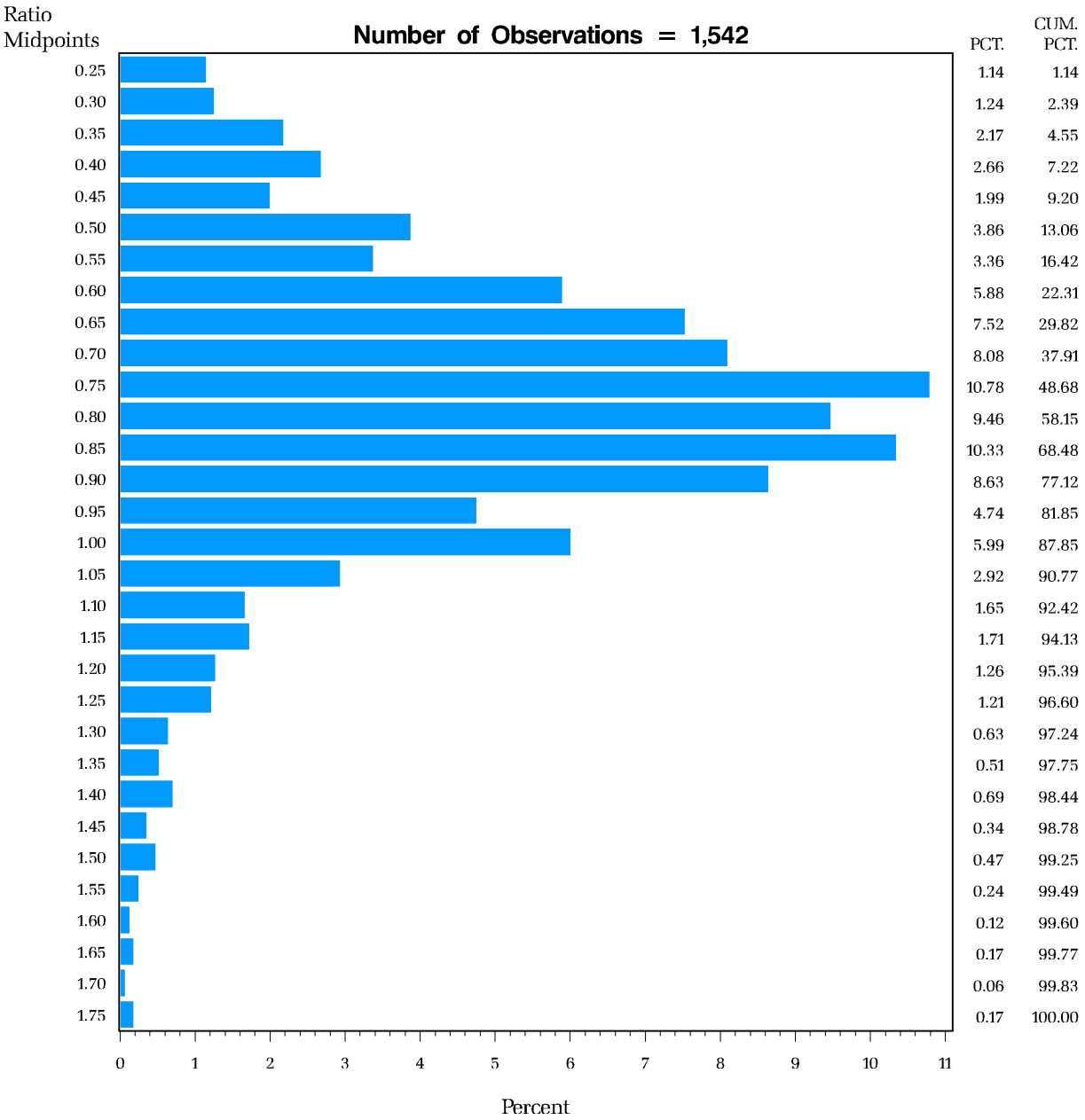
Ratio Midpoints	PCT.	CUM. PCT.
0.25	1.37	1.37
0.30	0.00	1.37
0.35	1.37	2.74
0.40	1.37	4.11
0.45	0.00	4.11
0.50	2.70	6.81
0.55	0.00	6.81
0.60	5.39	12.20
0.65	2.70	14.89
0.70	9.41	24.30
0.75	6.72	31.02
0.80	9.41	40.43
0.85	5.30	45.74
0.90	4.07	49.80
0.95	8.09	57.89
1.00	18.96	76.84
1.05	10.83	87.67
1.10	2.74	90.41
1.15	2.74	93.15
1.20	2.74	95.89
1.25	1.37	97.26
1.30	1.37	98.63
1.35	0.00	98.63
1.40	1.37	100.00
1.45	0.00	100.00
1.50	0.00	100.00
1.55	0.00	100.00
1.60	0.00	100.00
1.65	0.00	100.00
1.70	0.00	100.00
1.75	0.00	100.00

The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Cowlitz County

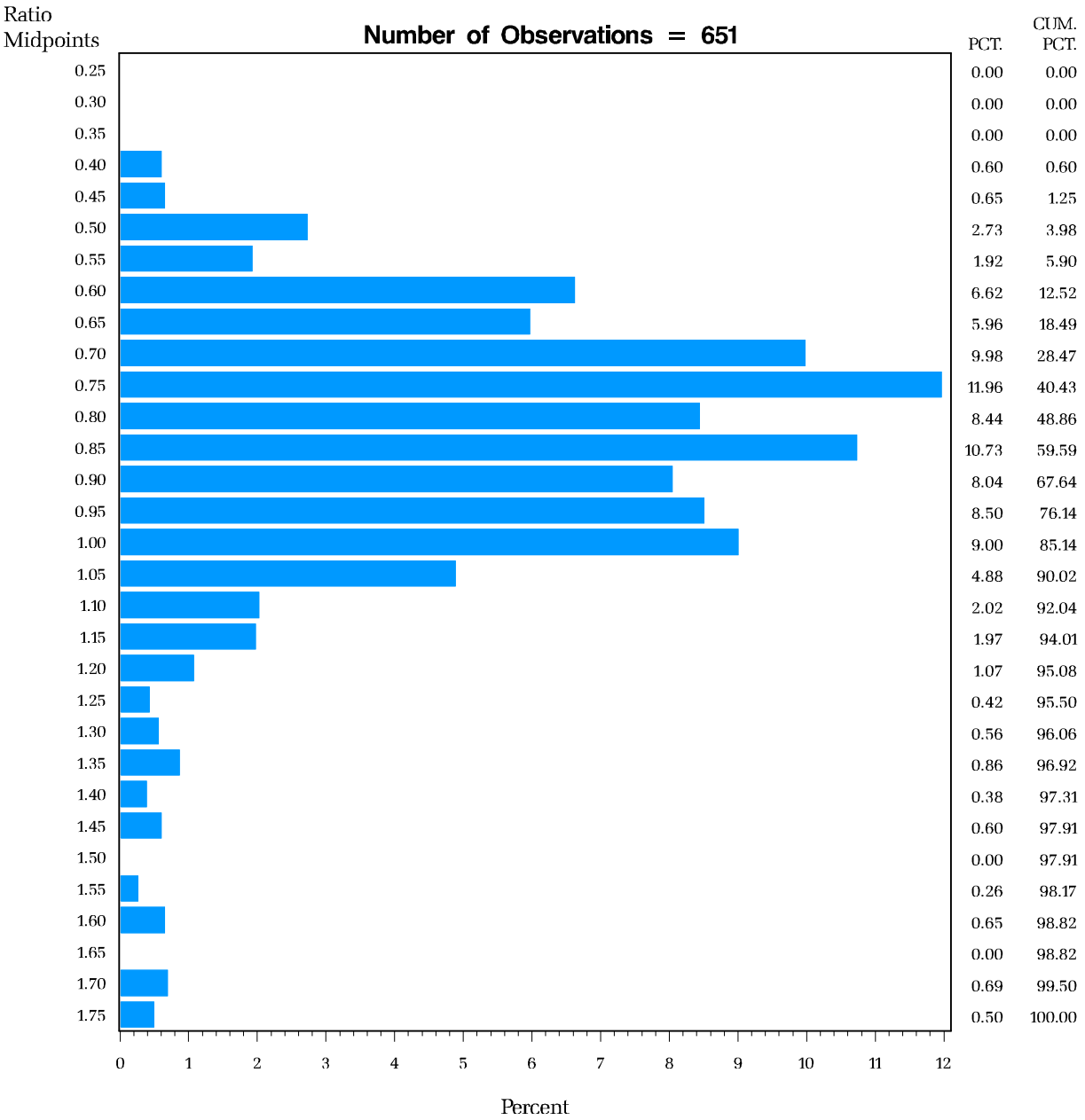


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Douglas County

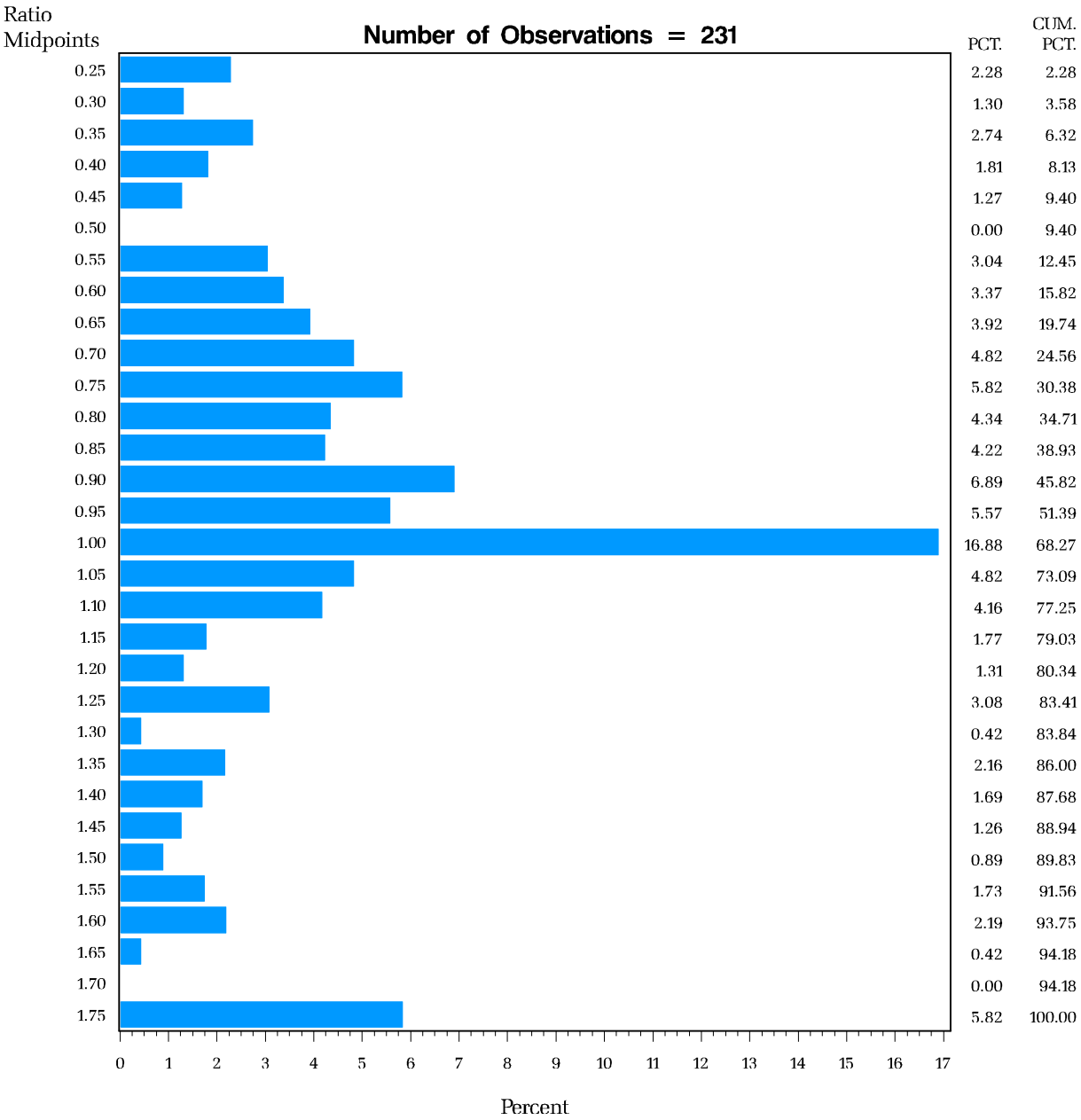


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Ferry County

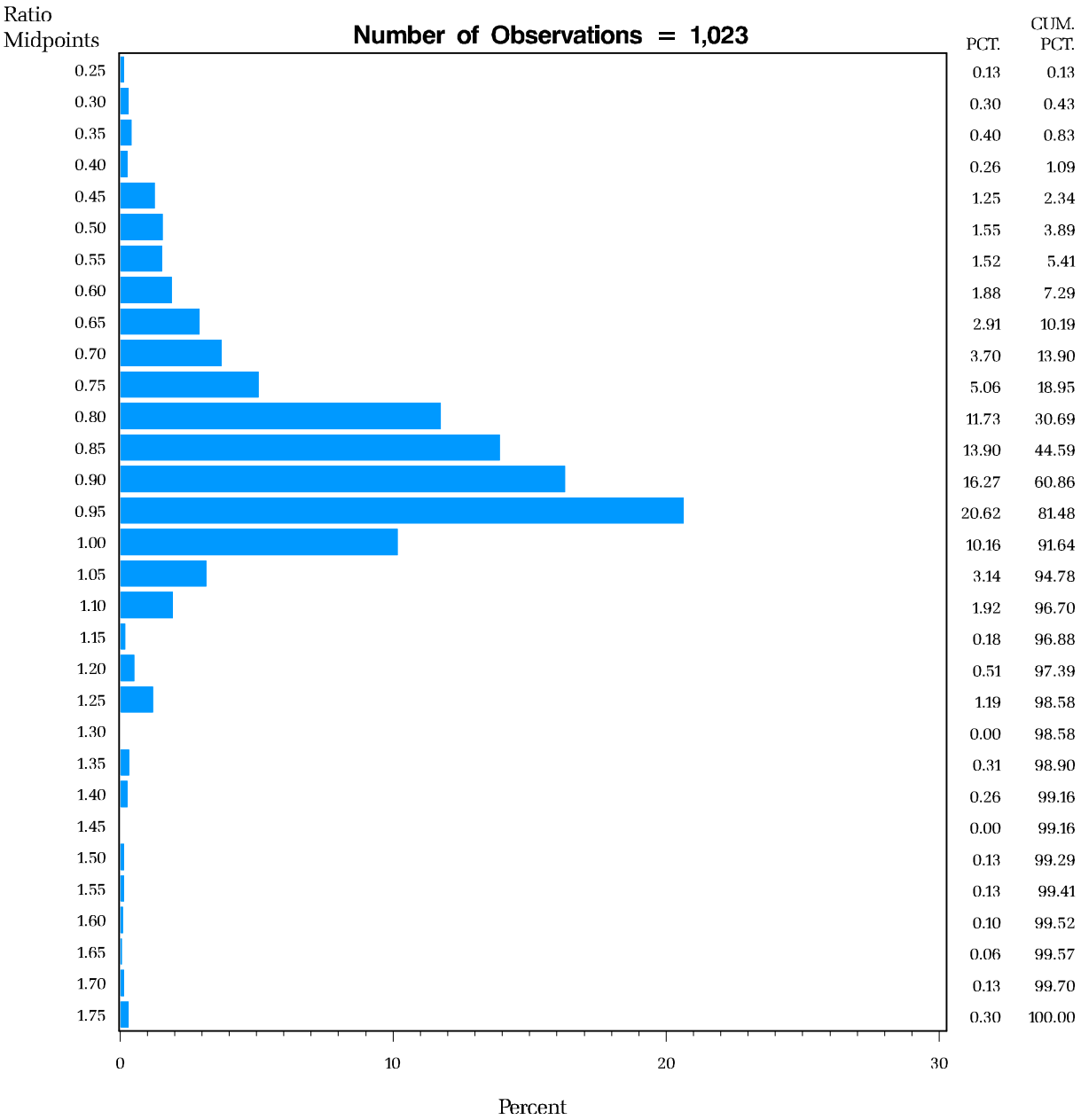


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals. The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide. For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Franklin County

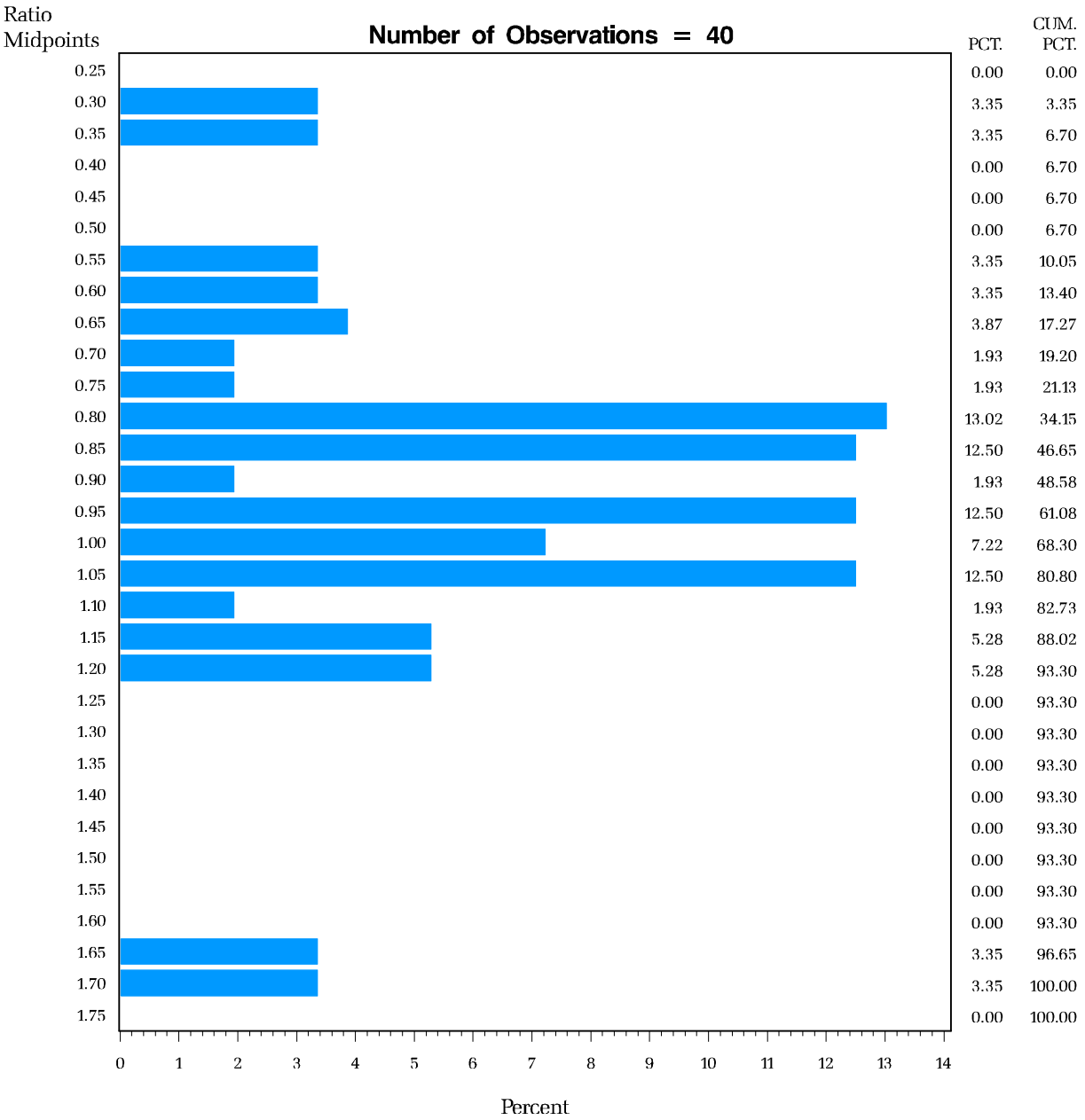


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals. The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide. For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Garfield County

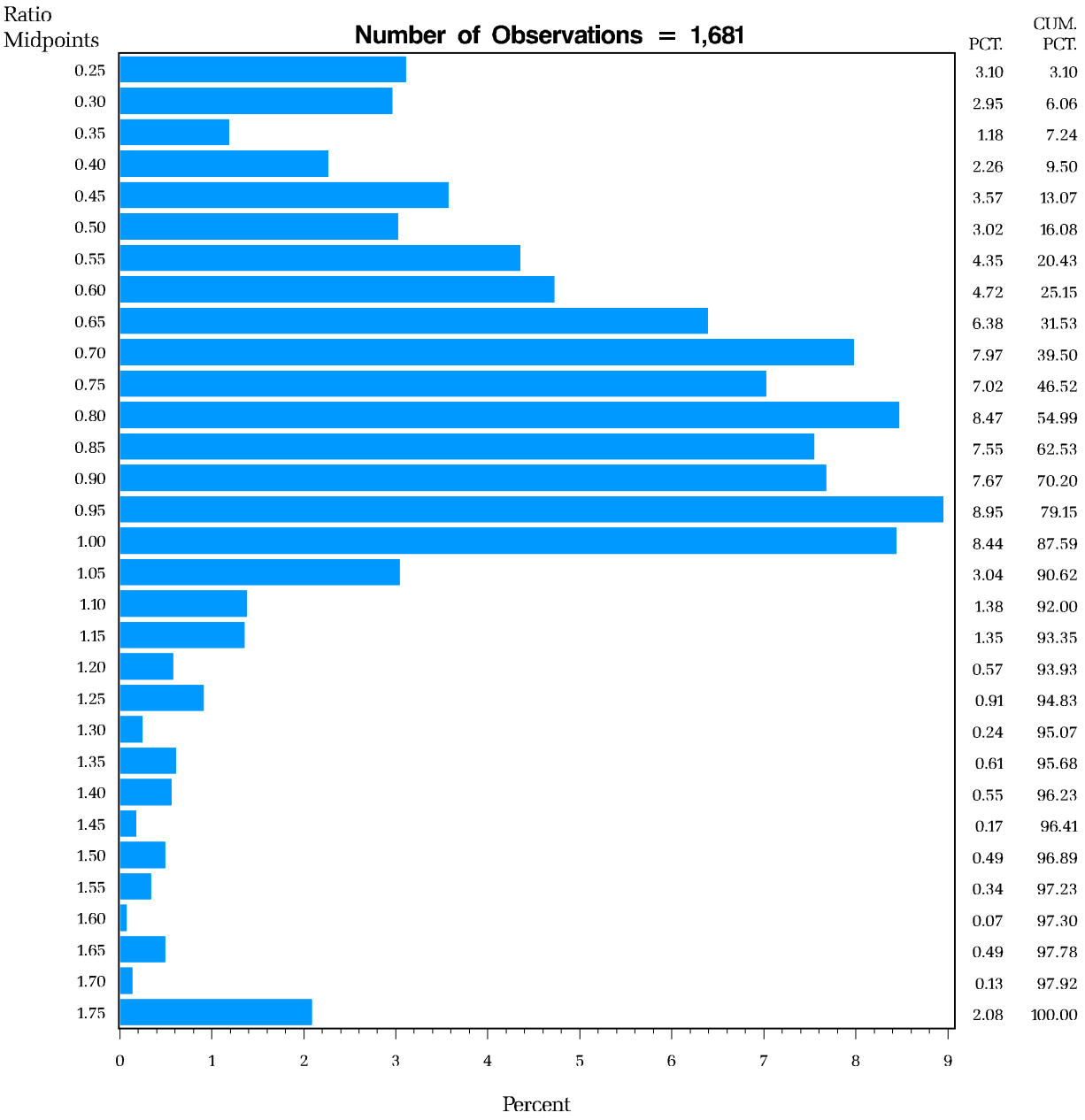


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Grant County

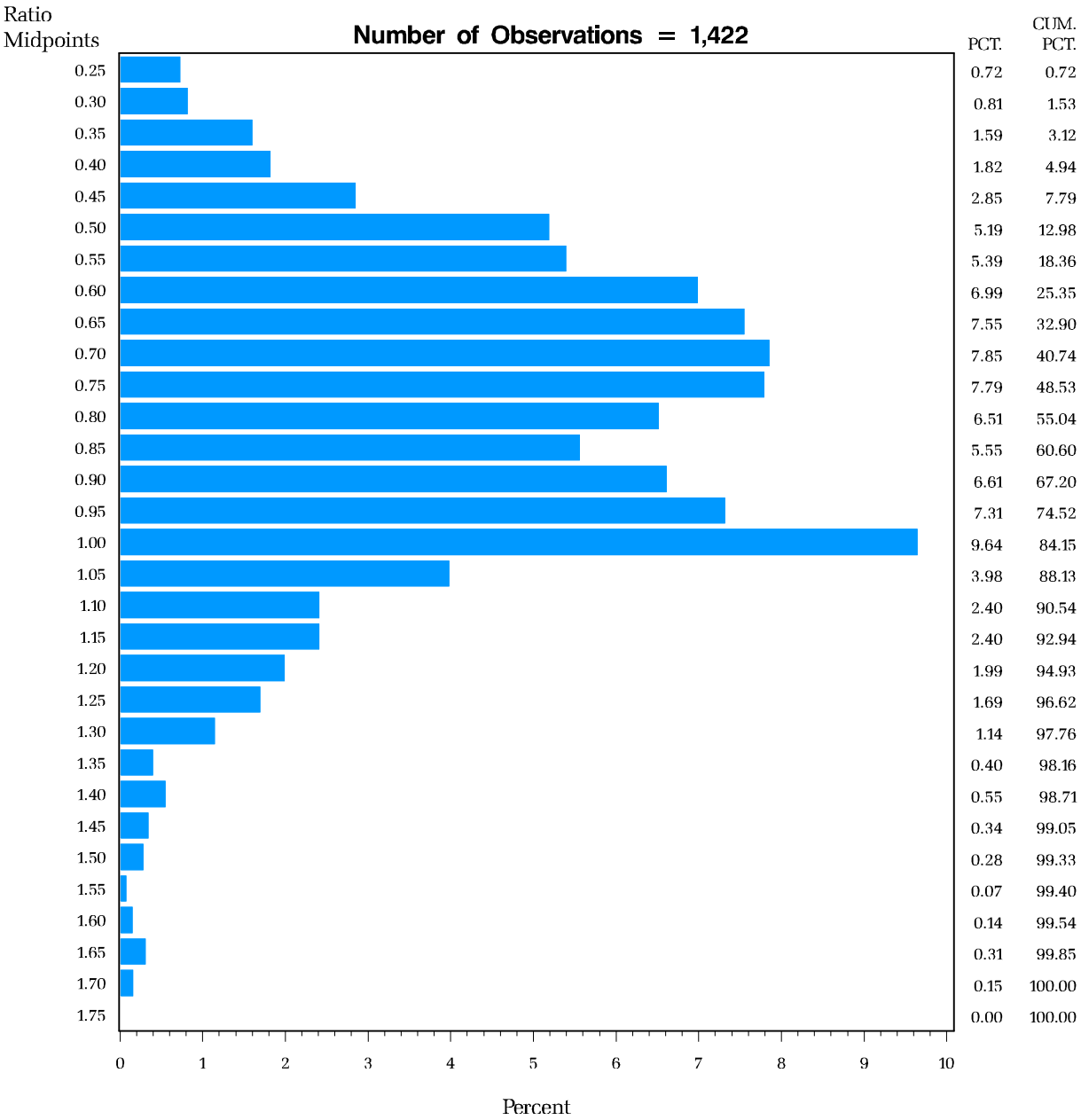


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals. The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide. For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Grays Harbor County

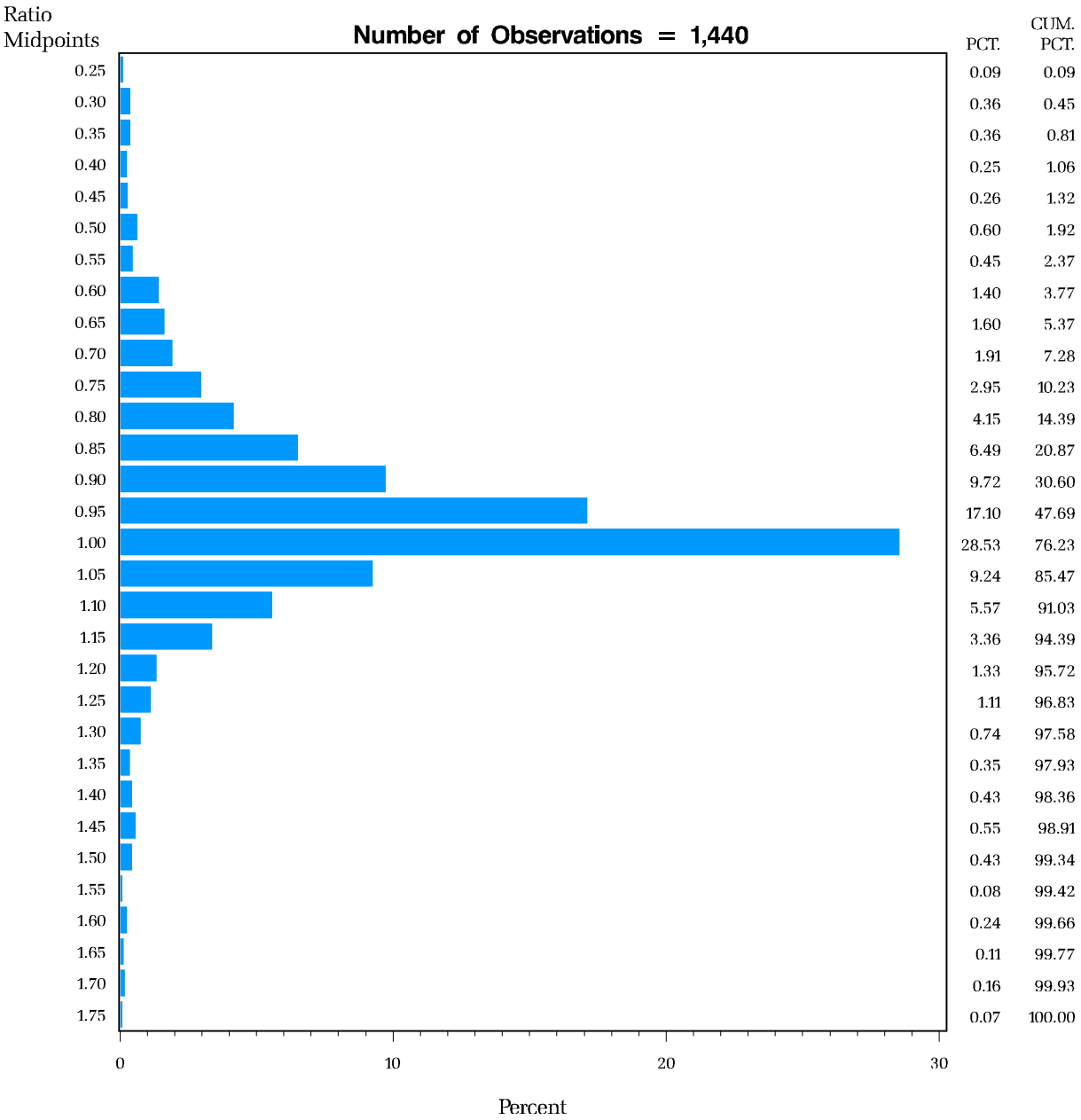


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals. The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide. For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Island County

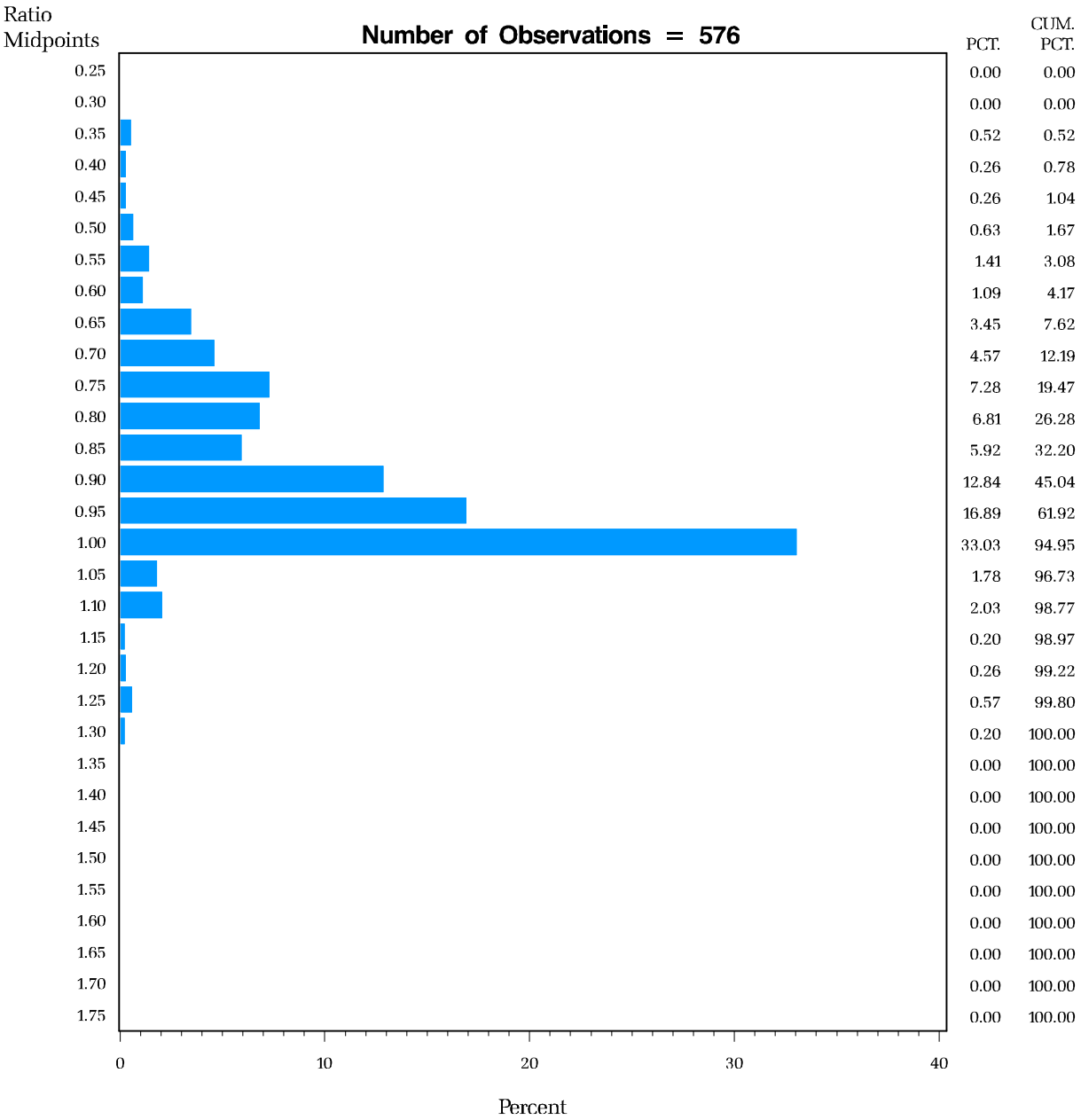


The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Jefferson County



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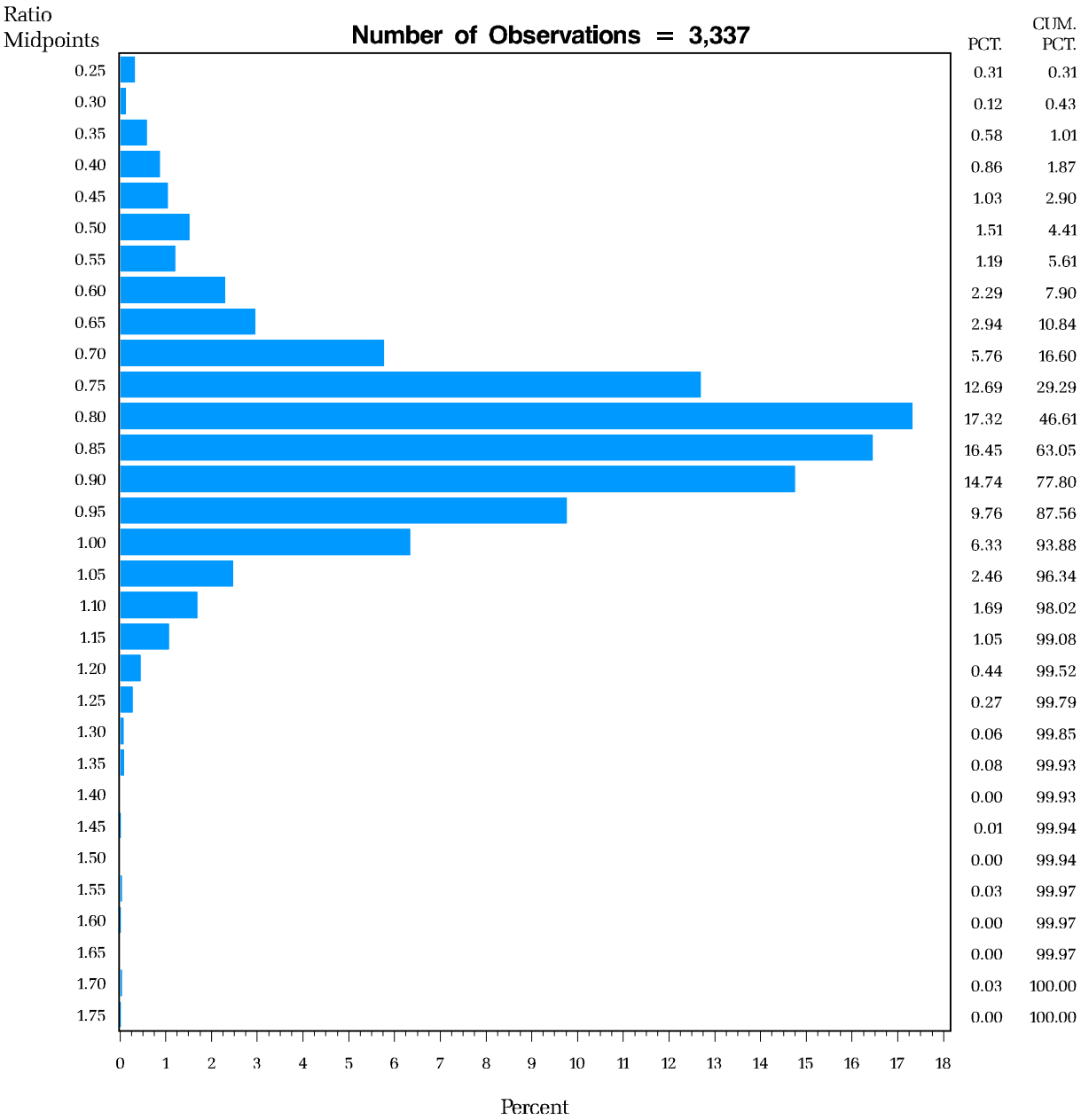
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for King County



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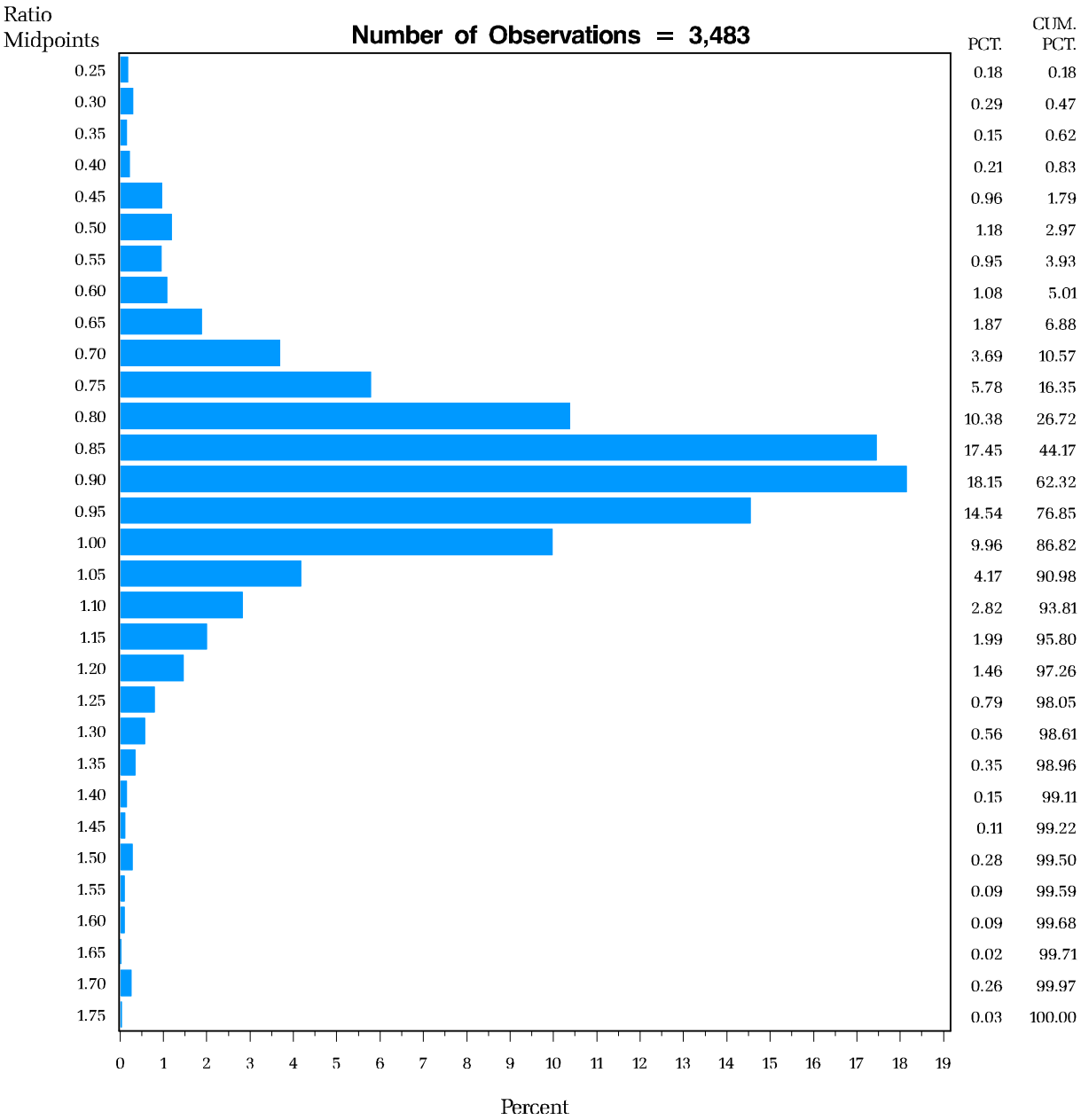
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Kitsap County



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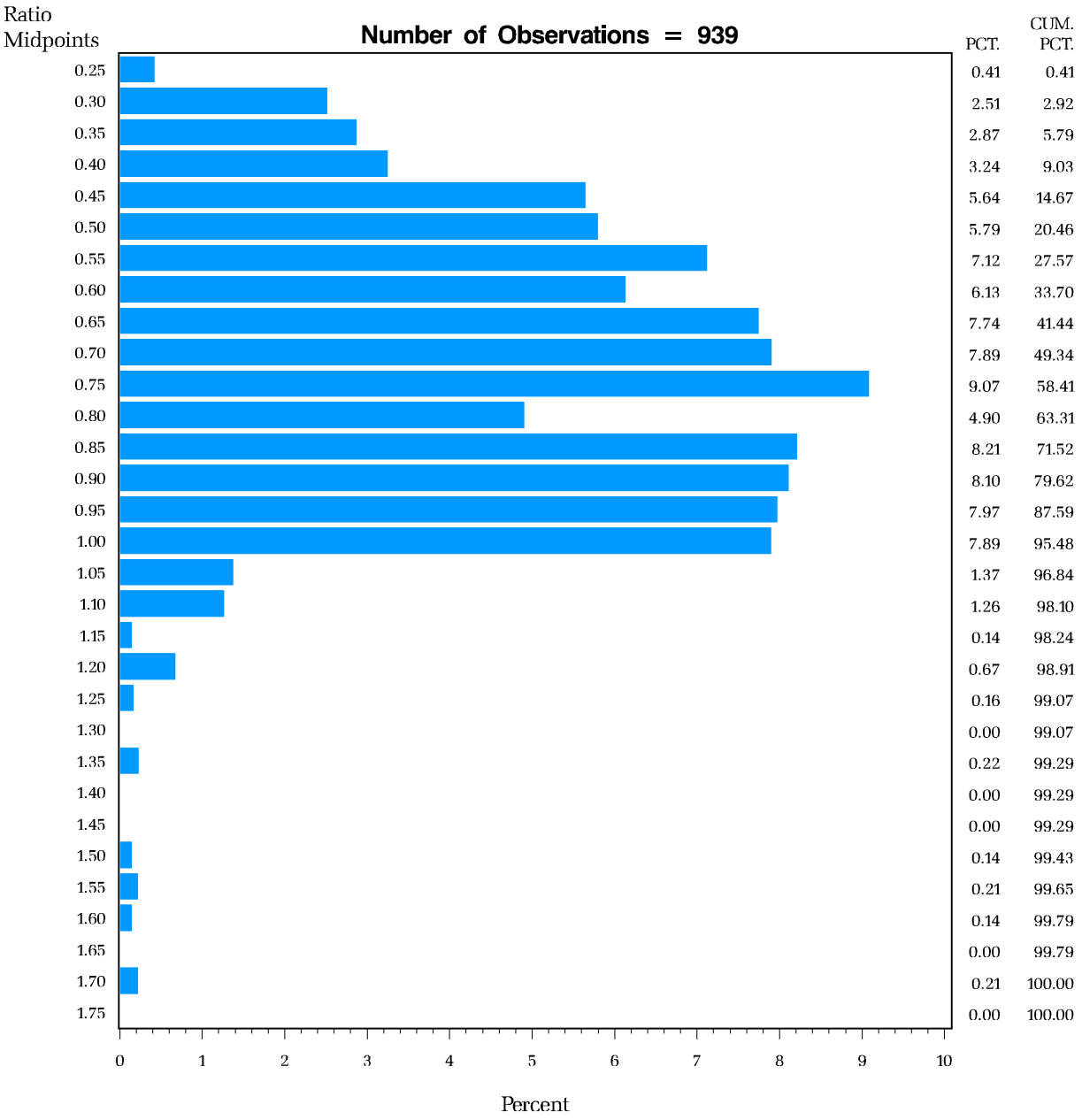
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Kittitas County



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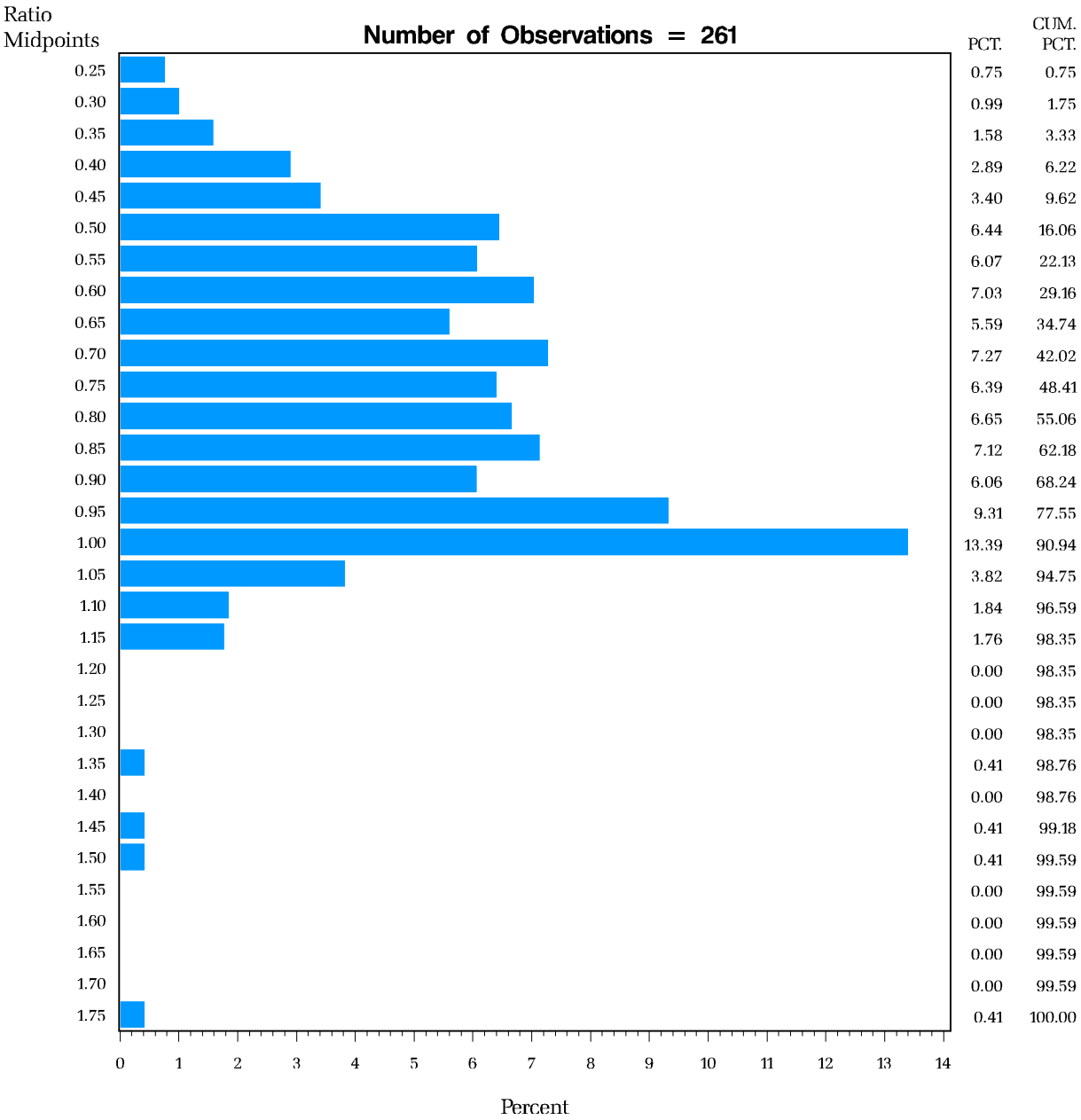
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Klickitat County



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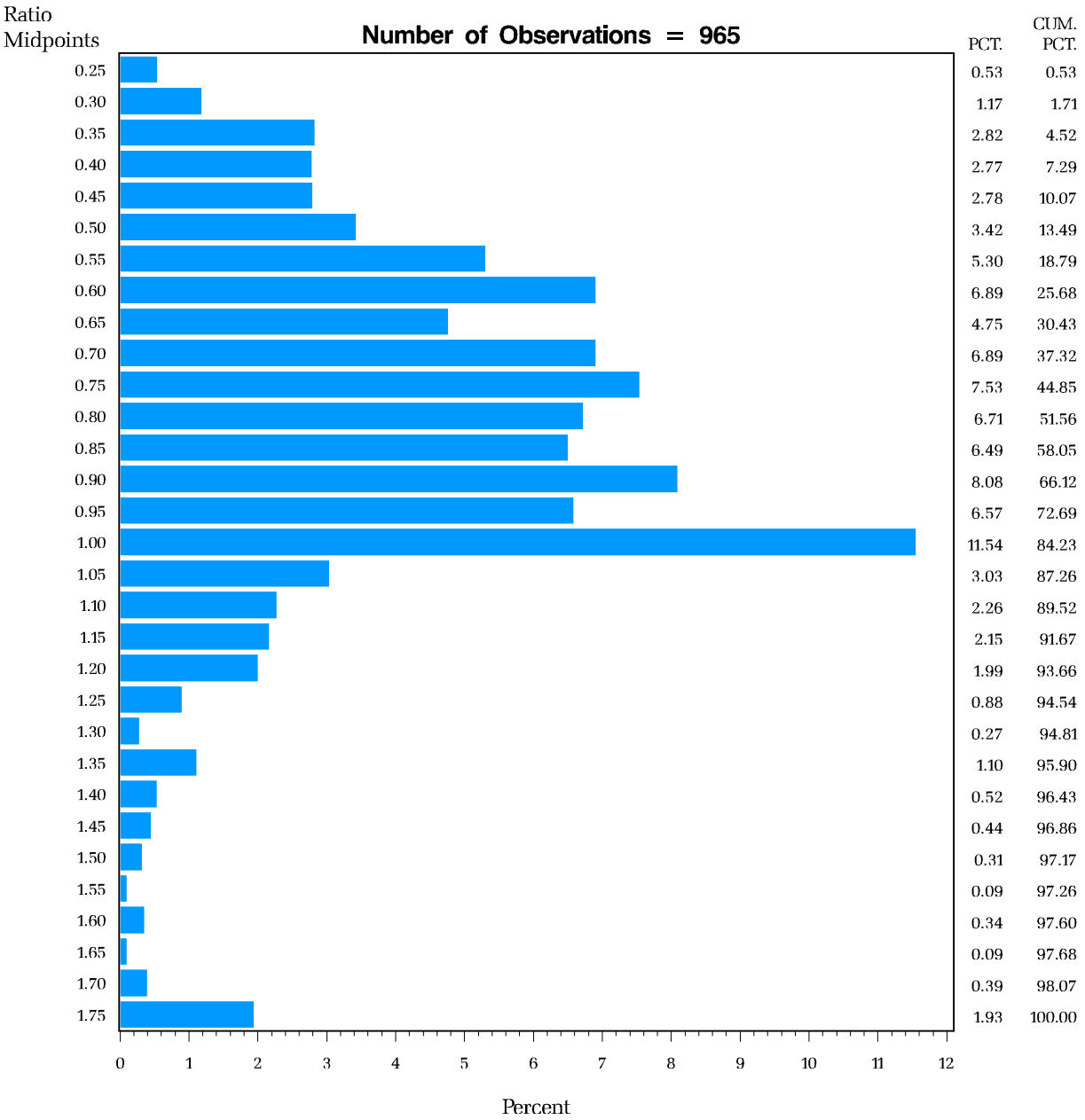
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Lewis County



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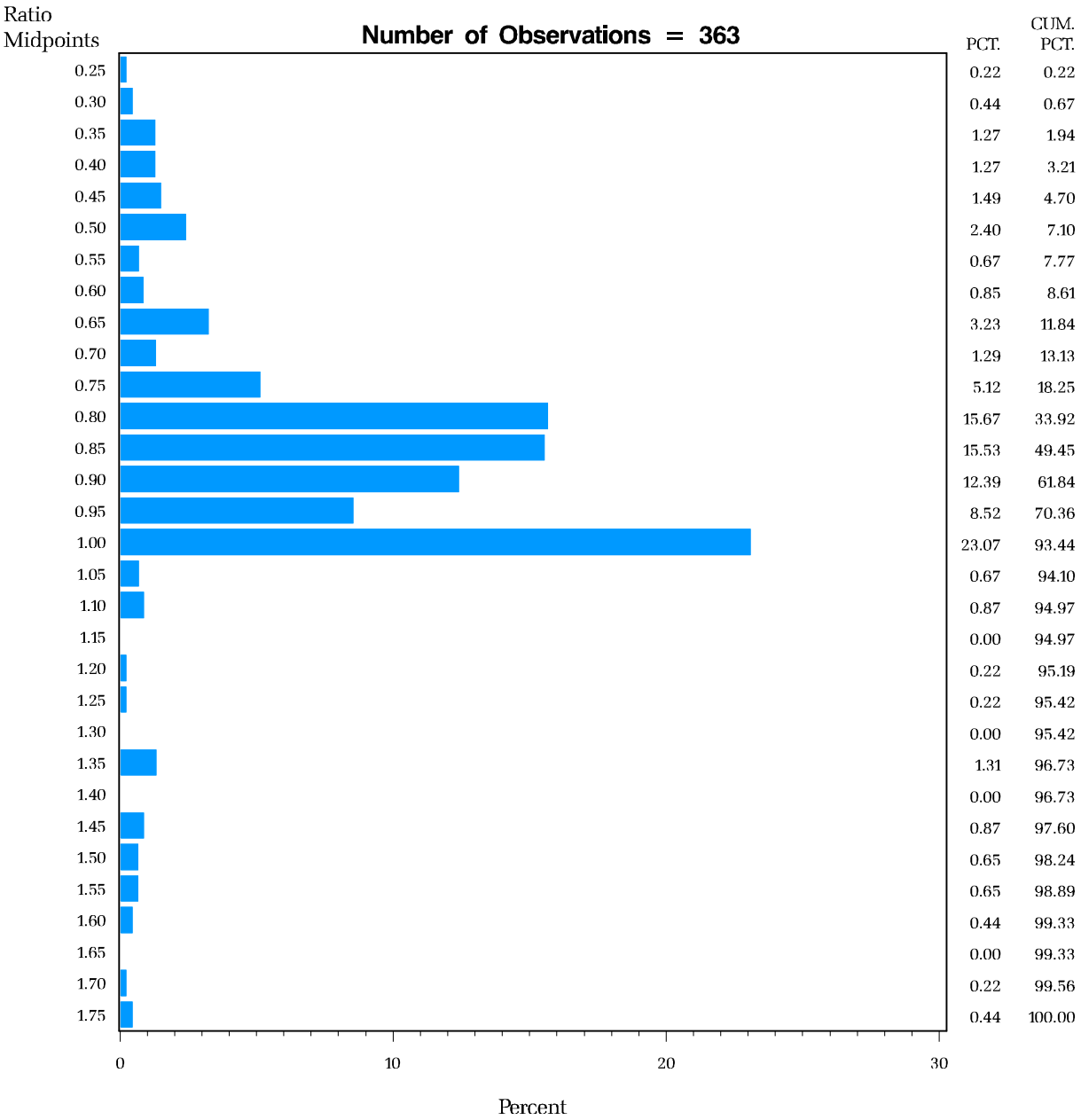
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Lincoln County



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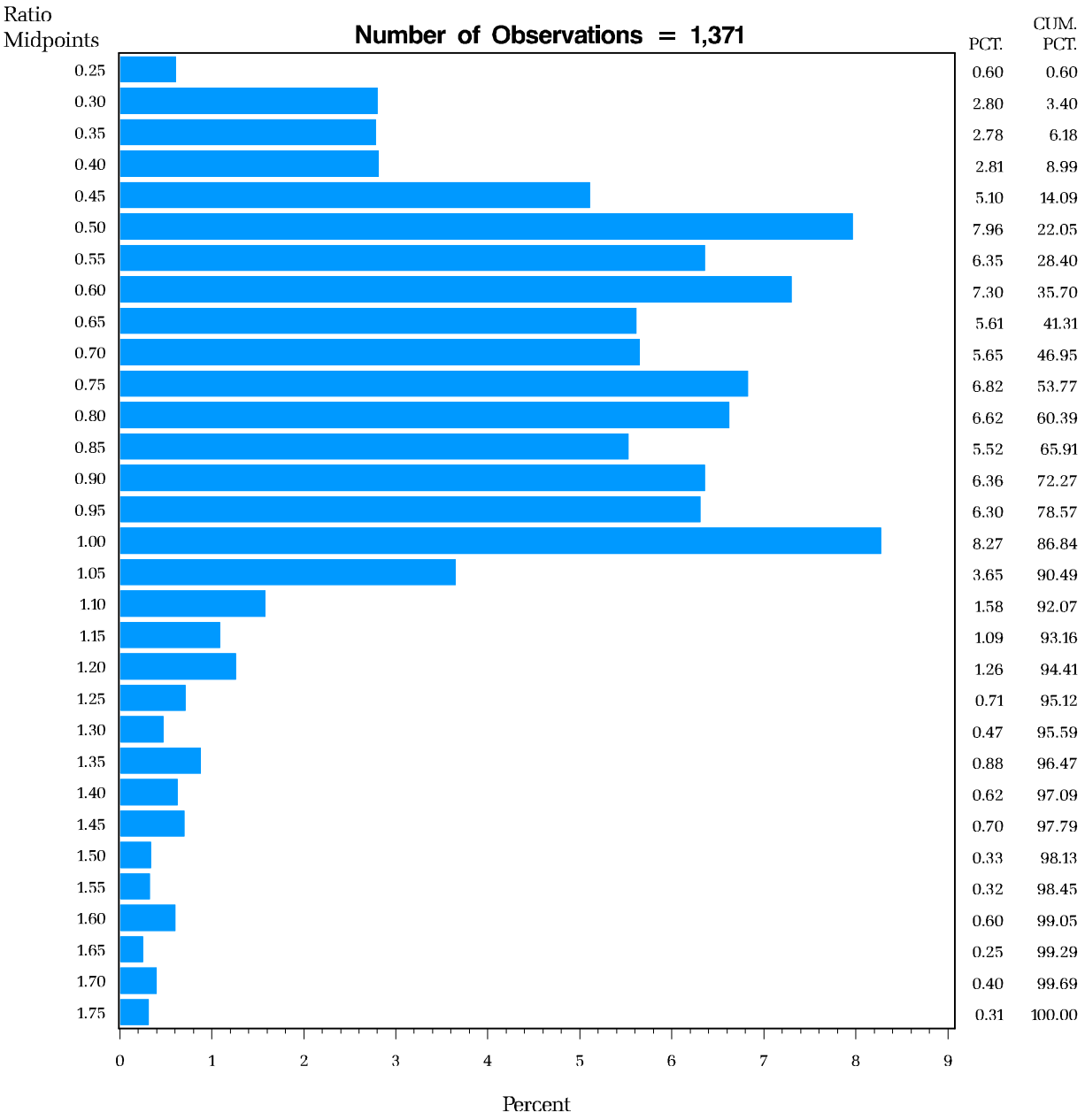
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Mason County



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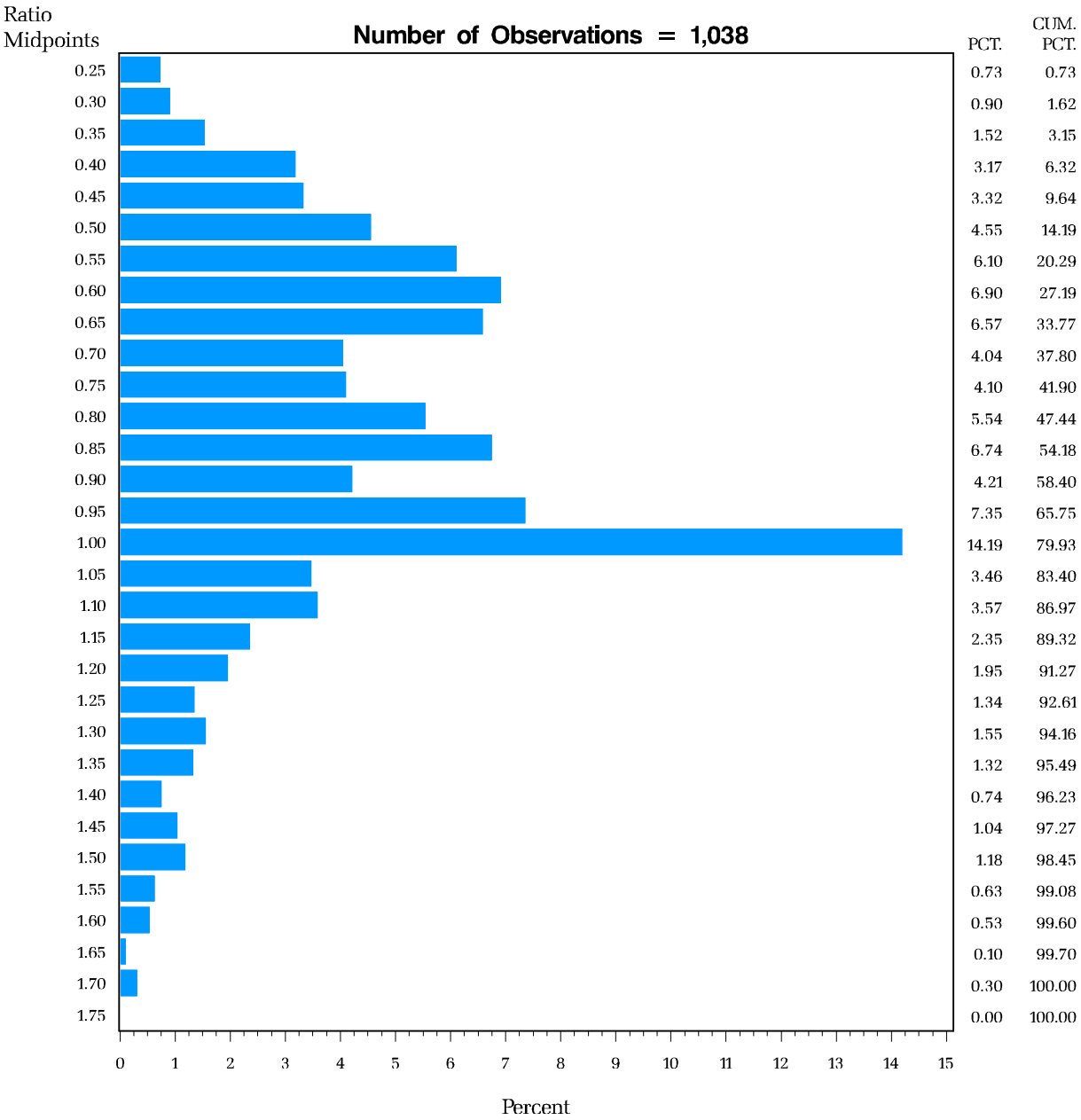
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Okanogan County



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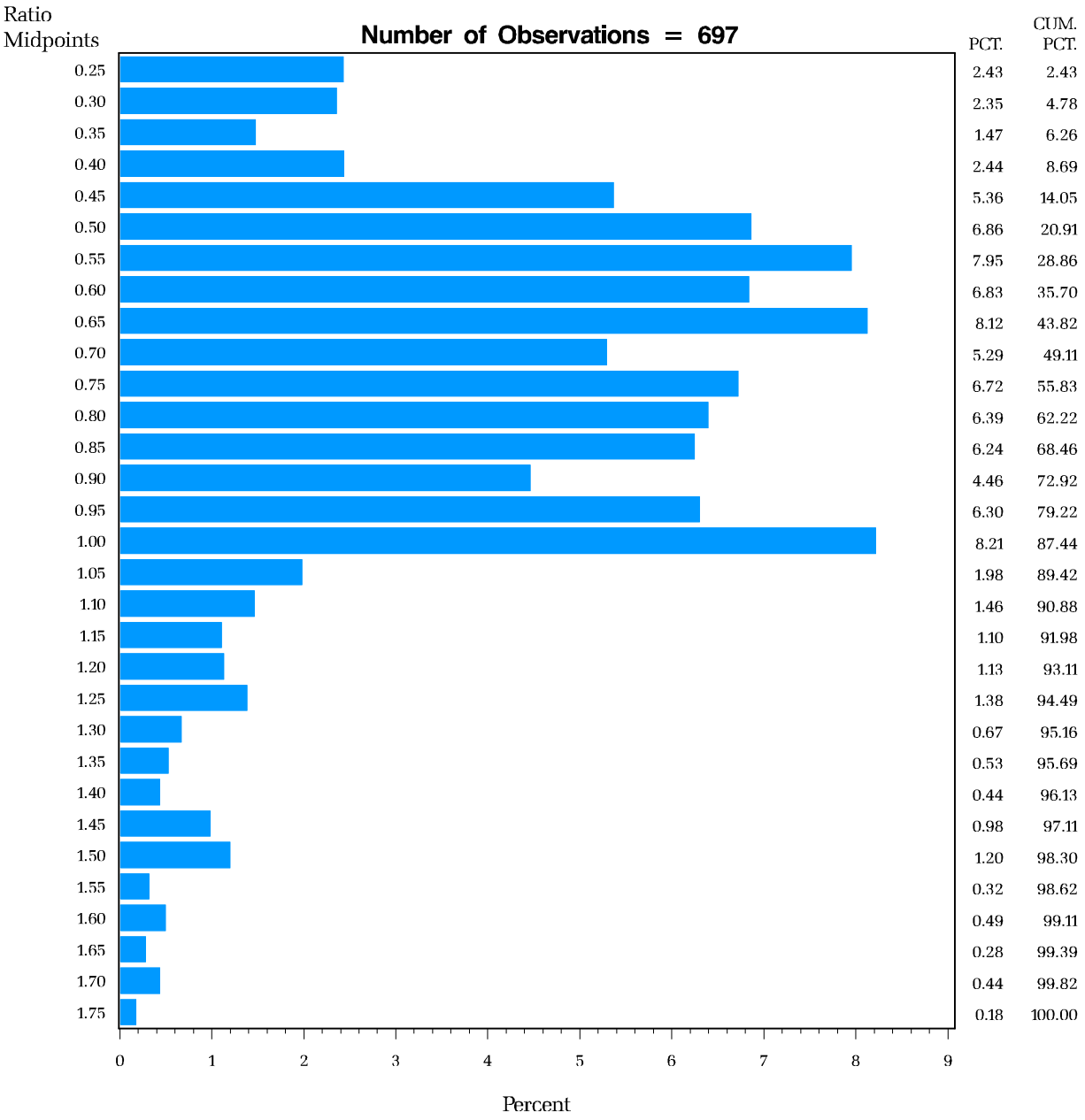
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Pacific County



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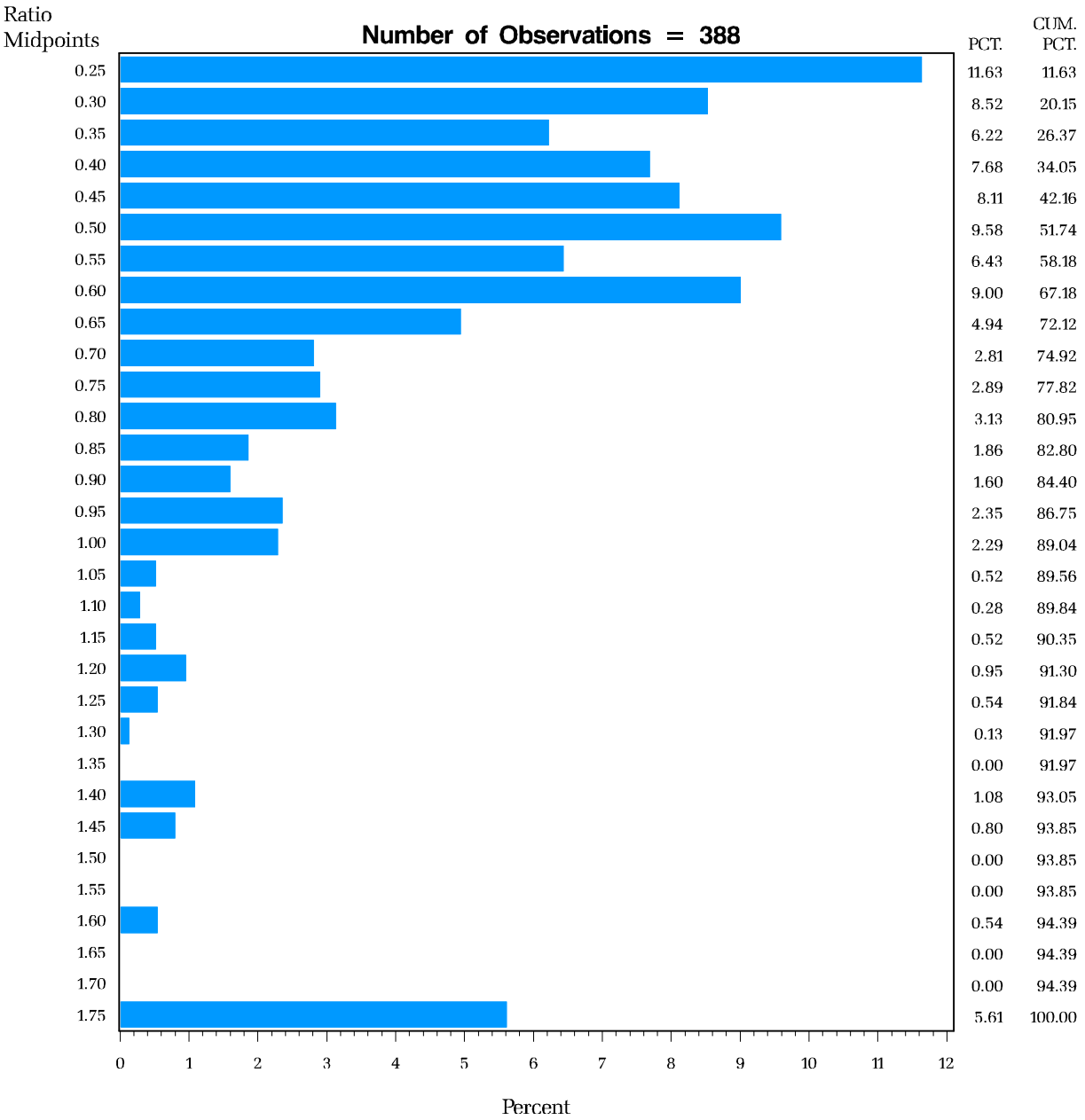
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Pend Oreille County



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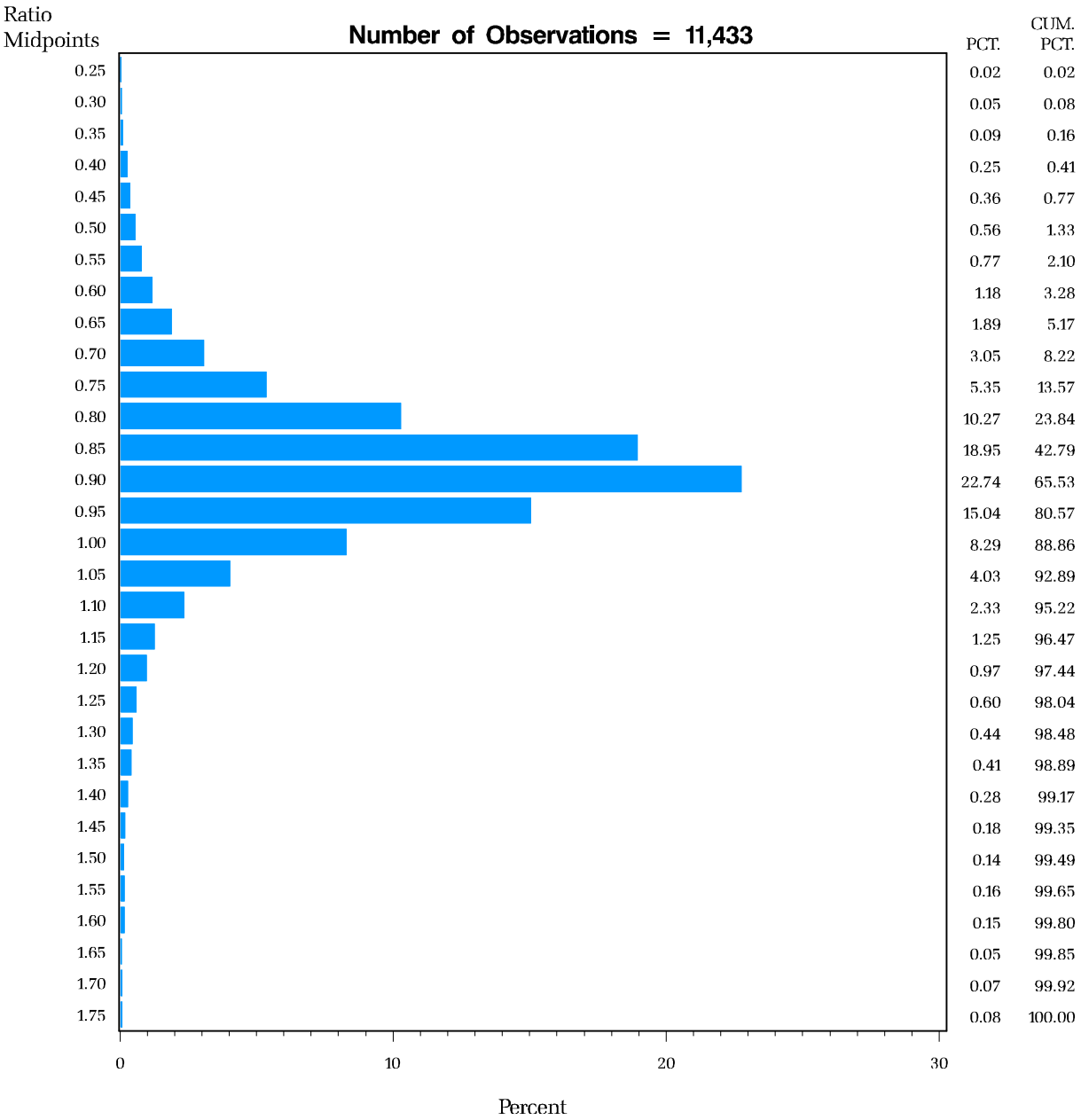
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Pierce County



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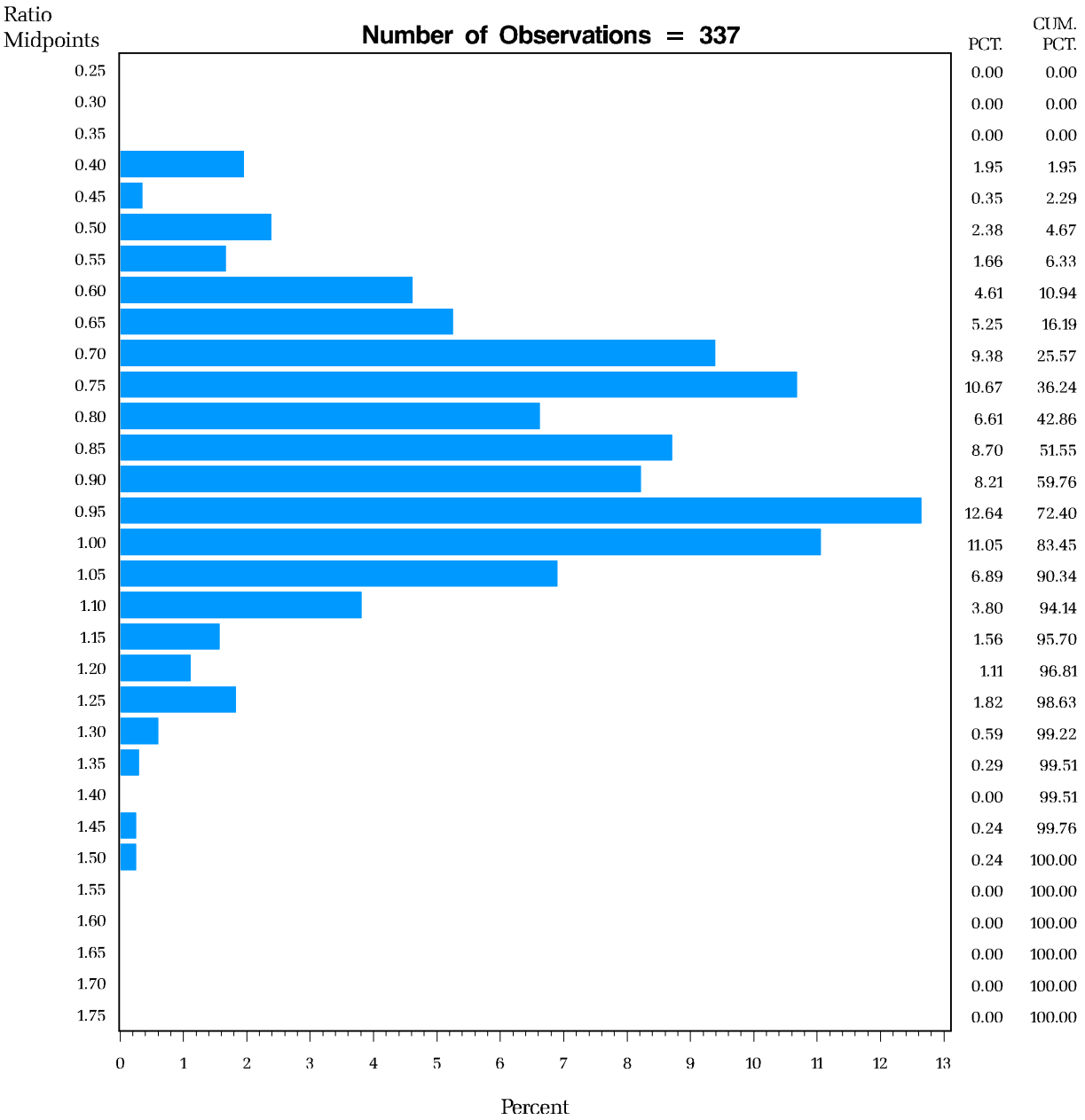
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for San Juan County



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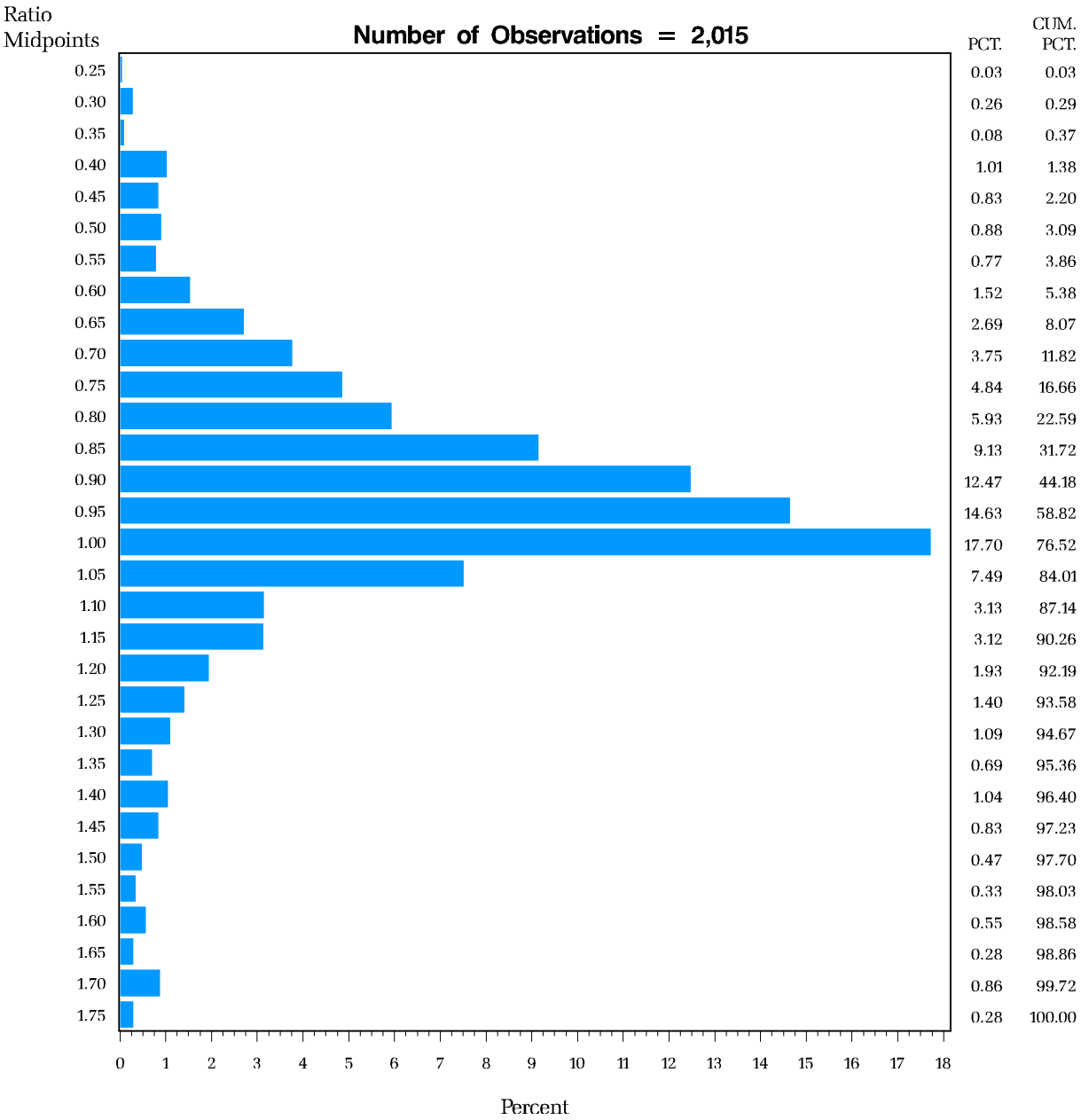
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Skagit County



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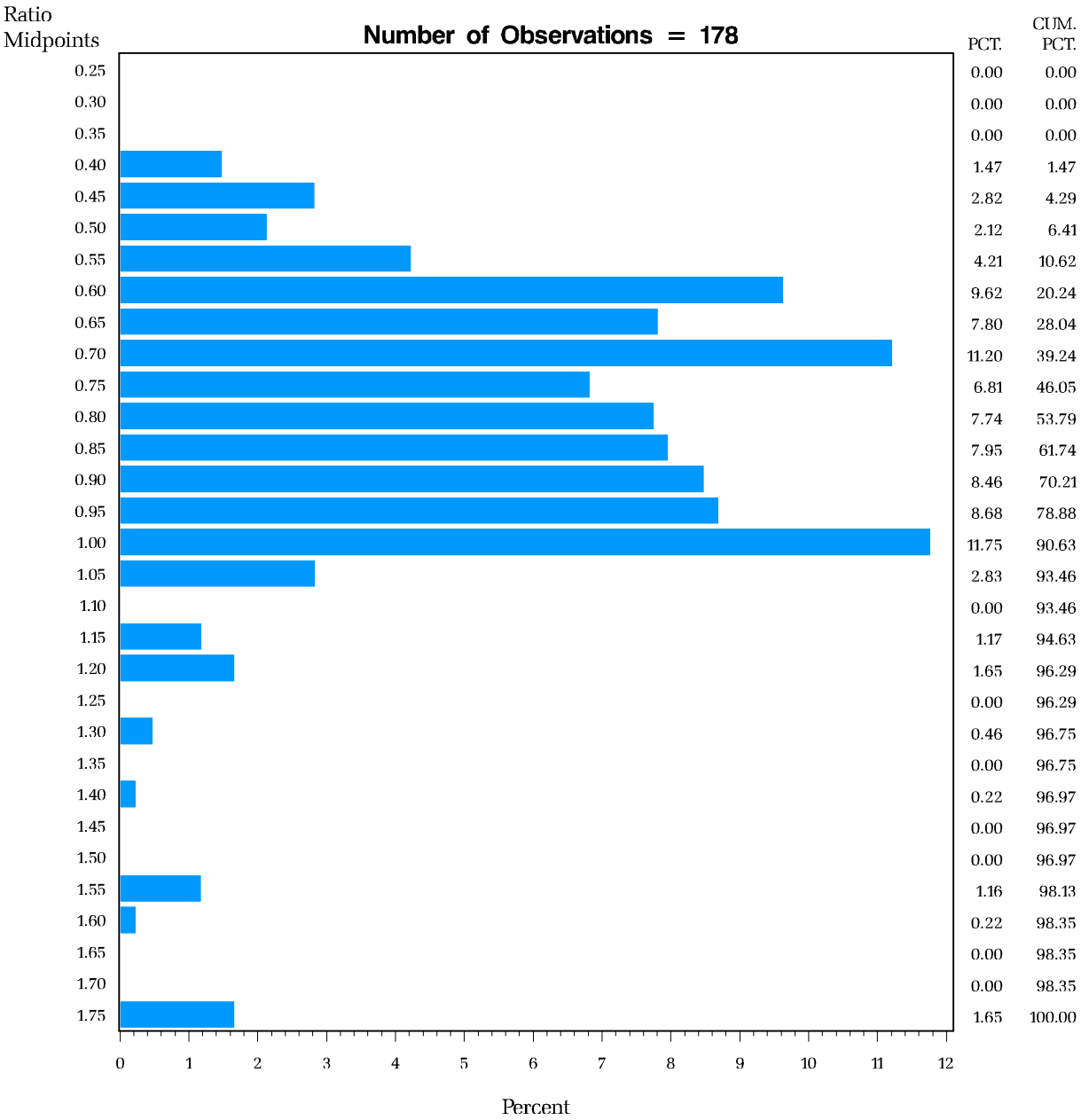
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Skamania County



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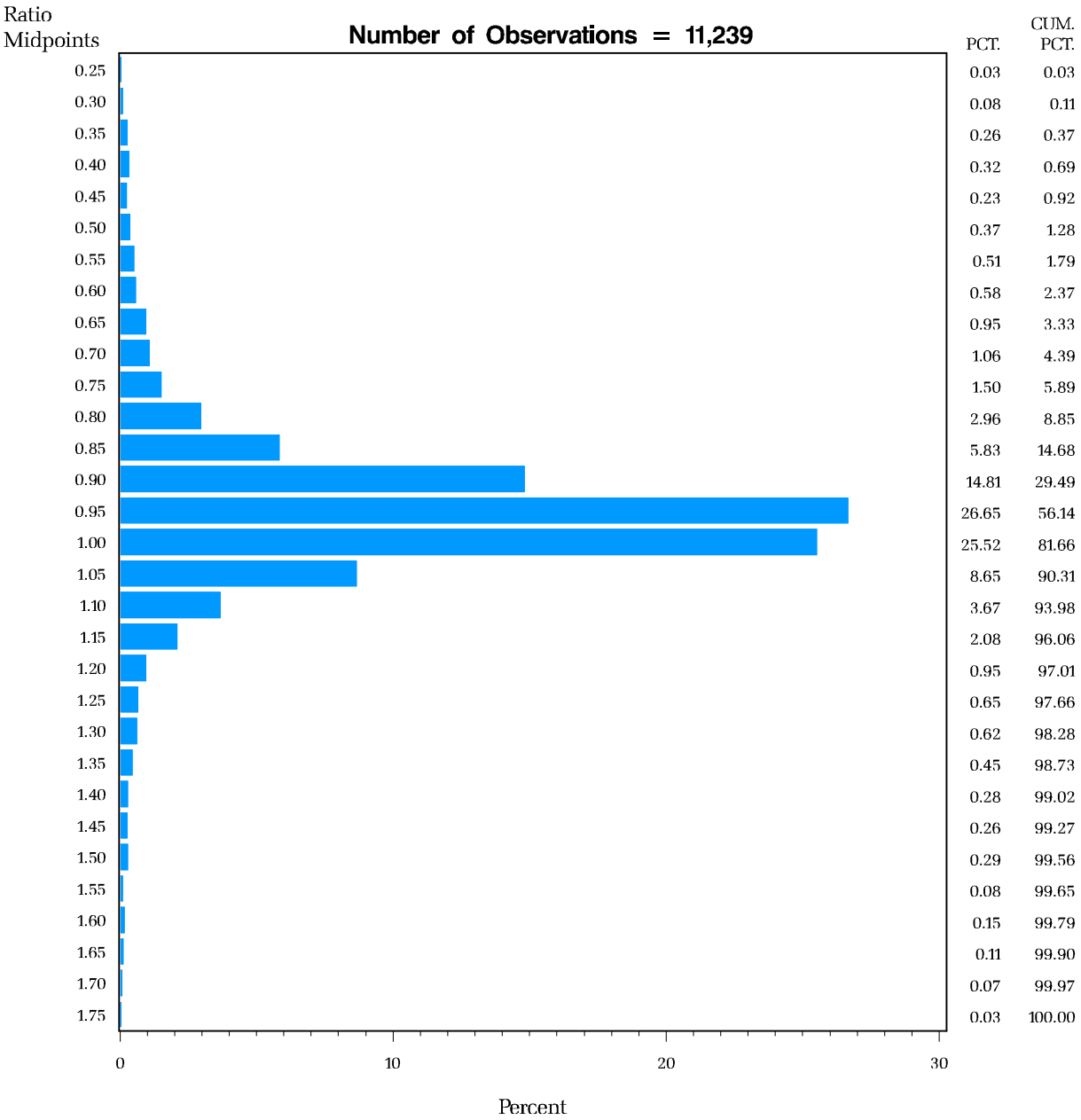
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Snohomish County



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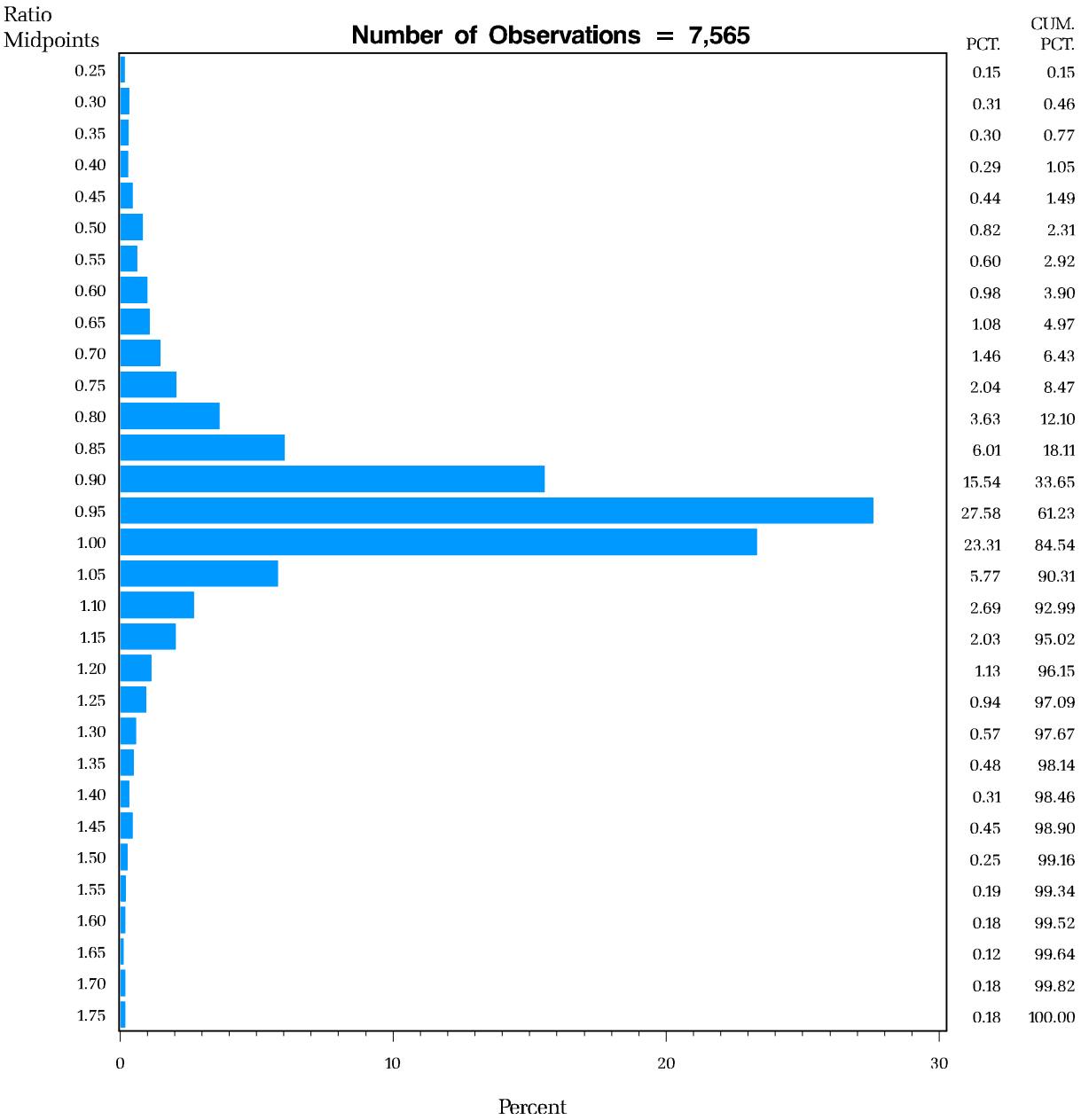
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Spokane County



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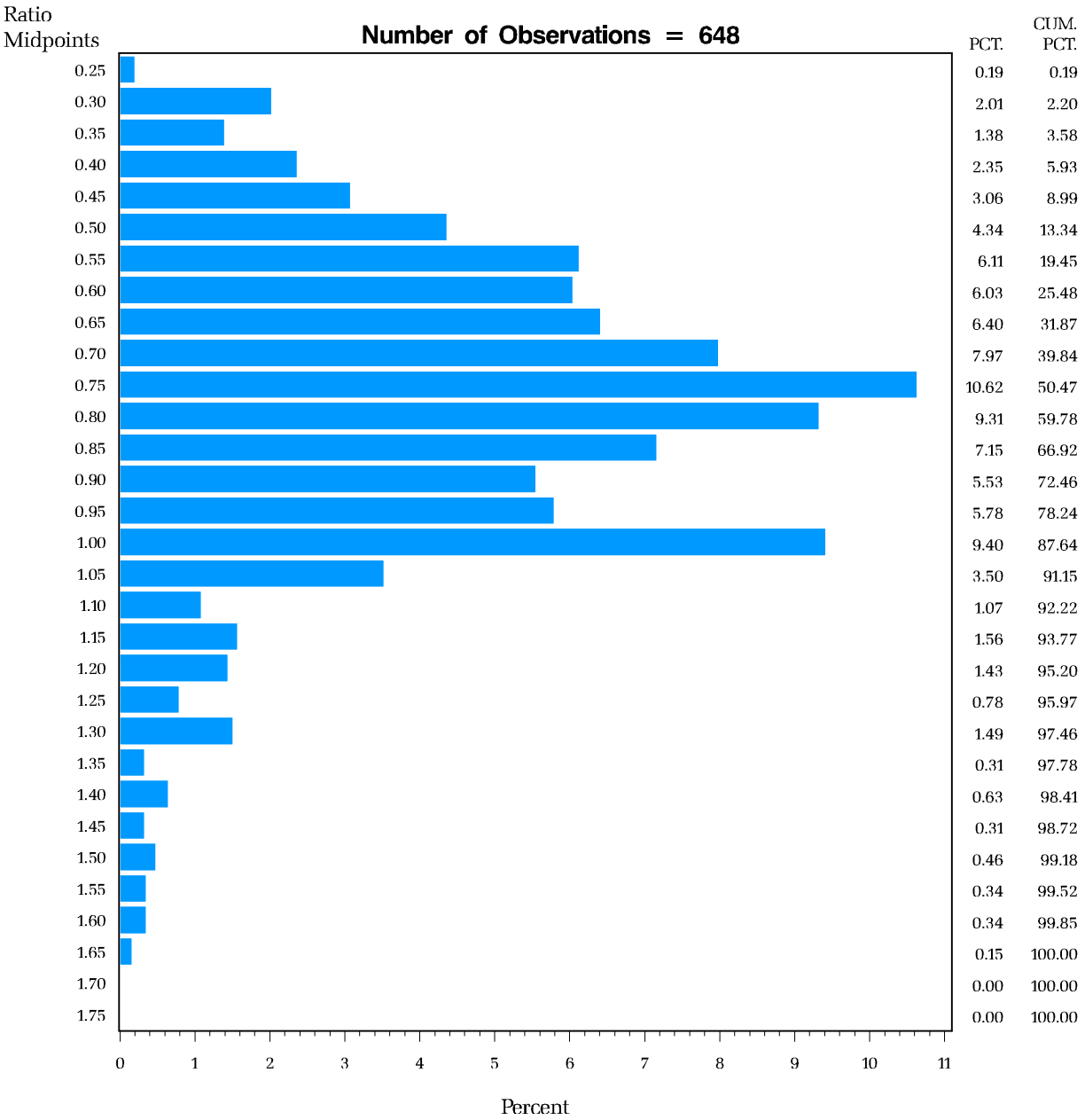
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Stevens County



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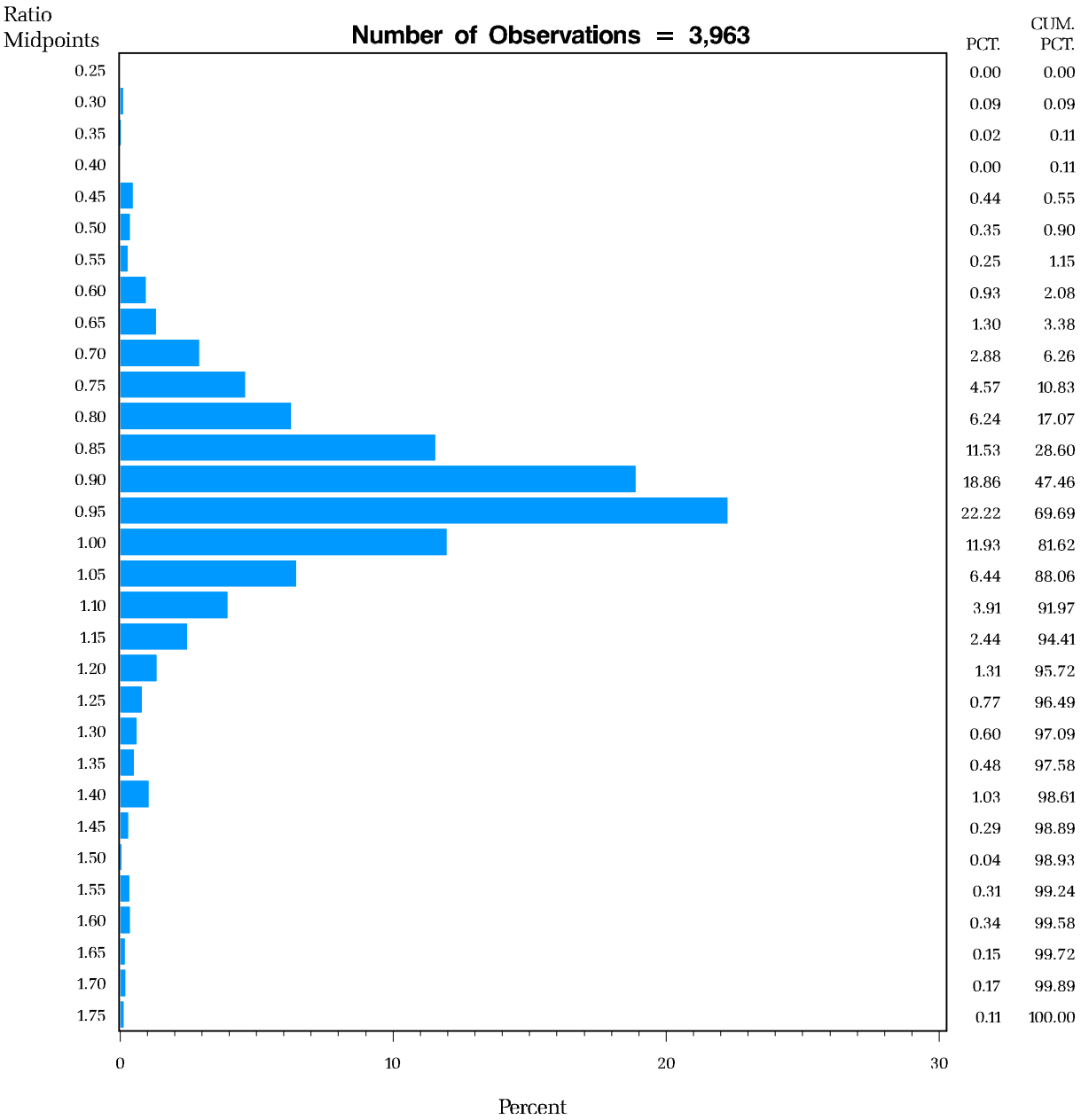
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Thurston County



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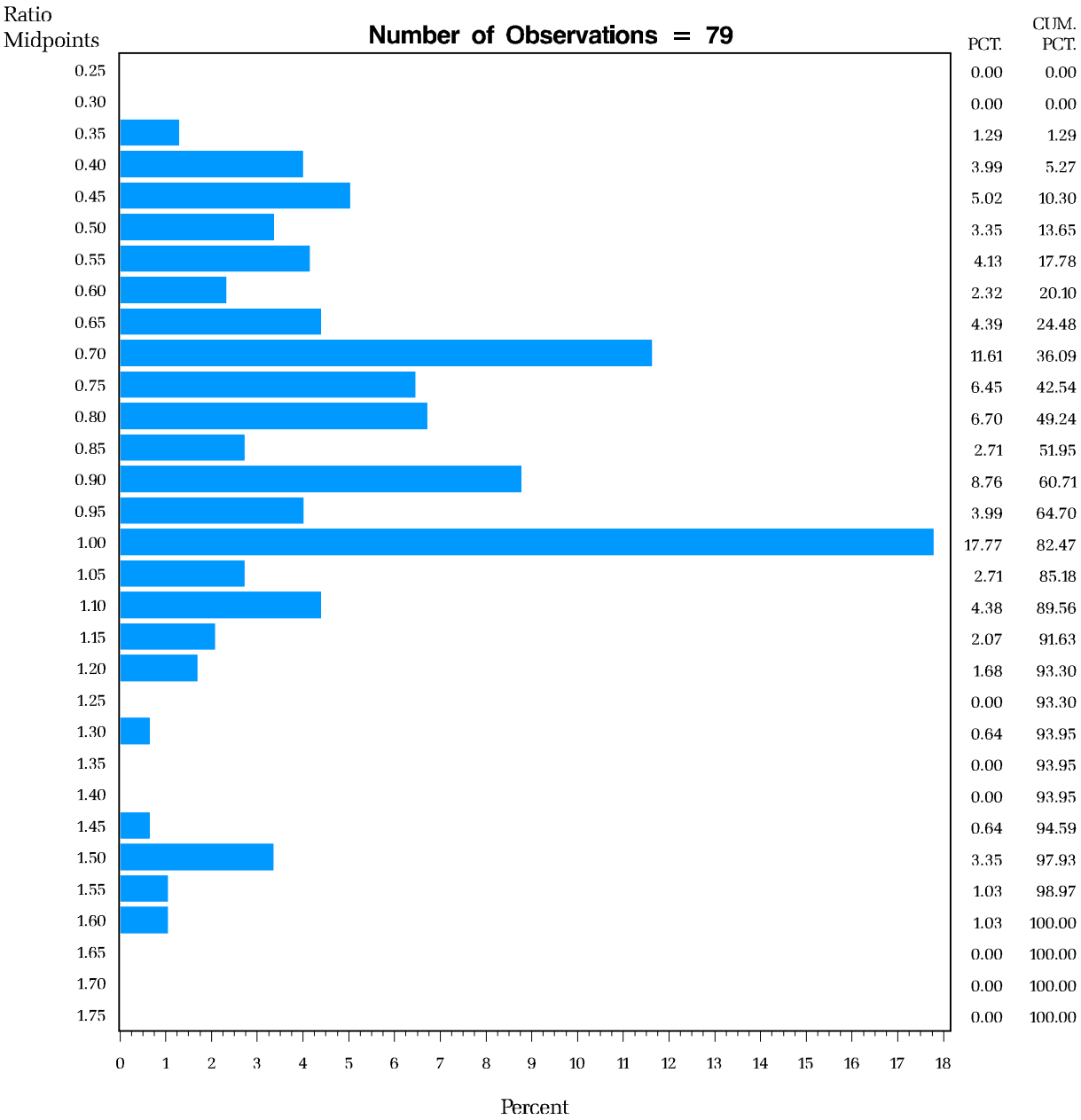
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Wahkiakum County



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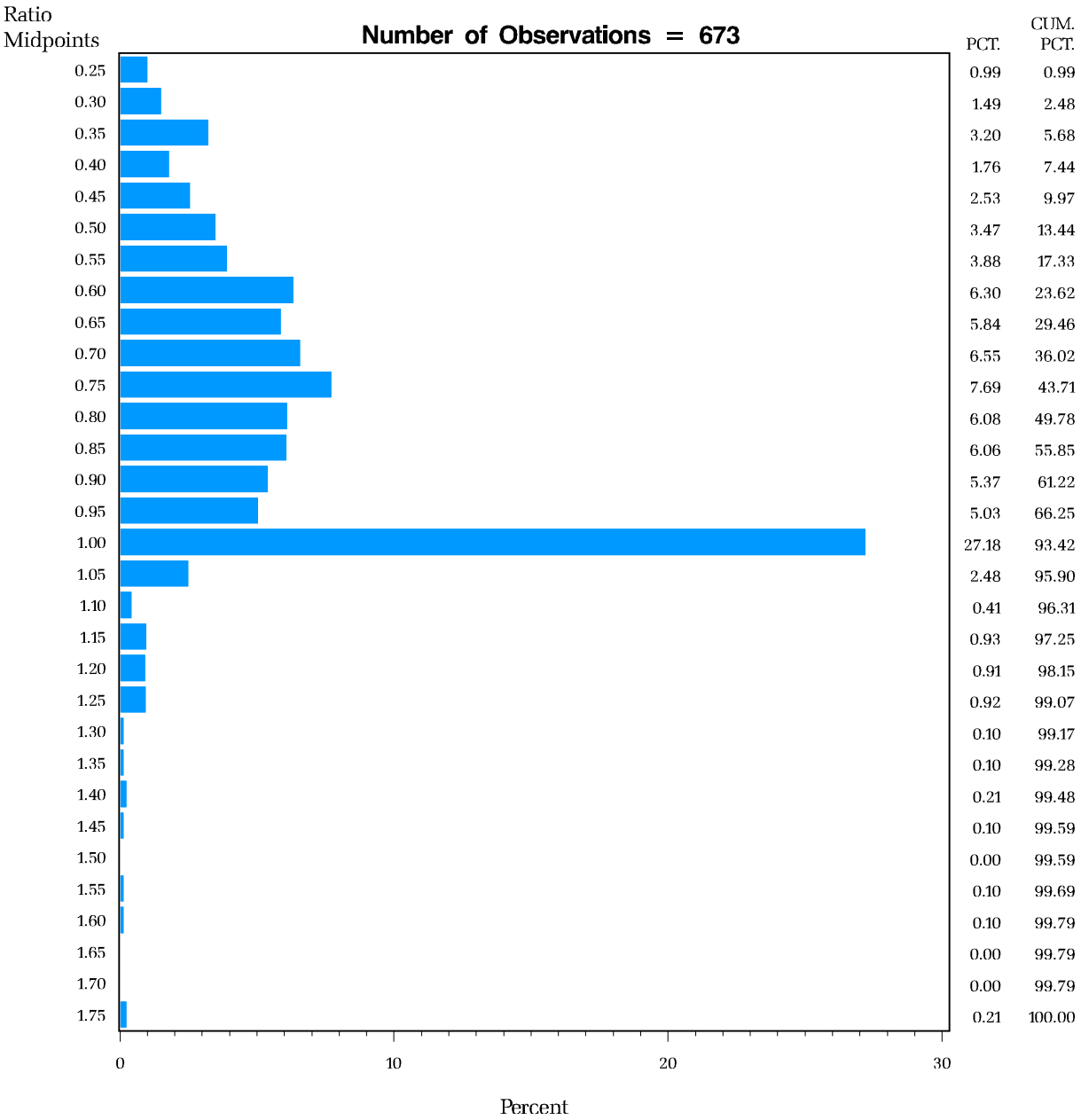
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Walla Walla County



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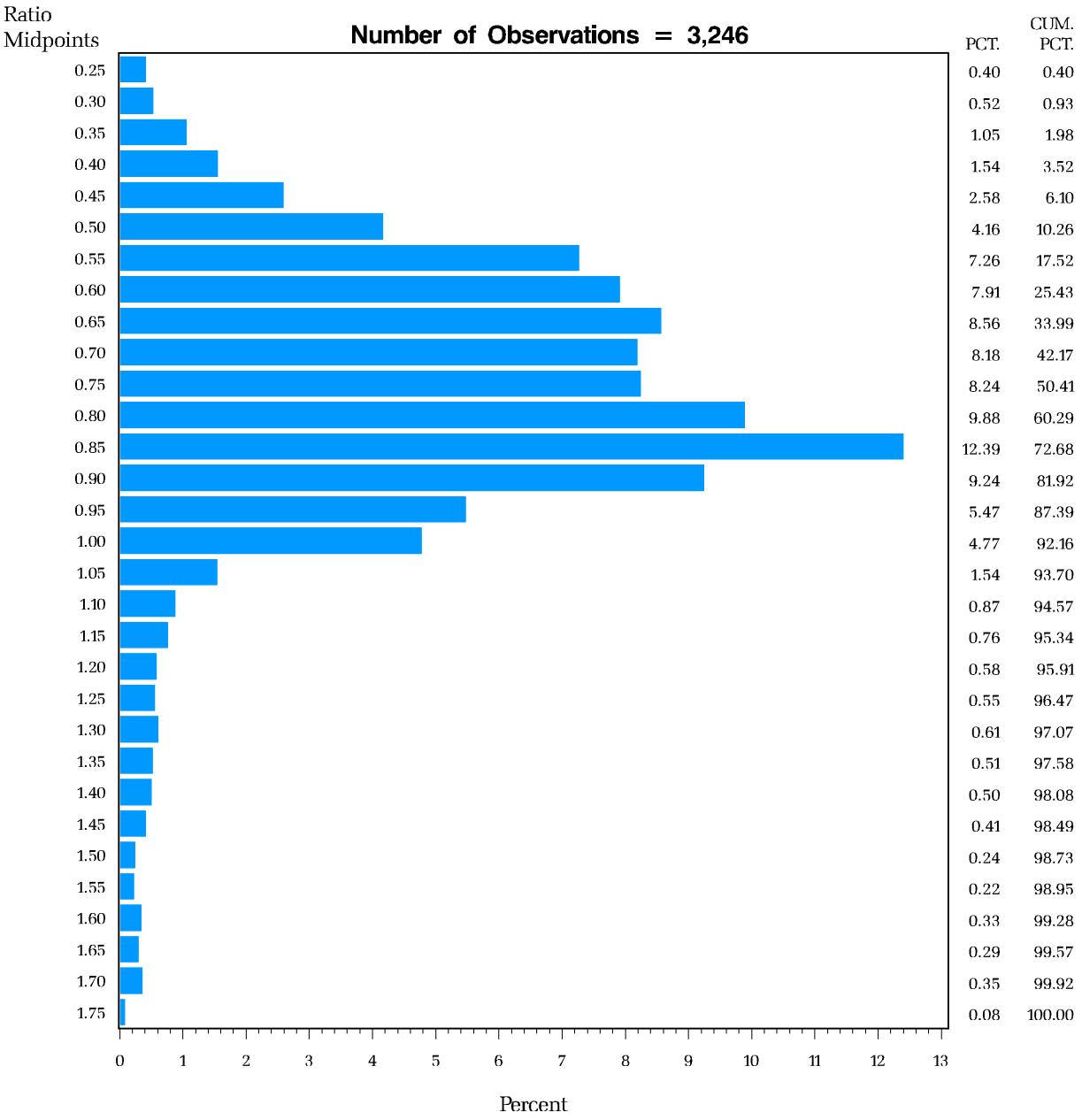
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Whatcom County



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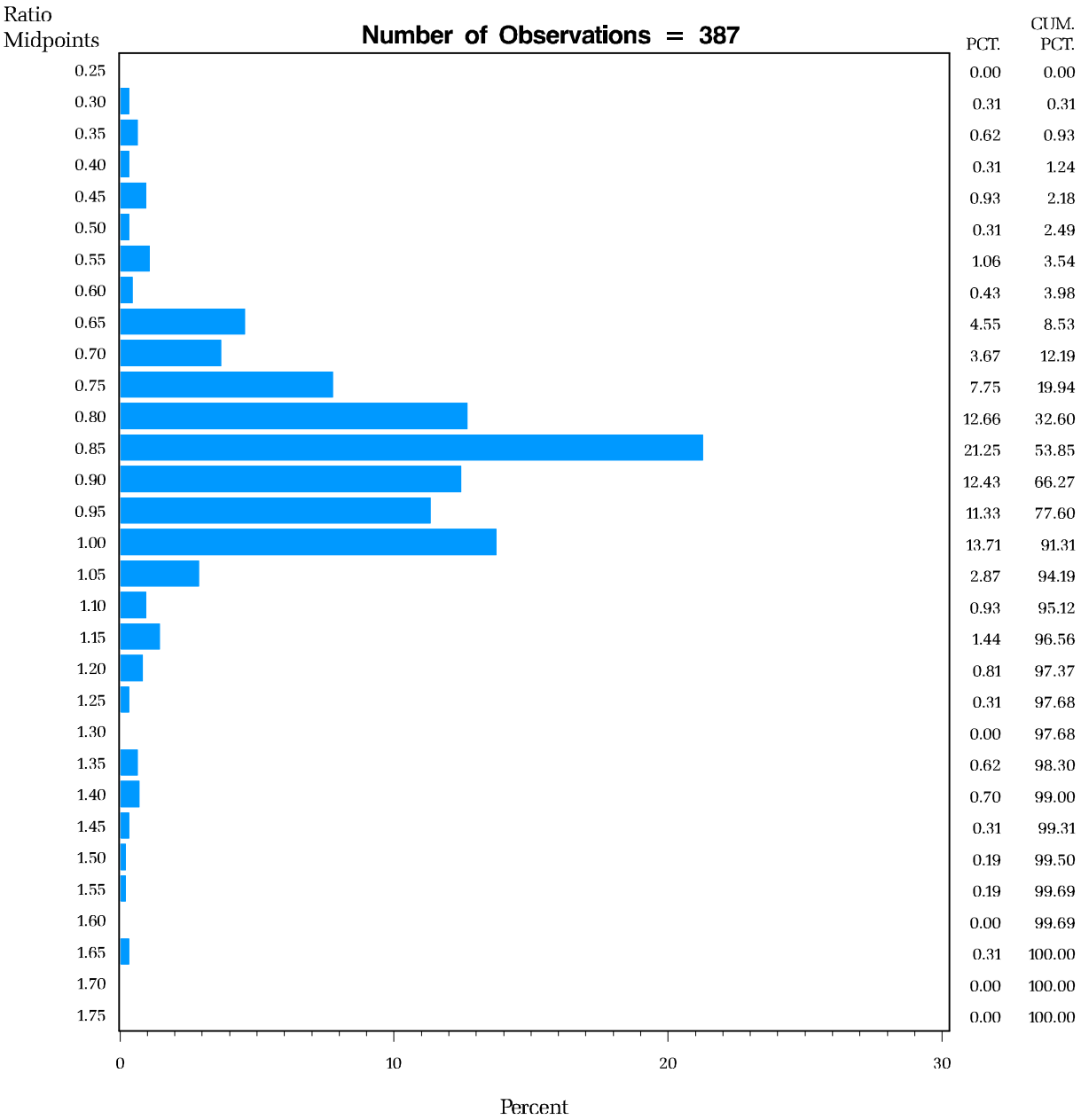
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Whitman County



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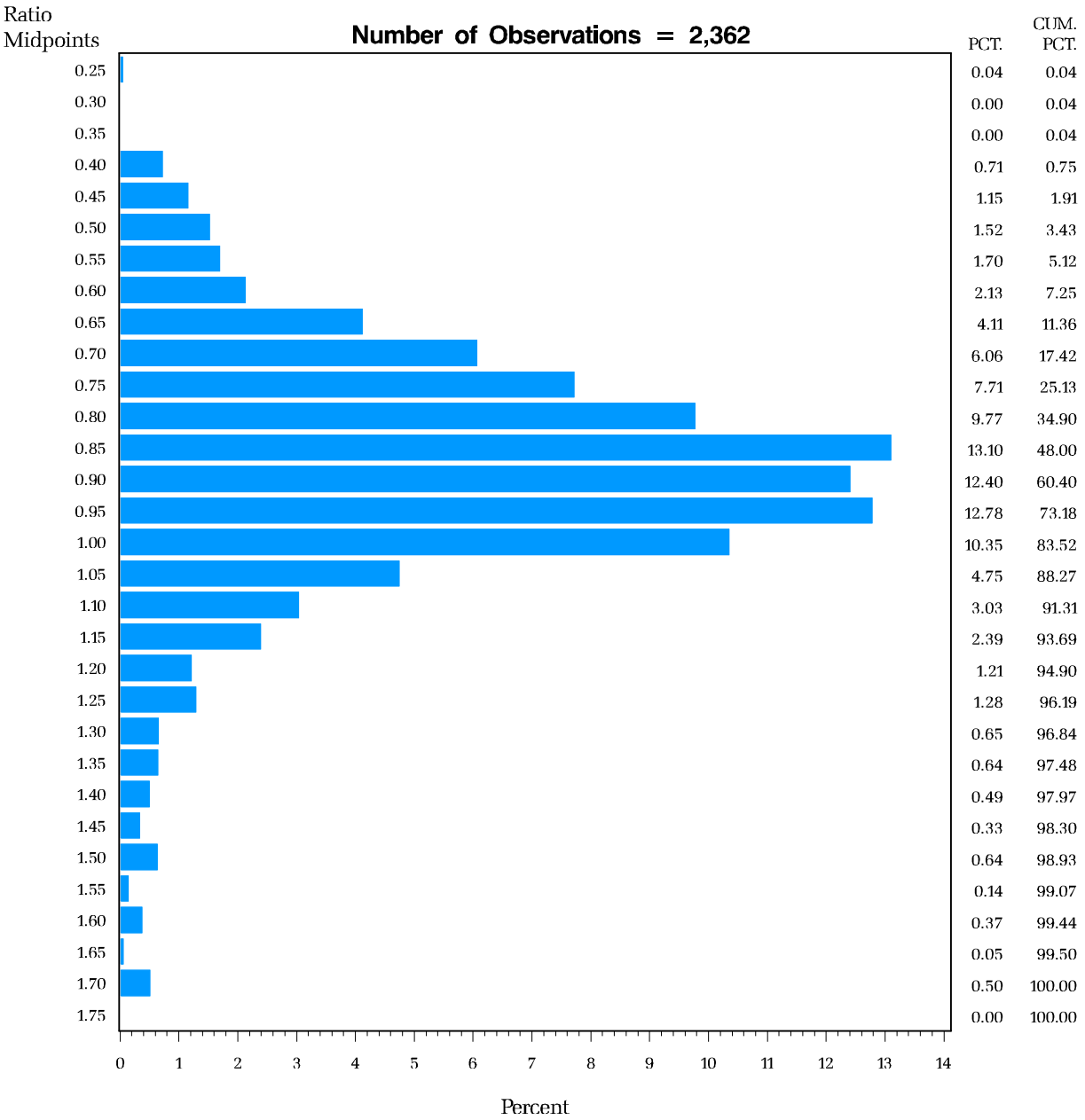
2007 Assessment Year

Frequency Distribution of Ratio of Assessed Value to Sales Value

Distribution for Yakima County



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