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

Office of Program Research
November 18, 1998

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

Rick Peterson
Office of Program Research
November 18, 1998

This study is an evaluation of assessment practices in the Washington property tax system. The House Finance Committee 1998 interim work plan includes a project on property tax assessment practices. This evaluation is a part of that project. This report is based on 1997 assessment year data and only covers real property.

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 a higher share of the taxes while properties with similar market values are paying a smaller share.

Ratio Study Method

This report uses the ratio study method to determine level of assessments and uniformity of assessments. The ratio study is the most common evaluation method 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 overassessed and properties with ratios less than one are underassessed. In practice, average or median assessment ratios are typically less than one. For example, the median assessment ratio for the state is 0.93. This means that half the properties have a ratio of assessed value to market value greater than 0.93 and half the properties have a ratio of assessed value to market value less than 0.93.

To illustrate the importance of the ratio, consider an example of two properties with a market value of $100,000. Assume one property is assessed at 90 percent of market value ($90,000) and the other at 110 percent of market value ($110,000). At the state average tax rate of $13.52, the first property has a tax bill of $1,217 and the second property has a tax bill of $1,487, 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.

Summary of Findings

Level of Assessment

The IAAO Standard suggests that level of assessment be evaluated by using the median assessment ratio for each jurisdiction being reviewed.

When evaluating residential and nonresidential property together, 26 counties are within IAAO standards for overall county assessment level. Thirteen counties are not within IAAO standards.

For residential property, 22 counties are within IAAO standards for assessment level. Eleven counties are not within IAAO standards for the level of assessment for residential property. Residential versus nonresidential data is not available for 6 counties.

[1]Standard on Ratio Studies, International Association of Assessing Officers, July 1990

For nonresidential property, 19 counties are within IAAO standards for assessment level. Fourteen counties are not within IAAO standards for the level of assessment for nonresidential property. Residential versus nonresidential data is not available for 6 counties.

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. This test is satisfied by 33 counties for residential property and 30 counties for nonresidential property. Residential versus nonresidential data is not available for 6 counties.

The IAAO Standard suggests that residential properties have a coefficient of dispersion less than 15 percent. Fourteen counties meet this standard. Nineteen 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. Thirteen counties are within this standard while twenty counties fail to reach this standard.

The IAAO Standard on Ratio Studies suggests that the price-related differential (a measure of vertical equity) should fall between 0.98 and 1.03. Twenty-two counties have price-related differentials within this range. Seventeen counties do not meet this standard.

Table 1 summarizes these results.

Table 1

Measuring Real Property Appraisal Performance								
	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			
Asotin				X	X			X
Benton	X	X		X	X	X	X	X
Chelan			X	X	X		X	X
Clallam	X	X	X	X	X	X	X	
Clark	X	X	X	X	X	X	X	
Columbia			X	X				
Cowlitz	X	X	X	X	X			
Douglas	X	X	X	X	X		X	
Ferry		X		X	X			
Franklin	X	X	X	X	X			
Garfield	X	*	*	*	*	*	*	
Grant				X				X
Grays Harbor	X	X	X	X	X			X
Island	X	*	*	*	*	*	*	X
Jefferson	X	X	X	X	X	X	X	X
King	X	X	X	X	X	X	X	X
Kitsap	X	X	X	X	X	X	X	X
Kittitas	X	X	X	X	X	X	X	X
Klickitat	X	*	*	*	*	*	*	
Lewis	X	X		X	X			
Lincoln				X	X			X
Mason				X	X			X
Okanogan				X	X			
Pacific		*	*	*	*	*	*	X
Pend Oreille				X	X			
Pierce	X	X	X	X	X	X		X
San Juan	X	X	X	X	X	X	X	X
Skagit	X	X	X	X	X	X	X	
Skamania				X	X			X
Snohomish	X	X	X	X	X	X		
Spokane	X	X		X	X			X
Stevens	X	*	*	*	*	*	*	X
Thurston	X	X	X	X	X	X	X	X
Wahkiakum				X	X			X
Walla Walla	X	X		X		X	X	X
Whatcom	X		X	X	X	X		
Whitman	X	*	*	*	*	*	*	
Yakima		X		X	X			X
	26	22	19	33	30	14	13	22
	* These six counties do not have data by land use classification.							

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 0.93. This means that half the properties have ratio of assessed value to market value greater than 0.93 and half the properties have a ratio of assessed value to market value less than 0.93. This is well 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 0.75 in Pend Oreille County to 1.02 in Island County. Seventeen counties have median ratios below 0.90. The remainder (22) have ratios between 0.90 and 1.02.

Since this study is based on a sample and not the universe of properties, it is not possible to say with certainty that all of these seventeen counties are below the IAAO standard of 0.90. It is possible that if a ratio was determined for every property in the county that the true median ratio would be at least 0.90. To determine the chance that this is the case a standard statistical test (the binomial test) was performed. This test indicates that it is most probable the following thirteen counties have median ratios less than 0.90: Asotin, Chelan, Columbia, Ferry, Grant, Lincoln, Mason, Okanogan, Pacific, Pend Oreille, Skamania, Wahkiakum, Yakima. The likelihood that the true median is greater than 0.90 for these counties is less than 5 percent (Prob <5%). Four counties, Garfield, Lewis, Stevens, and Walla Walla, have median ratios below 0.90 but the statistical test indicates there is some possibility (Prob > 5%) that the true median ratio may be at least 0.90 and therefore within the IAAO standards.

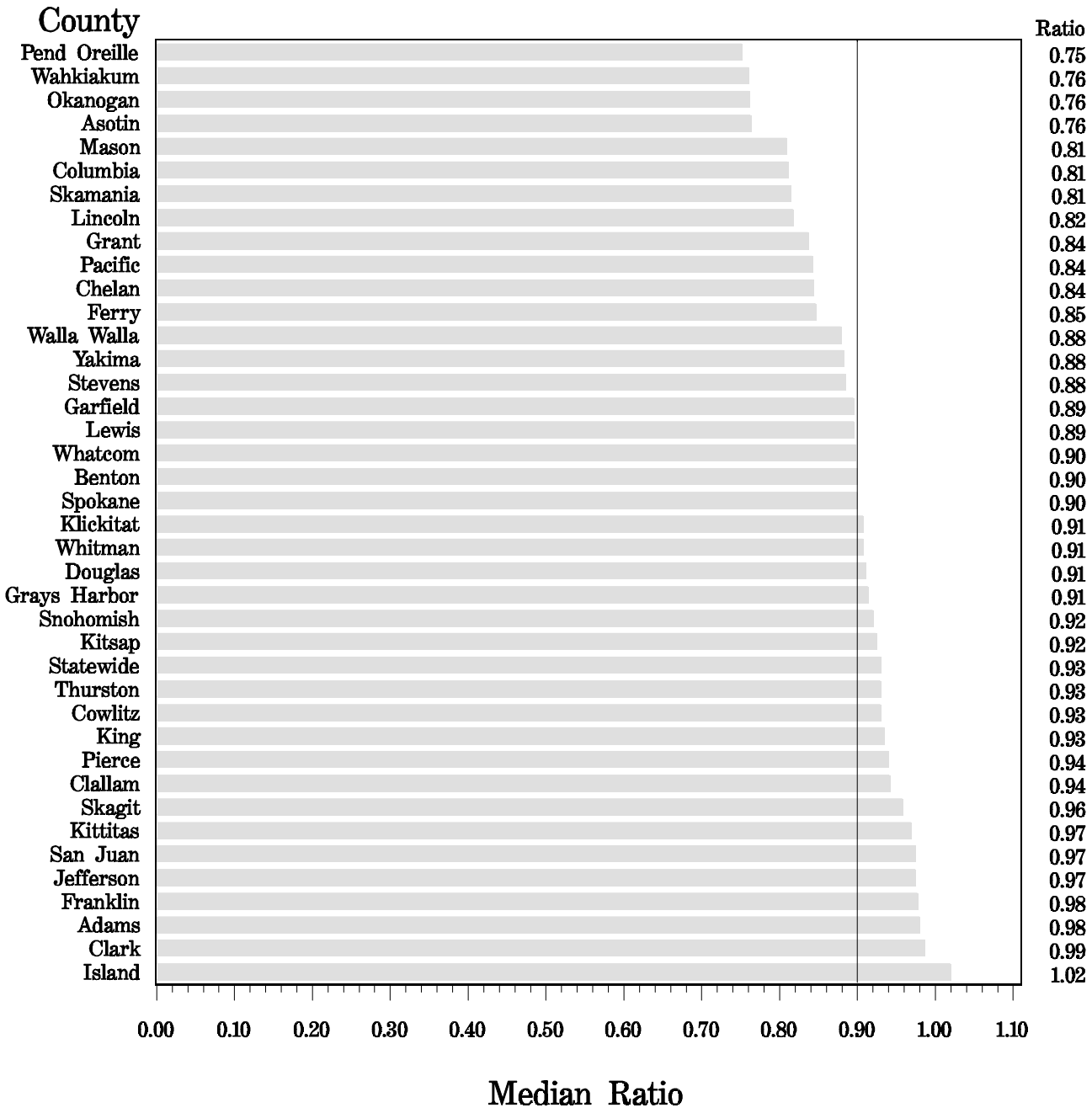
In summary, 26 counties satisfy the IAAO standard for assessment level.

Chart 1

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 Residential and Nonresidential

The IAAO Standard states that assessment ratios for each major class of property should be between 0.90 and 1.10. All but these six counties, Garfield, Island, Klickitat, Pacific, Stevens, and Whitman, reported assessed value data with land use classifications. Based on this information the data was divided between residential and nonresidential property. Then the median ratio was calculated for each class. On a statewide basis, the median ratio for residential property was 0.93 while the median ratio for nonresidential property was 0.91. 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 0.70 in Pend Oreille County to a high of 0.99 in Clark County. The median ratio for nonresidential property ranges from a low of 0.65 in Wahkiakum County to a high of 1.00 in San Juan County.

Twelve counties have residential median ratios below the IAAO suggested standard of 0.90. After performing the binomial test, it is most probable that the following eleven counties have median ratios for residential property less than 0.90: Asotin, Chelan, Columbia, Grant, Lincoln, Mason, Okanogan, Pend Oreille, Skamania, Wahkiakum, and Whatcom.

Sixteen counties have nonresidential median ratios below the IAAO standard of 0.90. After performing the binomial test, it is most probable that the following fourteen counties have median ratios for residential property less than 0.90: Asotin, Benton, Ferry, Grant, Lewis, Lincoln, Mason, Okanogan, Pend Oreille, Skamania, Spokane, Wahkiakum, Walla Walla, and Yakima.

In summary, 22 counties satisfy the IAAO standard for the assessment level of residential property, 11 do not. Nineteen counties satisfy the IAAO standard for the assessment level of nonresidential property, 14 do not.

CHART 2

Median Ratio for Residential Property

Ratio of Assessed Value to Sales Value

The median ratio should be between 0.90 and 1.10

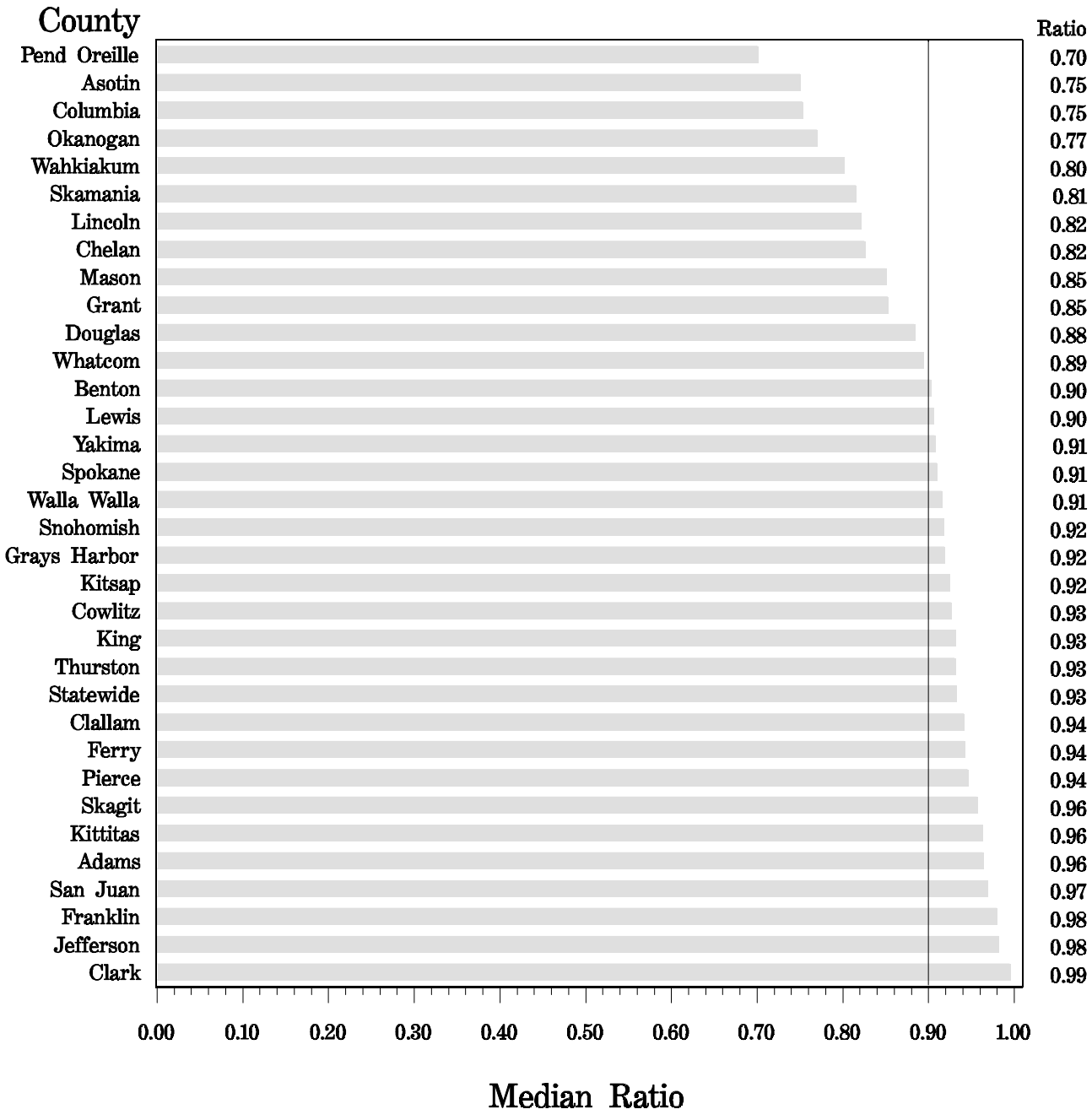
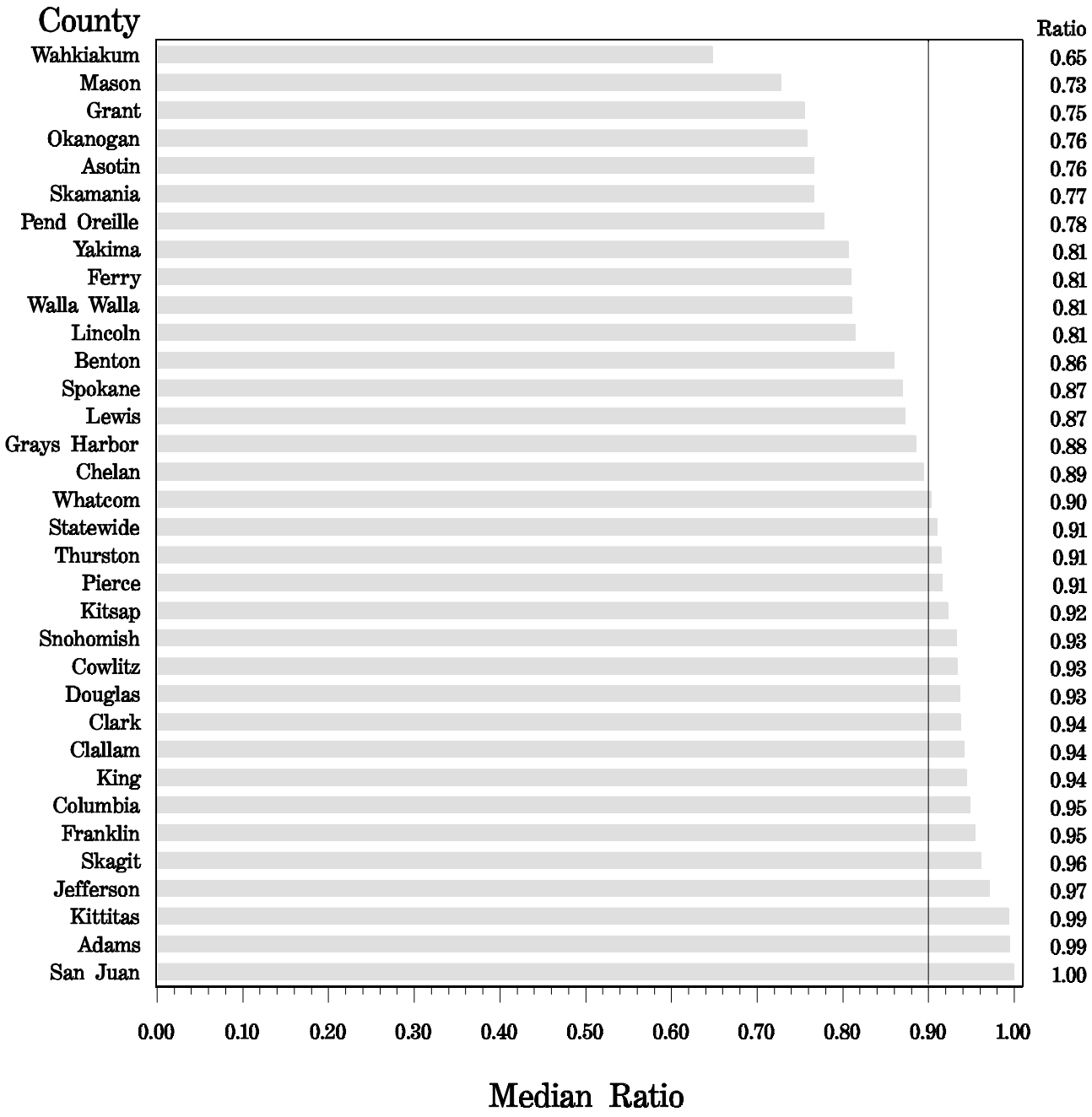


CHART 3

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 is to measure 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. 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 is to measure vertical equity in assessments. Vertical equity refers to the consistency at which lower valued properties are assessed compared to higher valued properties. To view vertical equity, the data is sorted from the lowest market value property to the highest market value property. It is then divided into four equal groups. The median ratio is calculated for each group and graphed. 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 33 counties with data available for residential and nonresidential property, 5 appear to have residential property ratios either greater than 1.05 percent of the county median ratio or less than 0.95 of the county median ratio. However all these percent differences are close enough to 5 percent to conclude, after performing the binomial test, that all counties are within the IAAO standard.

Eight counties appear to have nonresidential property ratios either greater than 1.05 percent of the county median ratio or less than 0.95 of the county median ratio. After performing the binomial test, it is most probable that Grant County and Walla Walla County have median ratios for nonresidential property more than 5 percent below the countywide median. Under this same test, it is most probable that Columbia County has a median ratio for nonresidential more than 5 percent greater than the countywide median. The remaining thirty counties satisfy the IAAO standard for having median ratios for nonresidential property within 5 percent of the countywide median ratio.

CHART 4

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

The difference should be within 5 percent of countywide median ratio

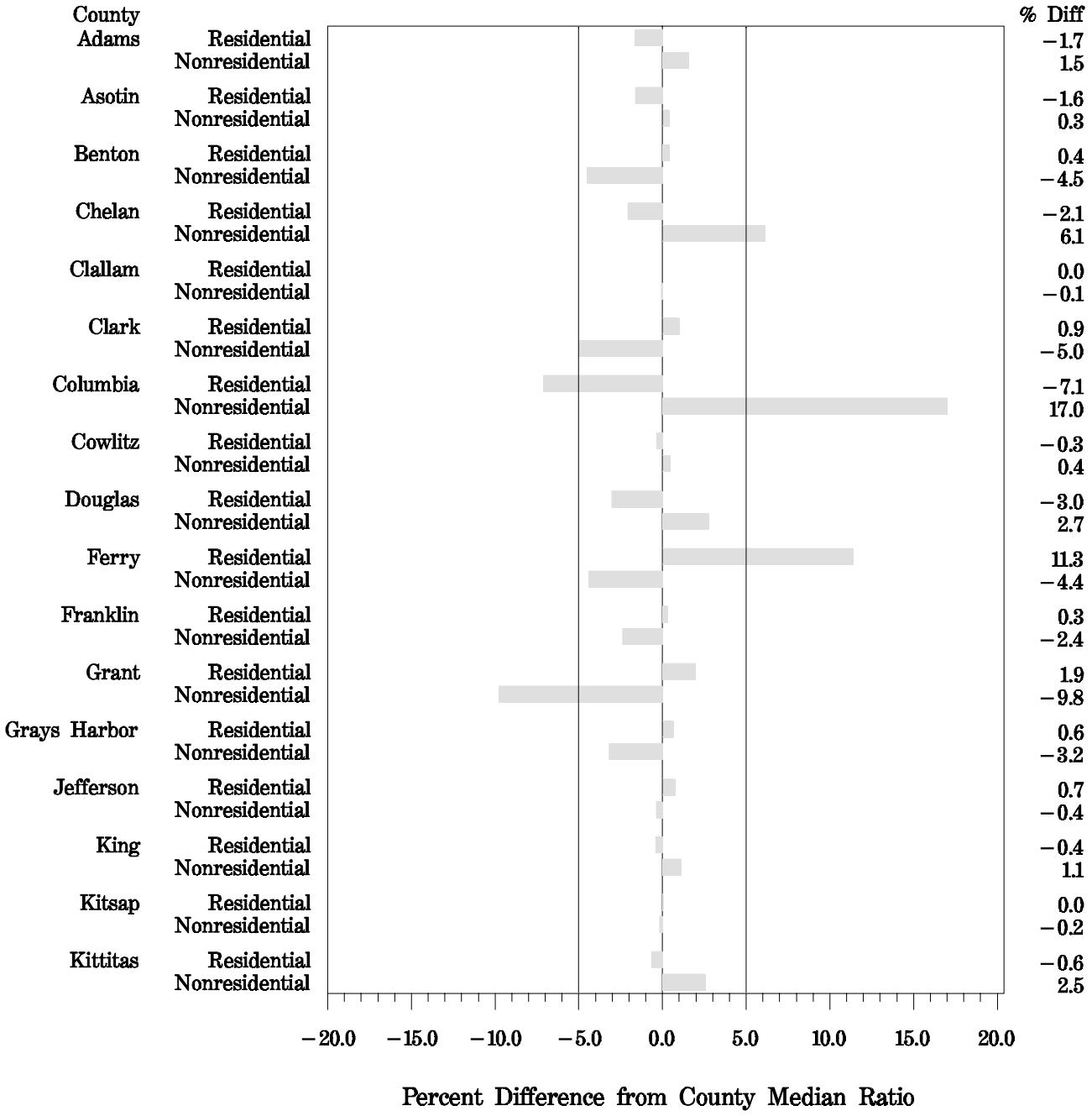
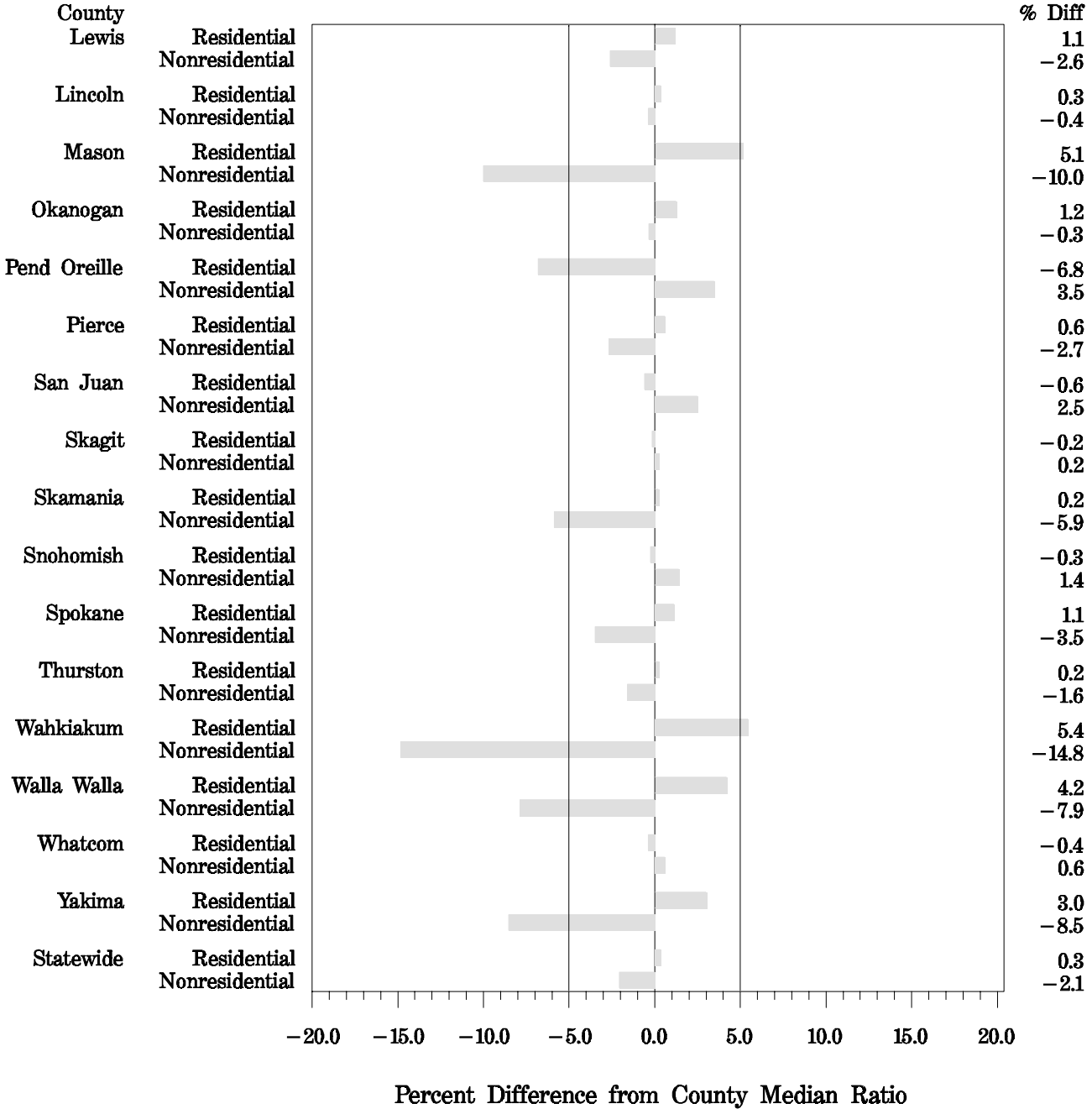


CHART 4 (Continued)

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

The coefficient of concentration measures the percentage of properties with ratios that fall close to the median ratio. As one way of illustrating 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 66 percent. This means that 66 percent of the properties have ratios of assessed to market value within plus or minus 15 percent of the statewide median ratio.

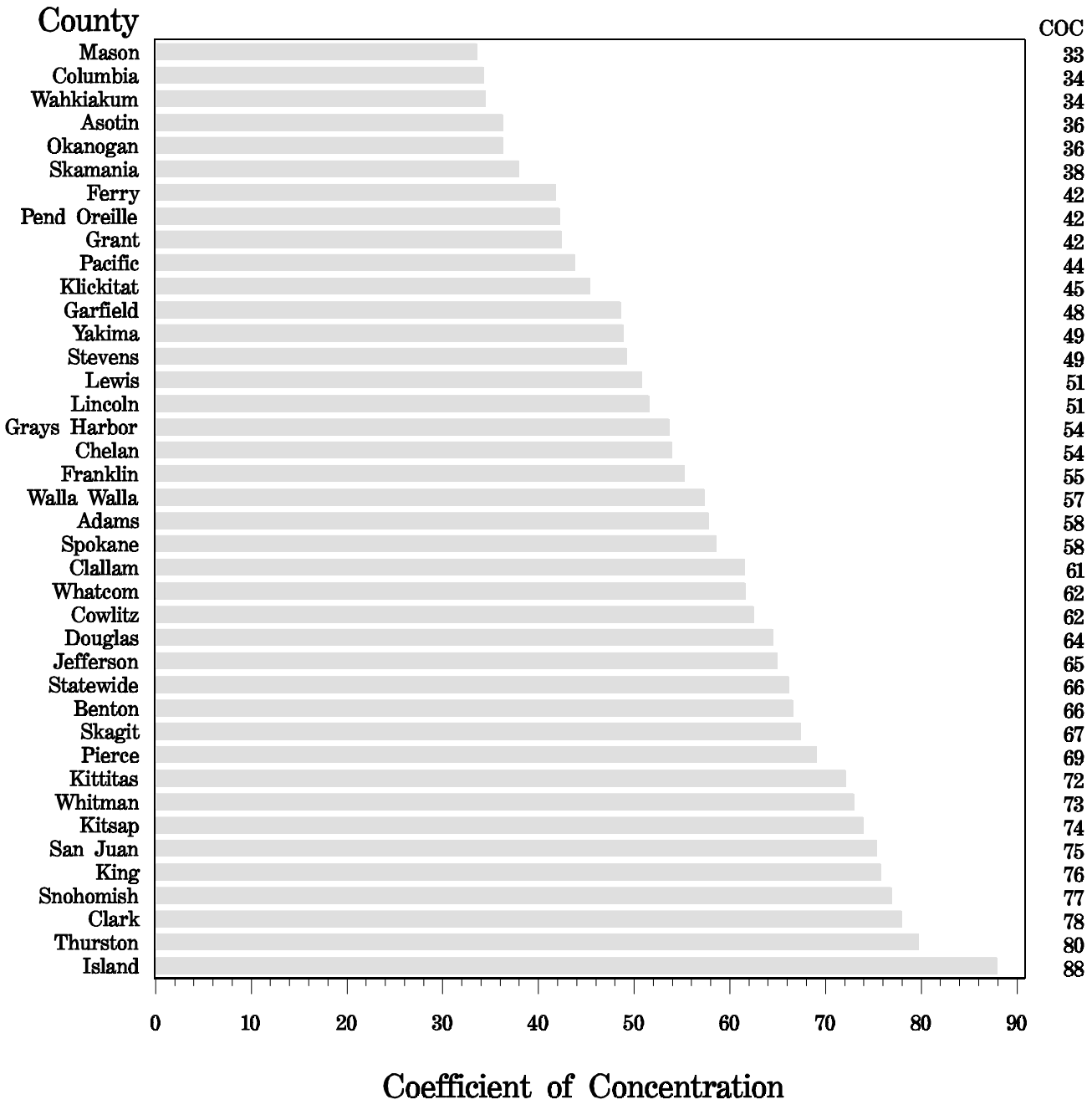
The coefficient of concentration is also calculated for each county. Each county's coefficient is calculated in relation to the county's median ratio. These coefficients range from a low of 33 percent in Mason County to a high of 88 percent in Island County.

CHART 5

Coefficient of Concentration

Percent of Properties with Ratios within 15 percent of Median Ratio

Large COC values indicate more properties within 15% of median



Uniformity of Assessments

Median Percentage Deviation

The median percentage deviation is the typical missassessment amount. 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 determines 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 properties are assessed to one another.

The median percentage deviation for the state is 9 percent. This means that the ratio of assessed value to market value of the typical property is different from the state median property by 9 percent.

Chart 6 shows the median percentage deviation for properties within each county. The median percentage deviation ranges from a low of 2 percent in Island County and a high of 25 percent in Okanogan County.

On a statewide basis the median percentage deviation for residential property is 8 percent and for nonresidential property is 13 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 6 percent in Clark, Jefferson, San Juan, and Snohomish Counties to a high of 30 percent in Asotin County. The lowest median percentage deviation for nonresidential property is 5 percent in Kittitas County and the highest is 35 percent in Wahkiakum County.

CHART 6

Median Percentage Deviation

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

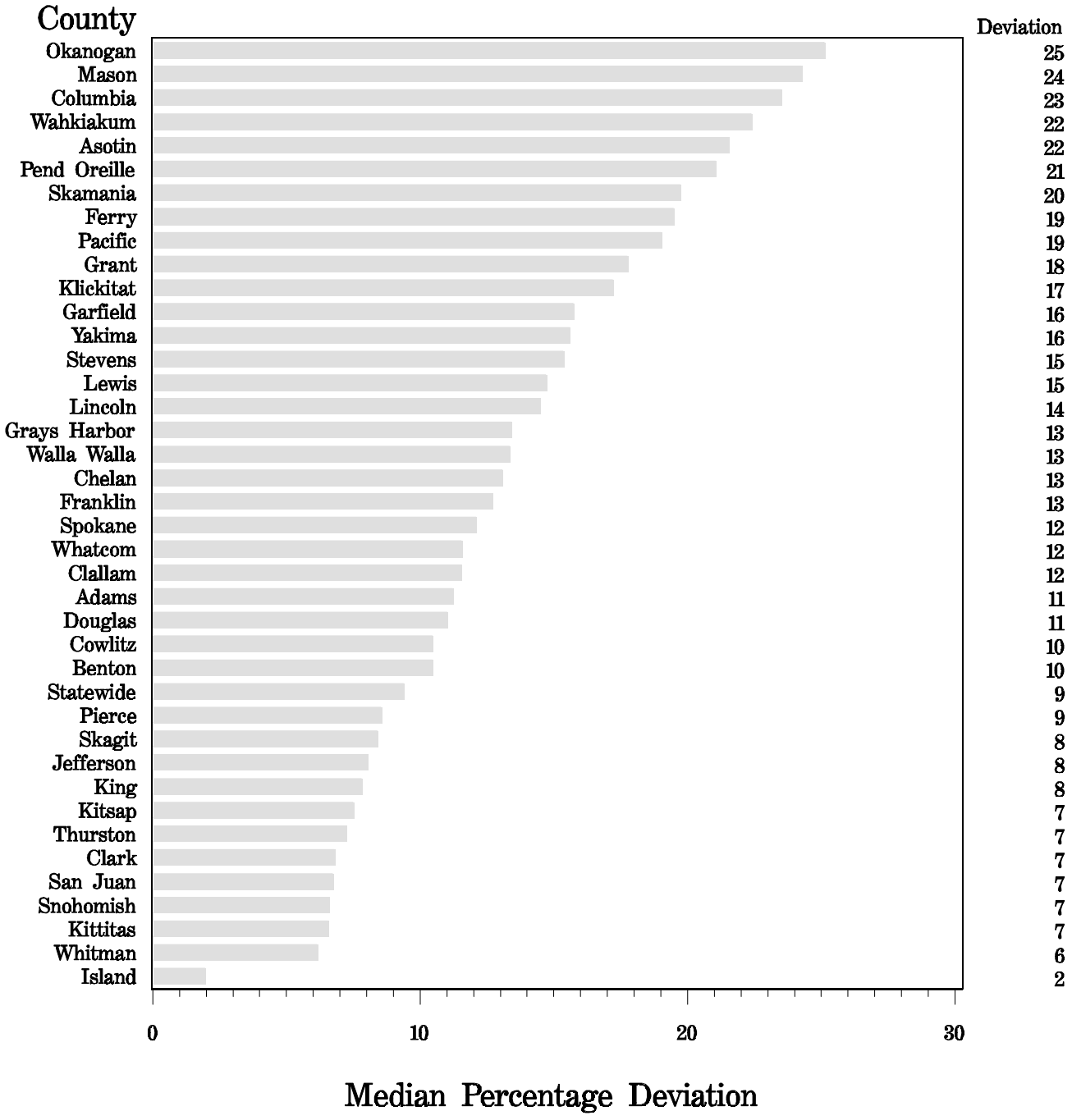


CHART 7

Median Percentage Deviation

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

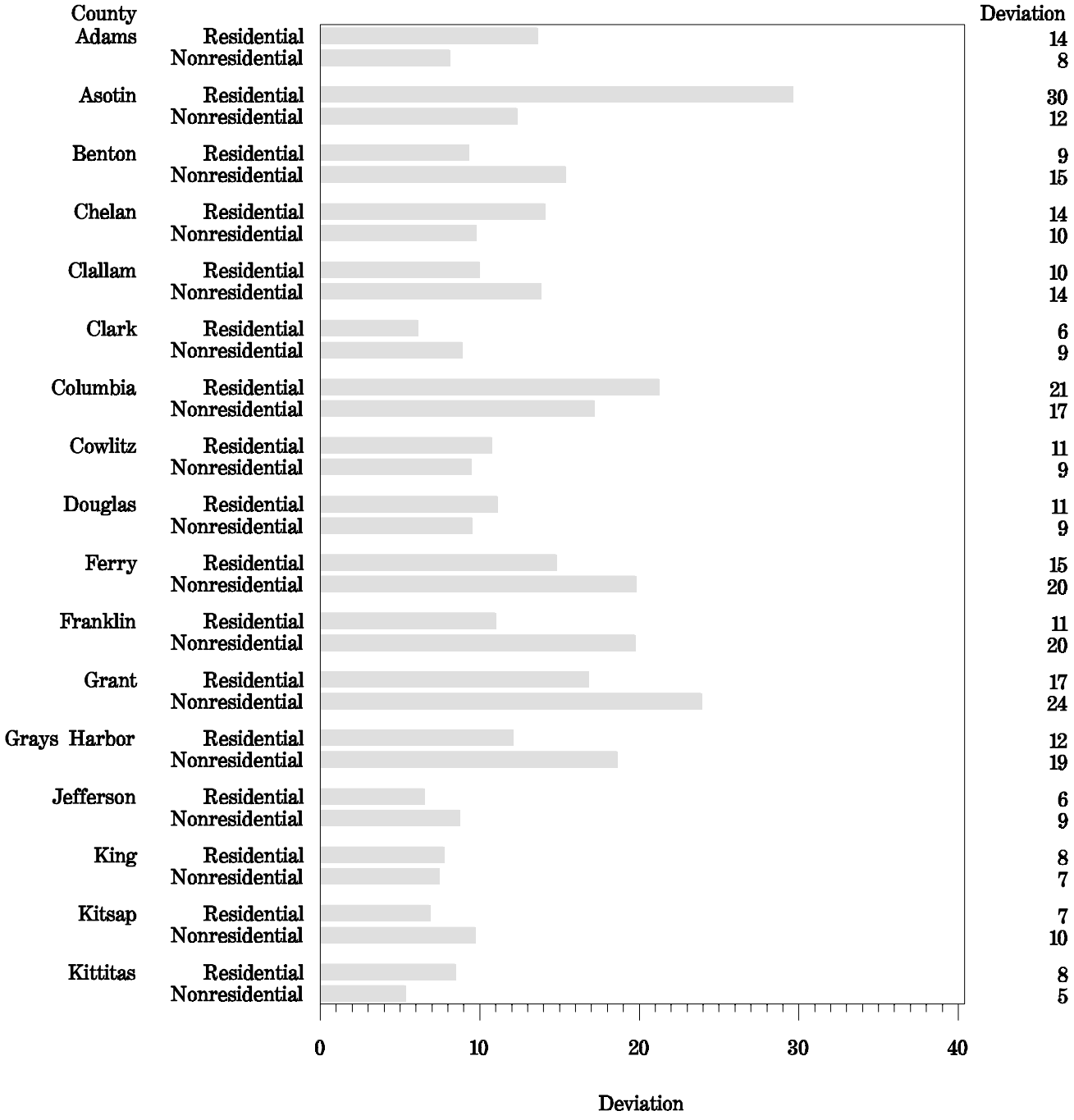
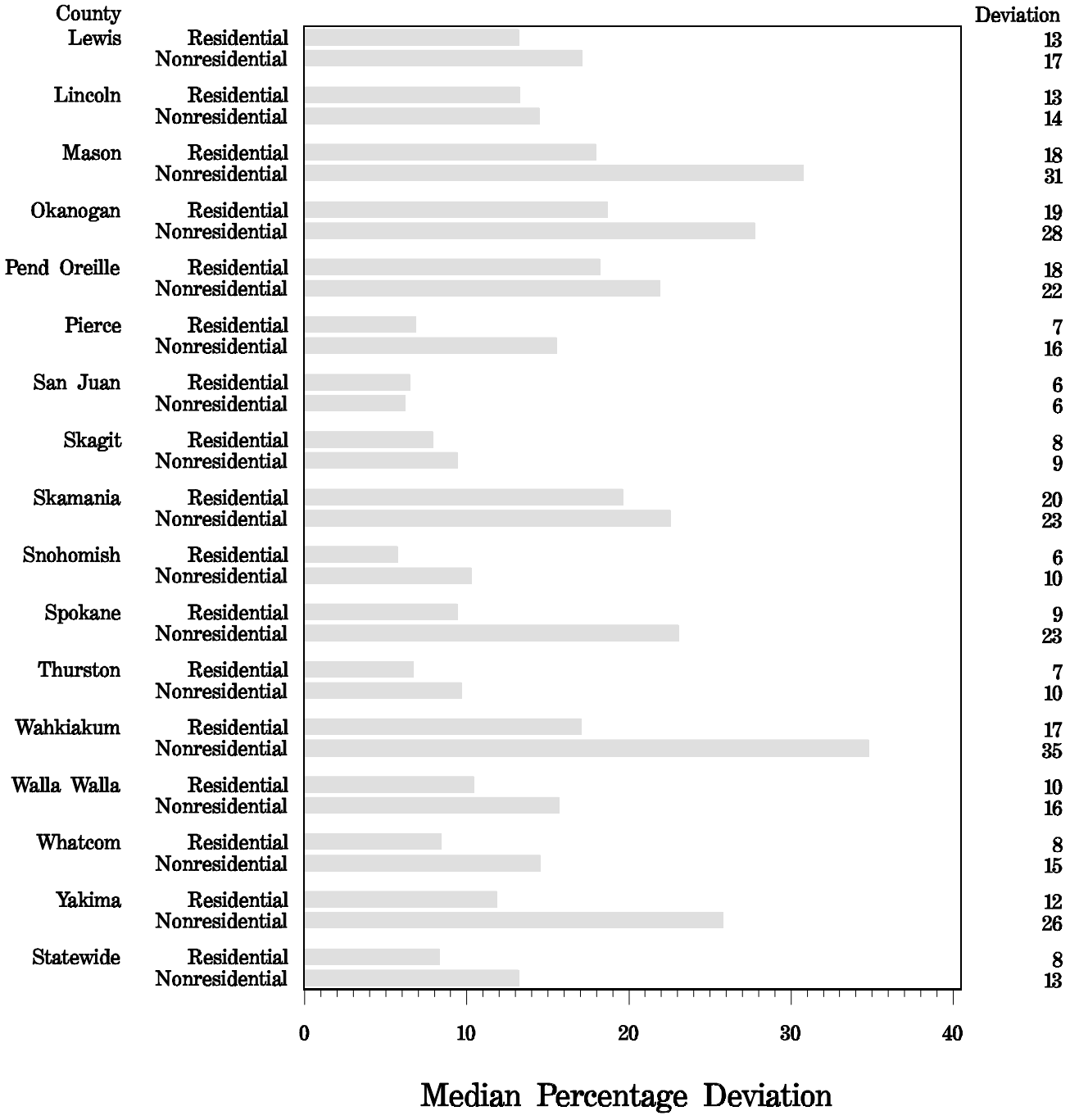


CHART 7 (Continued)

Median Percentage Deviation

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



Uniformity of Assessments

Coefficient of Dispersion

The Coefficient of Dispersion (COD) is the average deviation from the median expressed as a percent of the median. The IAAO Standard on Ratio Studies states uniformity standards using the 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 result is divided by the median to express the result as a percent of the median. For example, a COD of 15 percent means that the average percentage difference from the median is 15. The COD includes information from all the observations in the data, including the observations that are far away from the median ratio. The first two measures of dispersion used in this report do not include information from these extreme data points.

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. Fourteen counties have COD's less than 15 percent. Nineteen 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. Thirteen counties have COD's below 20 percent while twenty counties fail to reach this standard. Seventeen counties fail to reach the standards for both residential and nonresidential and 22 counties fail a least one standard.

Since this study is based on a sample, it is possible that some of the counties with COD's close to the IAAO standards may, with some probability, satisfy the IAAO standard. However, the coefficient of dispersion does not lend itself to straight forward statistical tests. So, it is not possible to test whether the COD's in Chart 8 are really higher than the IAAO standards or these results are just a function of the sample that was drawn.

CHART 8

Coefficient of Dispersion

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

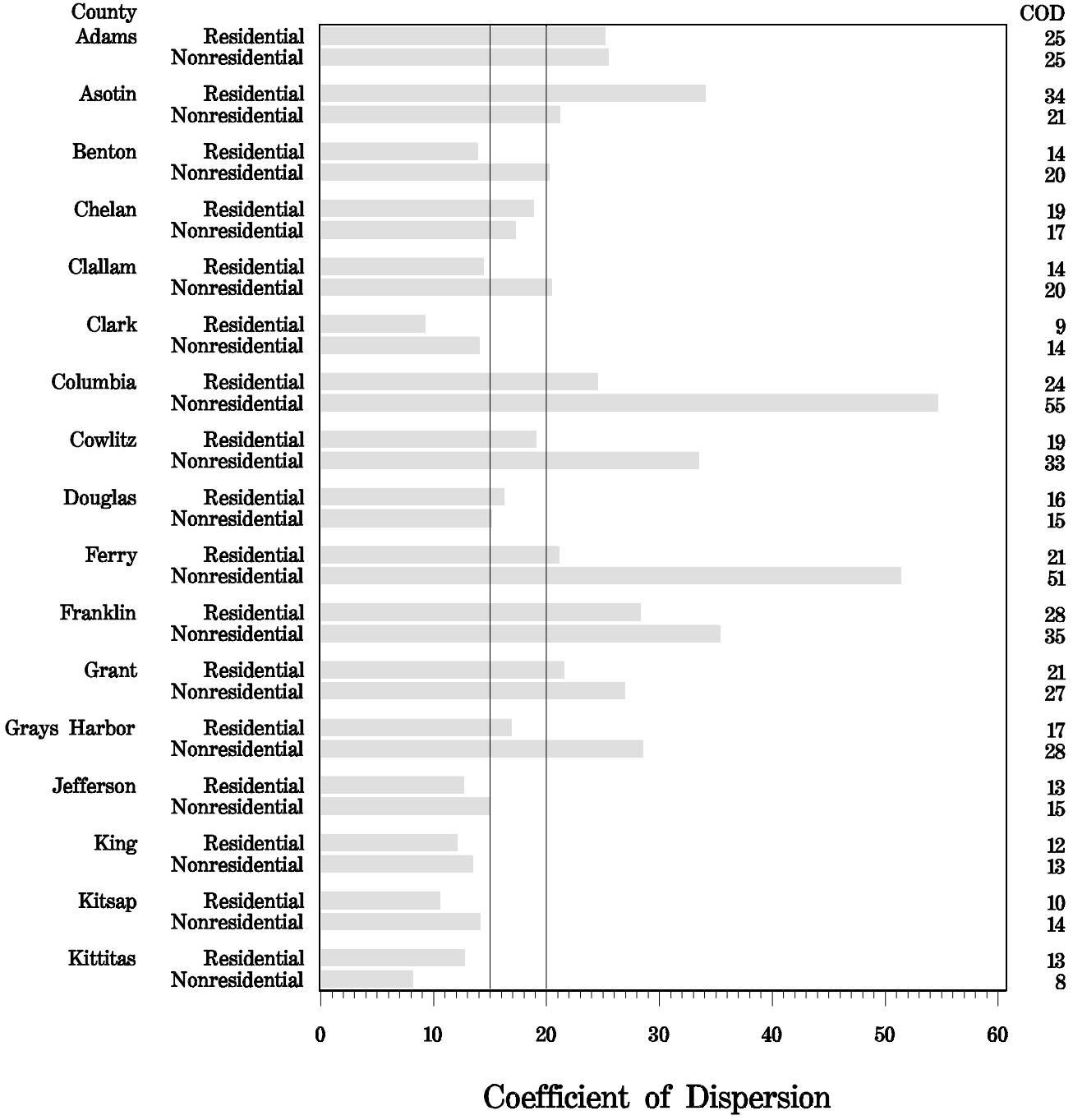
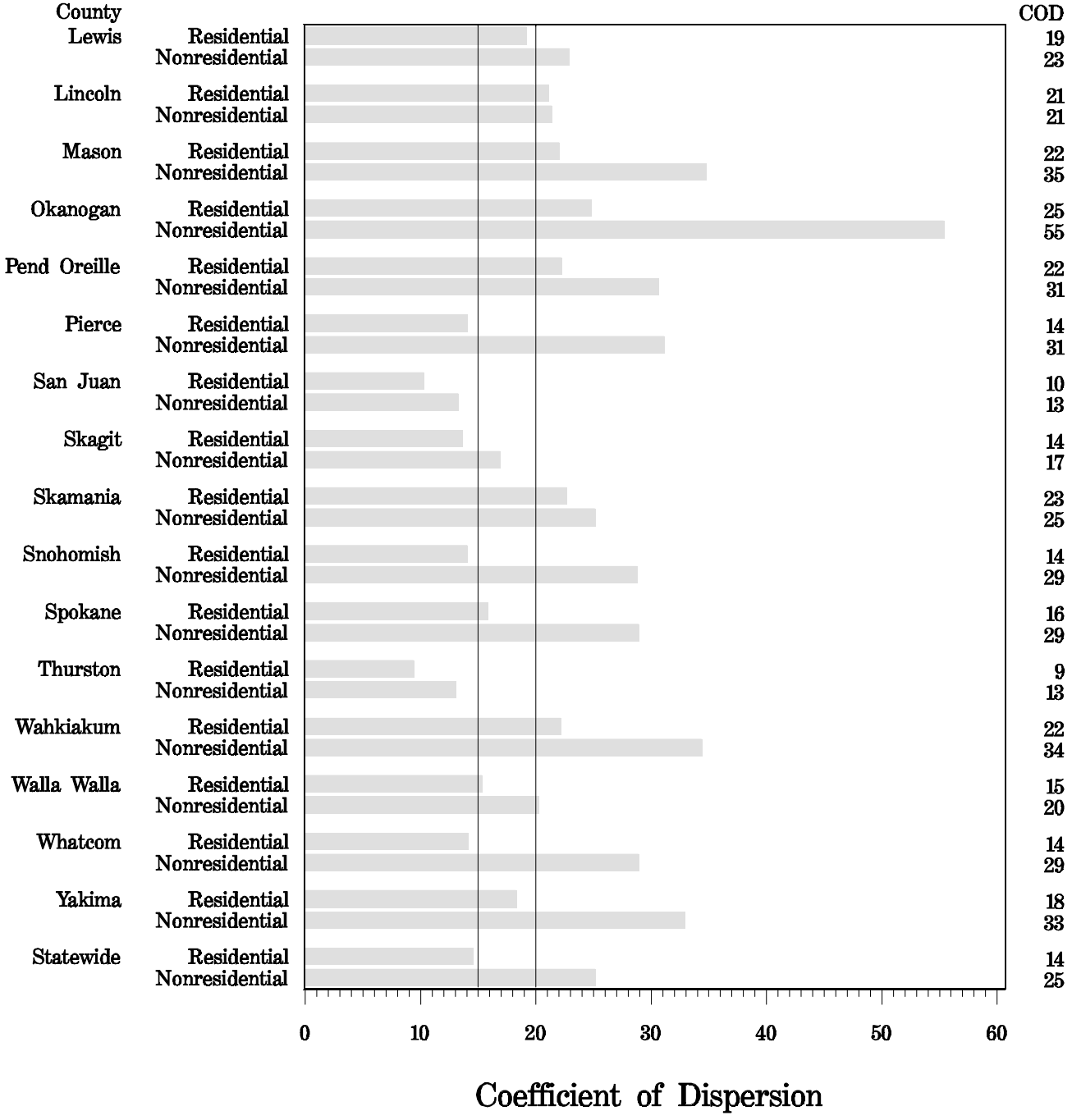


CHART 8 (Continued)

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 the same ratio to market value.

Median Ratio by Value Quartile

This section develops a method to view 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 groups of equal numbers of properties (quartiles). The median ratio is calculated for each group. The results are displayed in Chart 9.

The following counties appear to have a slightly lower ratios of assessed value to market value for the higher value properties than for lower value properties: Adams, Clallam, Clark, Columbia, Ferry, Garfield, Lewis, Okanogan, Pend Oreille, San Juan, Skagit, Skamania, Snohomish, Whatcom, and Whitman.

Only one county, Klickitat County, appears to have a slightly higher ratio for the higher value properties.

CHART 9

Median Ratios of Properties divided into Sales Value Quartiles

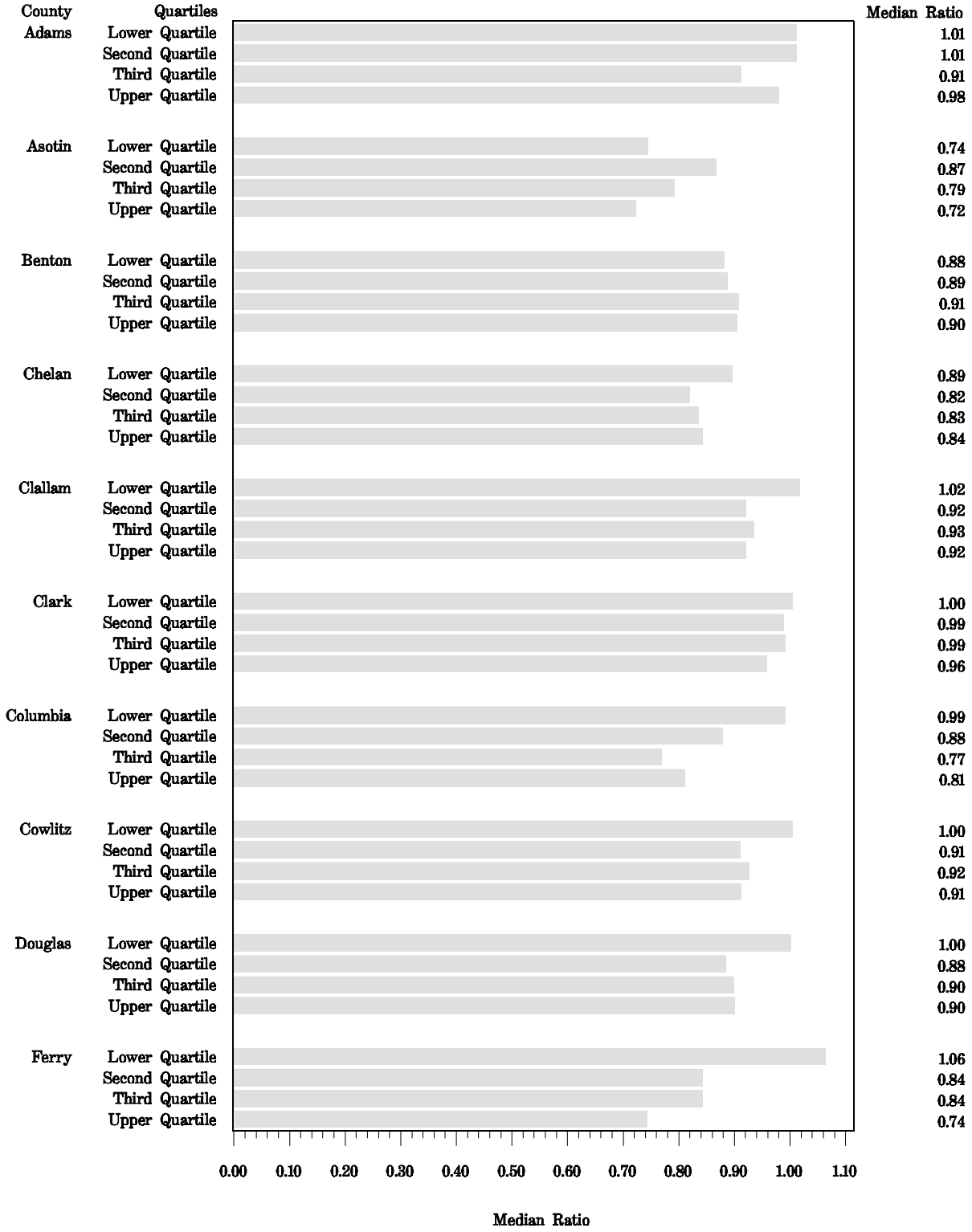


CHART 9 (continued)

Median Ratios of Properties divided into Sales Value Quartiles

CHART 9 (Continued)

Median Ratios of
Properties divided into Sales Value Quartiles

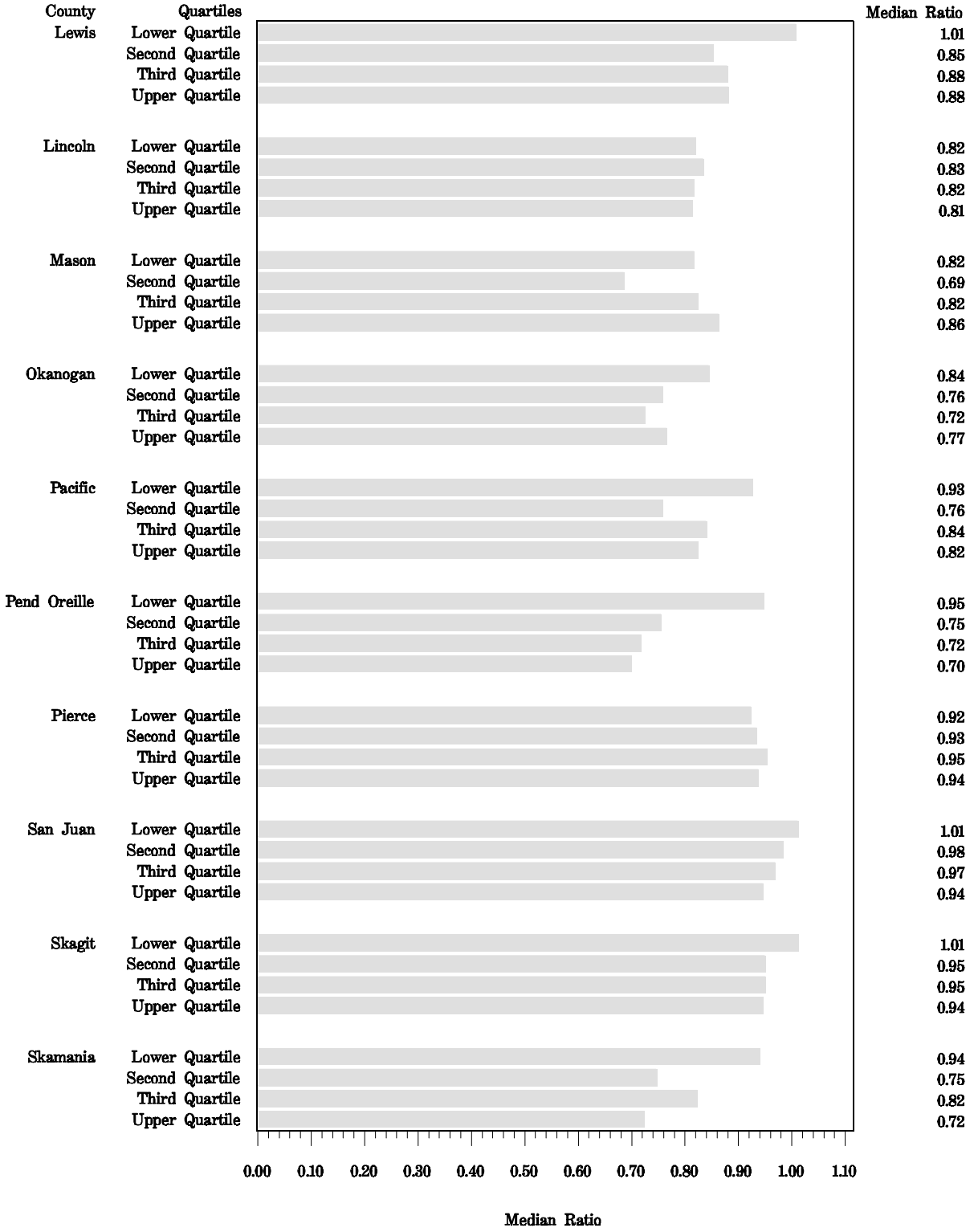
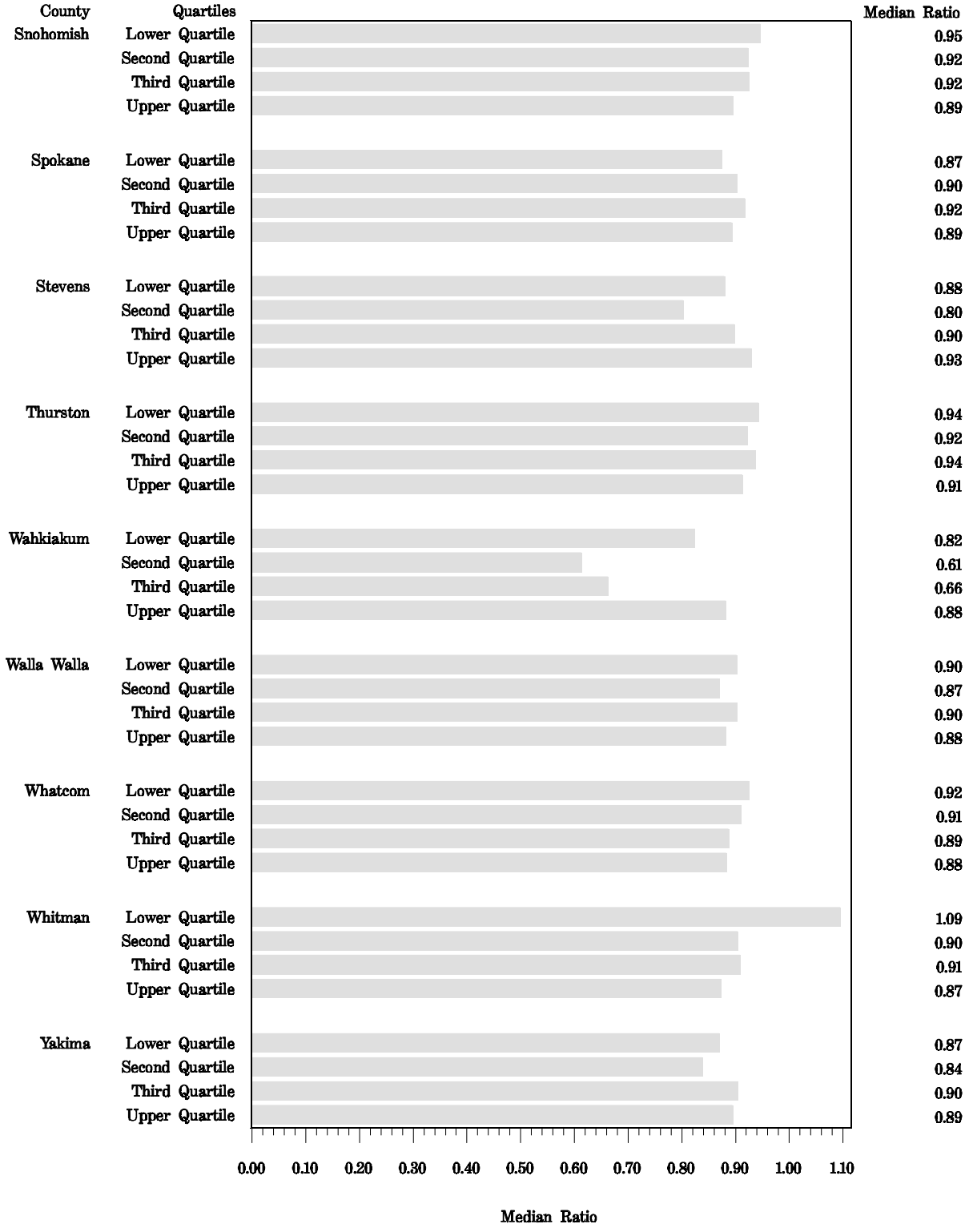


CHART 9 (Continued)

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 (mean) ratio by the weighted average ratio (weighted mean).

Price-related differential = mean ratio / weighted mean ratio

The average ratio is the sum of the individual ratios divided by the number of properties. This is called an unweighted average (or mean). In the calculation of the weighted average ratio, each ratio is counted in proportion to the value of the property (weighted mean). 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 lower ratios 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 mean will be greater than the unweighted mean 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 price-related differential calculations by county.

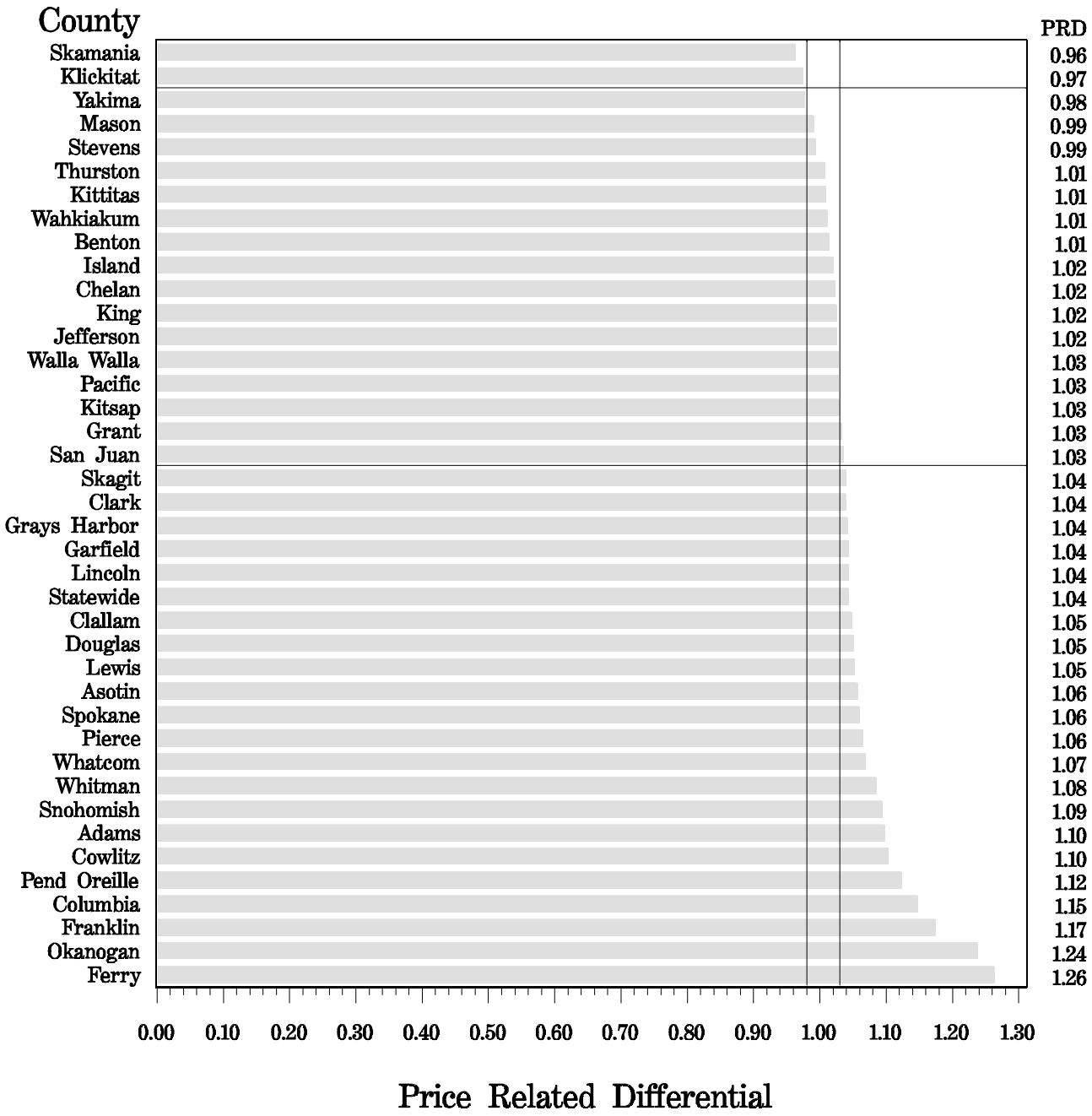
Skamania and Klickitat Counties have PRD's below 0.98. This indicates that higher valued properties are assessed at a higher ratio to market value than lower valued properties. The following 21 counties have PRD's greater than 1.03: Skagit, Clark, Grays Harbor, Garfield, Lincoln, Clallam, Douglas, Lewis, Asotin, Spokane, Pierce, Whatcom, Whitman, Snohomish, Adams, Cowlitz, Pend Oreille, Columbia, Franklin, Okanogan, and Ferry. 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. Spearman correlations (another standard statistical test) calculated for the relationship between ratios and value do not support the conclusion that Skamania County assesses higher value property at a higher ratio. Also they do not support the conclusion that Grays Harbor, Lincoln, Asotin, Spokane, and Pierce are assessing higher value properties at lower ratio. Therefore, it appears that 22 counties satisfy the IAAO standard. And that 6 counties with PRD's above 1.03 assess higher value property at slightly lower ratios than lower value property and one county with a PRD below 0.98 is assessing higher value property at higher ratios.

CHART 10

Price – Related Differential

The PDR 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 property assessed values. Seventeen counties update property values annually based on appropriate statistical data. State law allows properties to be physically inspected once every 6 years in counties that annually update assessed values. Other counties (22 counties) revalue on 2, 3, or 4 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

Annually the 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 data on assessed values, sales prices and appraisals generated for the Department of Revenue study is used in this report to evaluate the performance of the state's property tax appraisal system. The data is for the 1997 assessment year (January 1, 1997 valuation date.)

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. The most useful statistic for this purpose 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 includes over 50,000 real property parcels for which sales prices and assessed values are available. The sales data was screened to obtain valid arms length transactions.[2] For most counties, the data is coded by land use classification. In addition to sales price information, the data set includes over 600 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 total number of 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 50,000 observations these errors should be quite small. When the statistics are calculated for counties or use classes within a county, the error will be larger than for the state wide statistics.

---

[2]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 about from the way in which the sample is drawn. The primary source of data comes from properties that 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 roughly 600 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 in counties with over 15 percent of their value in open space farm classification. For these later counties, improvements on open space farm land are included.

Appendix A
COUNTY REVALUATION CYCLES
1997 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		SPOKANE
PEND OREILLE		THURSTON
SNOHOMISH		WHITMAN
STEVENS		YAKIMA
WAHKIAKUM		
WALLA WALLA		
WHATCOM		

SUMMARY

Revaluation Cycle	Number of Counties	Inspection Cycle 2 yrs	Inspection Cycle 3 yrs	Inspection Cycle 4 yrs	Inspection Cycle 5 yrs	Inspection Cycle 6 yrs
Annual	17	1	1	22	1	14
2 Year	1	1				
3 Year	1		1			
4 Year	20			20		

Appendix B

Frequency Distribution of Ratios by County

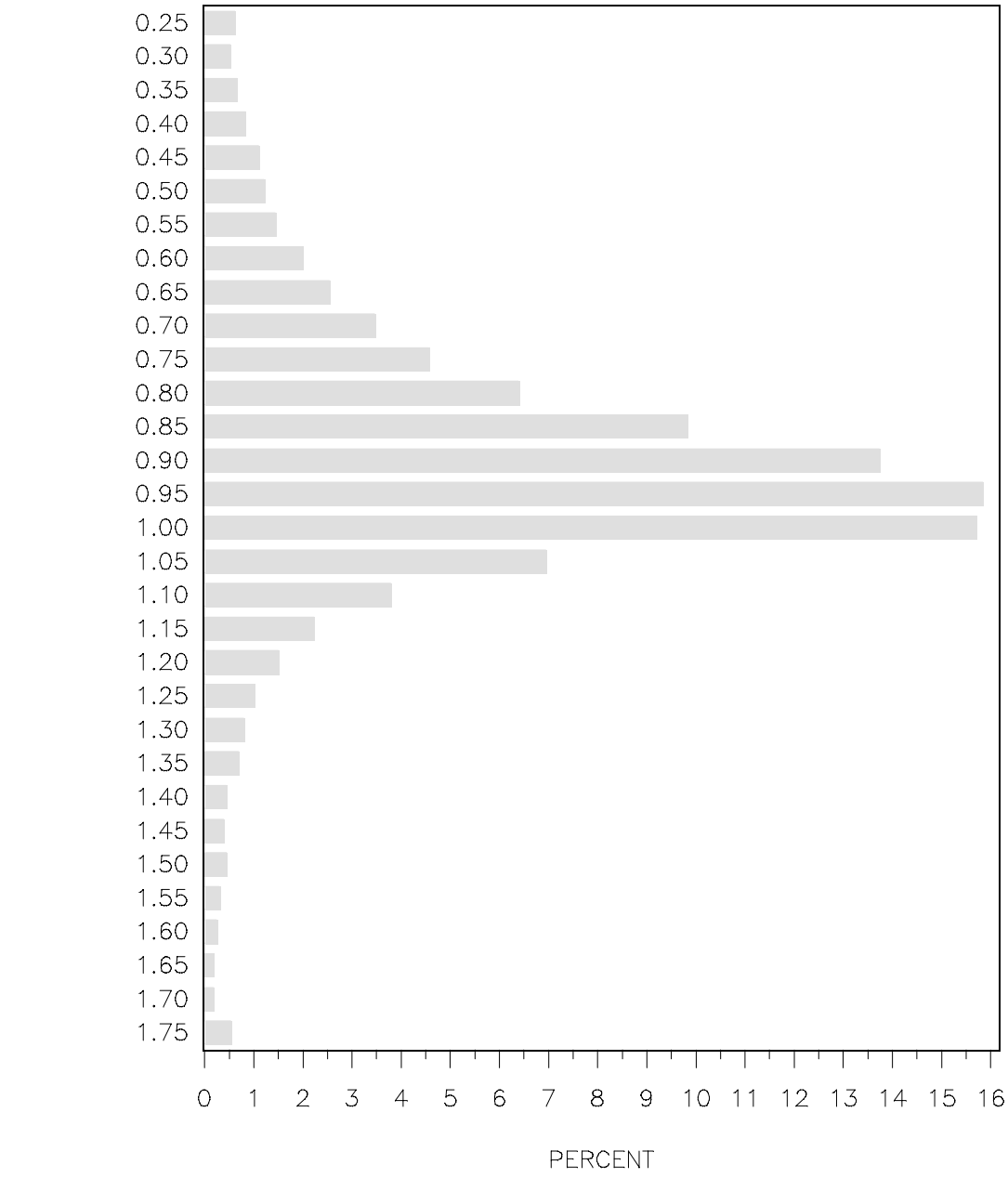
Washington contains approximately 2.6 million real property parcels. Due to the high volume of assessments county assessors must use mass appraisal techniques to determine assessed values. Each property has unique characteristics and it is not possible for assessing officials to fully capture the influence 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 to 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. To read the chart see, for example, the bar centered on 0.90. The bar represents properties with ratios between 0.875 and 0.925. The length of the bar indicates that 13.73 percent of the properties have ratios between 0.875 and 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for the State



PCT.	CUM. PCT.
0.61	0.61
0.52	1.13
0.65	1.77
0.82	2.60
1.10	3.70
1.21	4.91
1.44	6.35
1.98	8.33
2.54	10.88
3.46	14.34
4.56	18.90
6.38	25.28
9.82	35.10
13.73	48.83
15.84	64.67
15.71	80.38
6.94	87.32
3.78	91.10
2.22	93.32
1.50	94.83
1.00	95.83
0.80	96.63
0.69	97.31
0.43	97.74
0.39	98.13
0.45	98.58
0.30	98.88
0.24	99.12
0.18	99.30
0.18	99.47
0.53	100.00

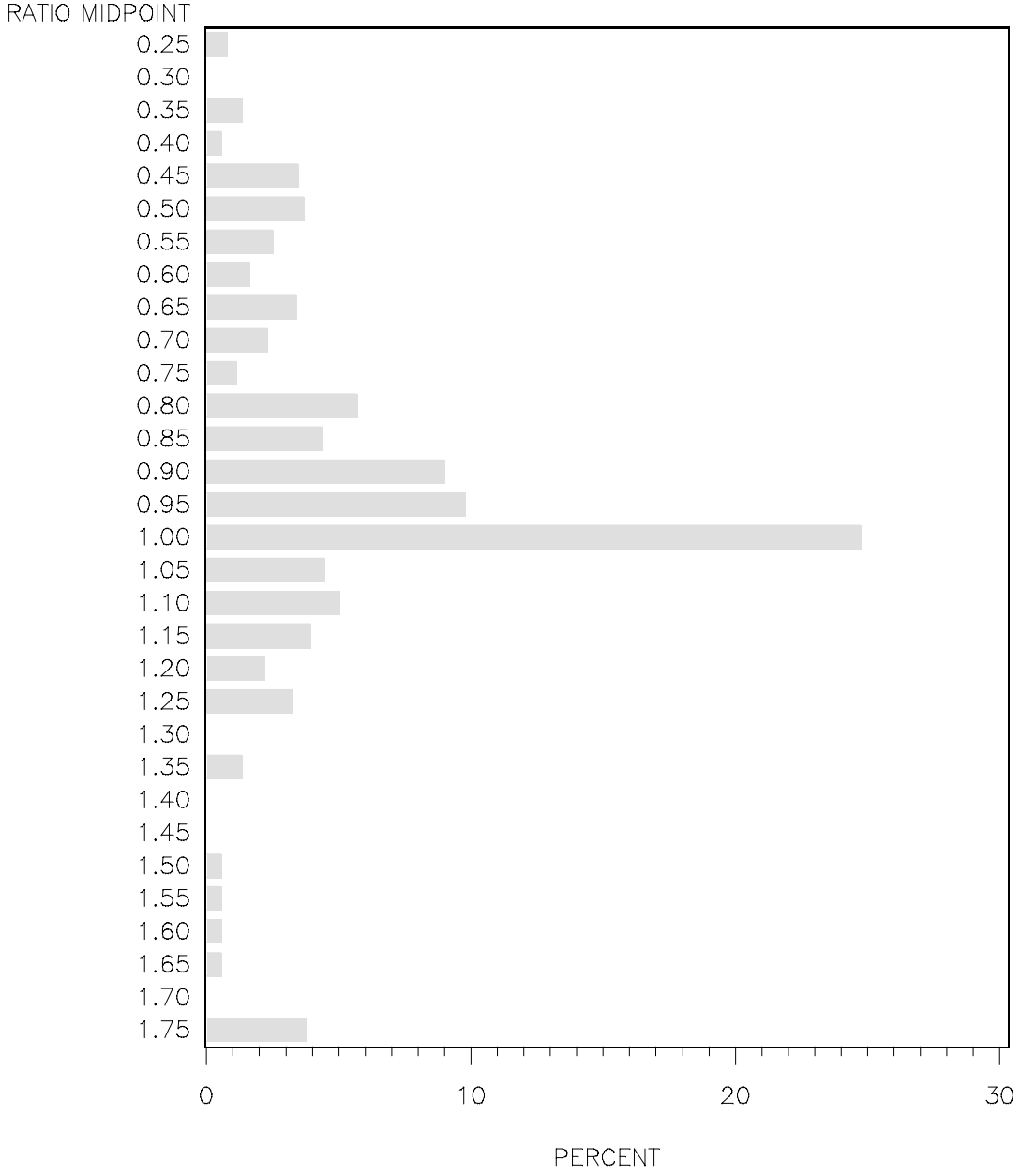
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Adams County

County=Adams



RATIO MIDPOINT	PCT.	CUM. PCT.
0.25	0.76	0.76
0.30	0.00	0.76
0.35	1.31	2.07
0.40	0.55	2.62
0.45	3.45	6.07
0.50	3.66	9.73
0.55	2.49	12.22
0.60	1.59	13.81
0.65	3.37	17.18
0.70	2.28	19.46
0.75	1.10	20.56
0.80	5.66	26.22
0.85	4.36	30.59
0.90	8.98	39.57
0.95	9.76	49.32
1.00	24.71	74.03
1.05	4.45	78.48
1.10	5.00	83.48
1.15	3.92	87.39
1.20	2.14	89.54
1.25	3.24	92.78
1.30	0.00	92.78
1.35	1.31	94.09
1.40	0.00	94.09
1.45	0.00	94.09
1.50	0.55	94.64
1.55	0.55	95.18
1.60	0.55	95.73
1.65	0.55	96.28
1.70	0.00	96.28
1.75	3.72	100.00

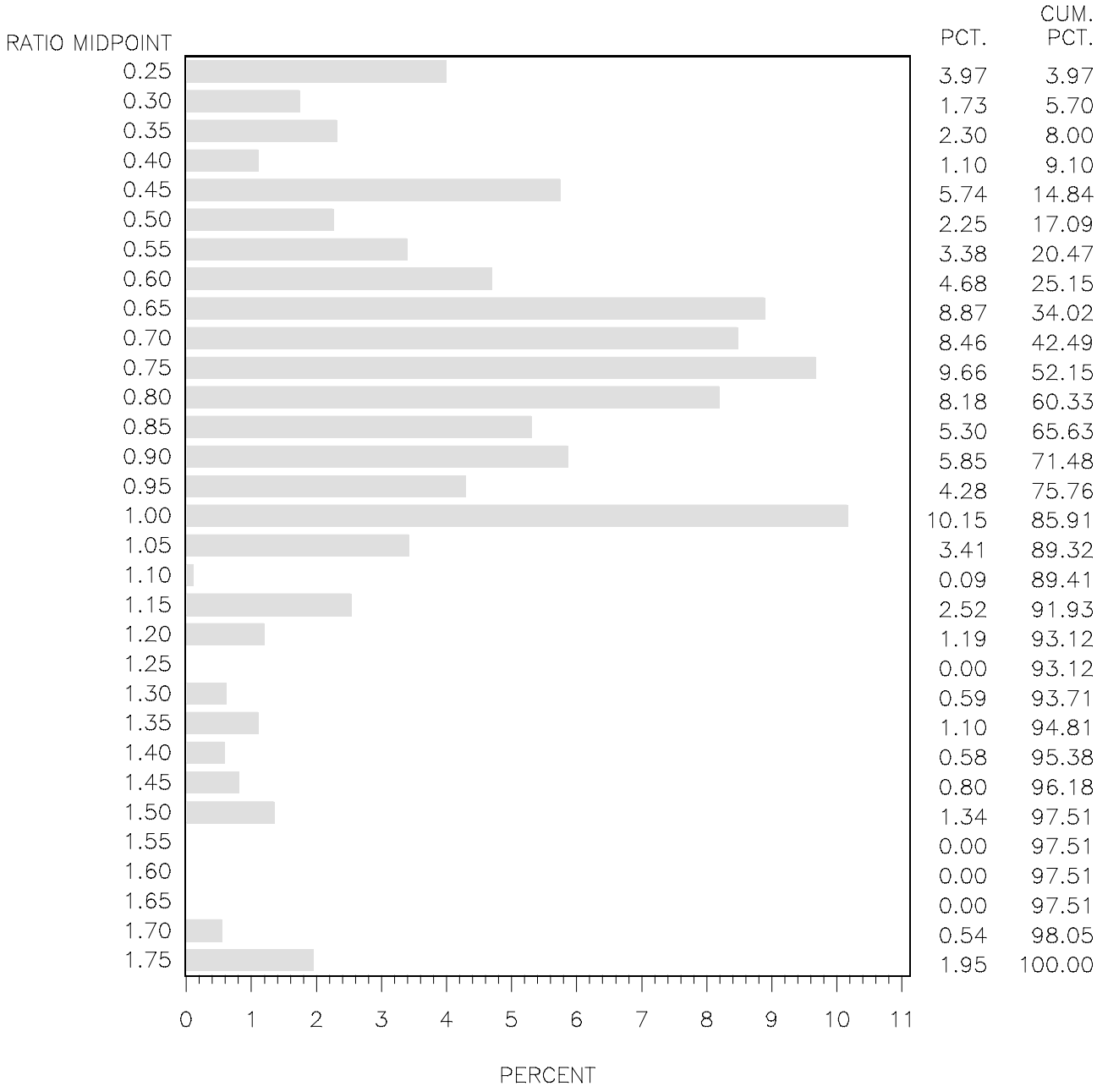
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Asotin County

County=Asotin



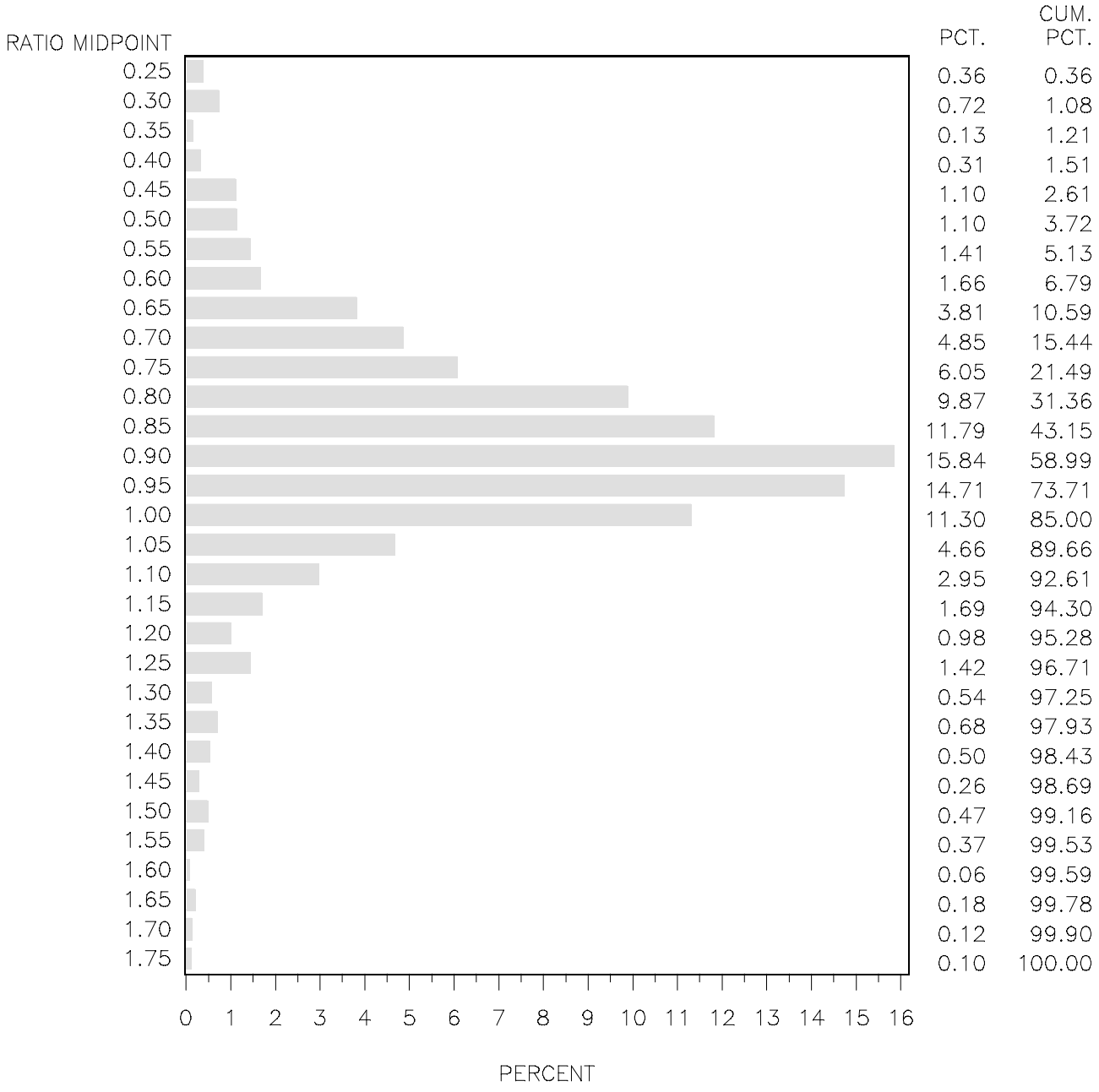
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Benton County

County=Benton



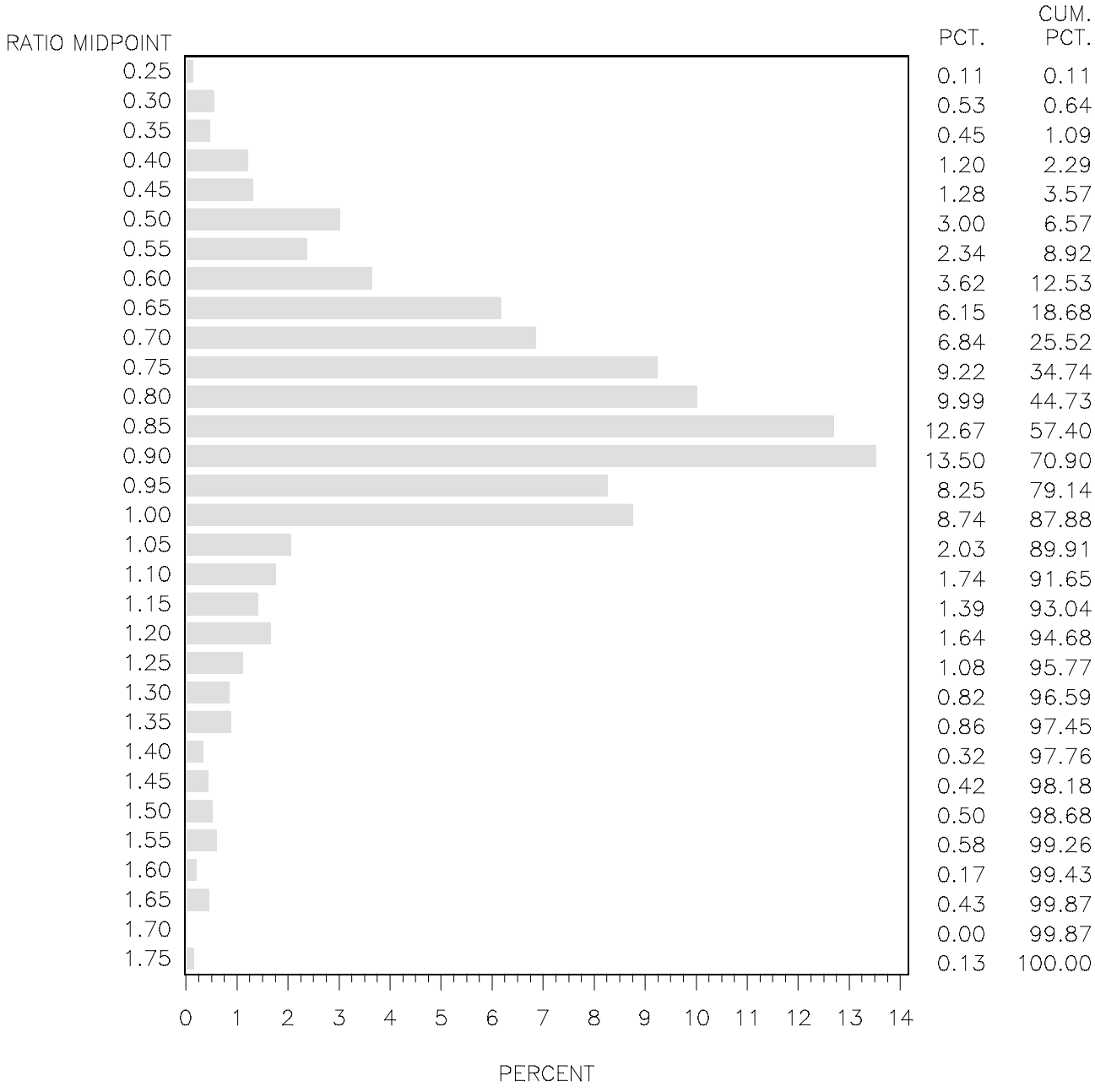
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Chelan County

County=Chelan



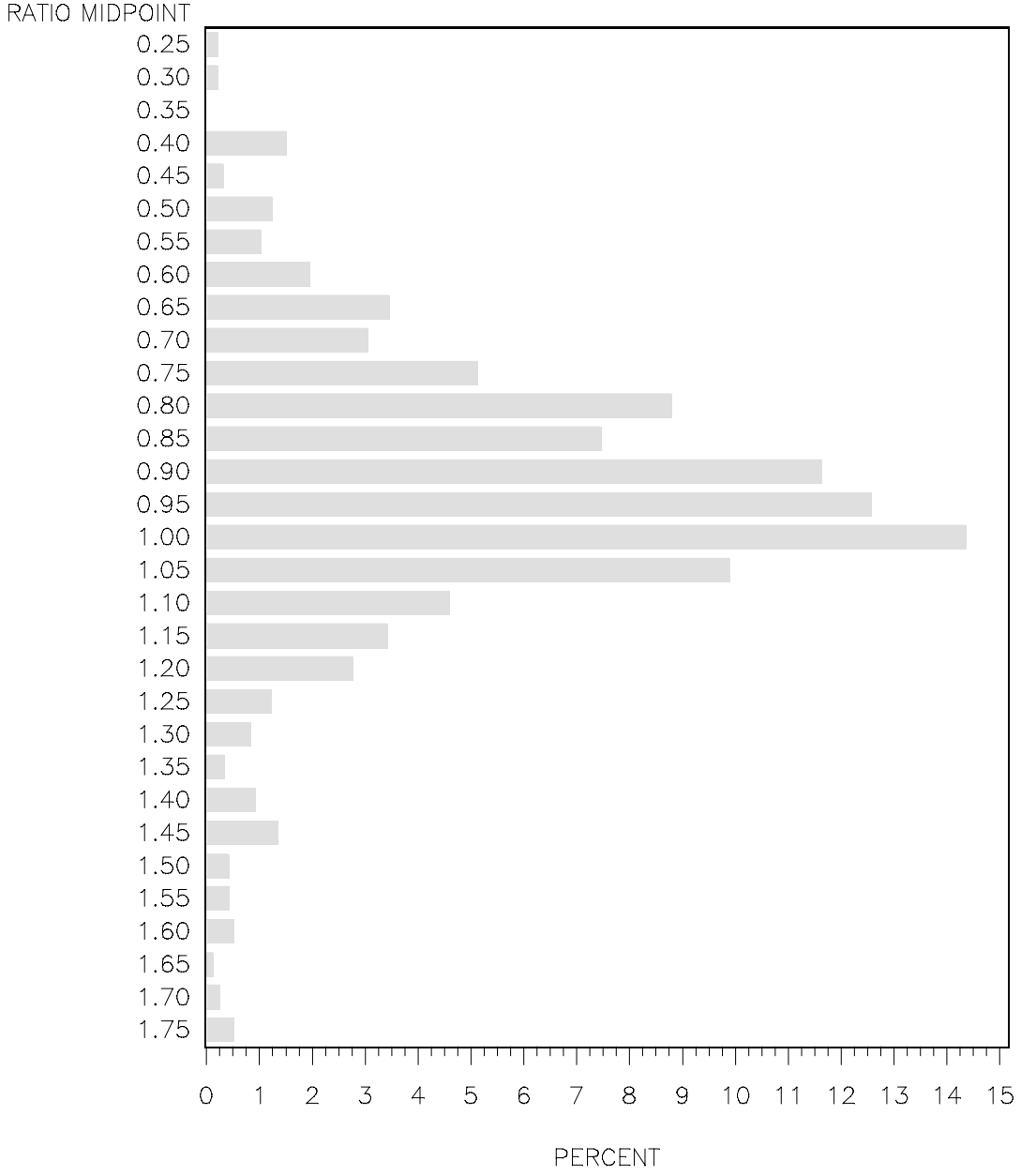
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Clallam County

County=Clallam



RATIO MIDPOINT	PCT.	CUM. PCT.
0.25	0.19	0.19
0.30	0.19	0.38
0.35	0.00	0.38
0.40	1.49	1.87
0.45	0.31	2.18
0.50	1.22	3.40
0.55	1.01	4.41
0.60	1.94	6.35
0.65	3.44	9.79
0.70	3.04	12.83
0.75	5.12	17.95
0.80	8.78	26.72
0.85	7.44	34.17
0.90	11.62	45.78
0.95	12.56	58.34
1.00	14.33	72.68
1.05	9.88	82.56
1.10	4.57	87.13
1.15	3.41	90.53
1.20	2.74	93.27
1.25	1.21	94.48
1.30	0.82	95.30
1.35	0.32	95.63
1.40	0.90	96.53
1.45	1.32	97.85
1.50	0.40	98.25
1.55	0.42	98.67
1.60	0.50	99.16
1.65	0.11	99.28
1.70	0.23	99.50
1.75	0.50	100.00

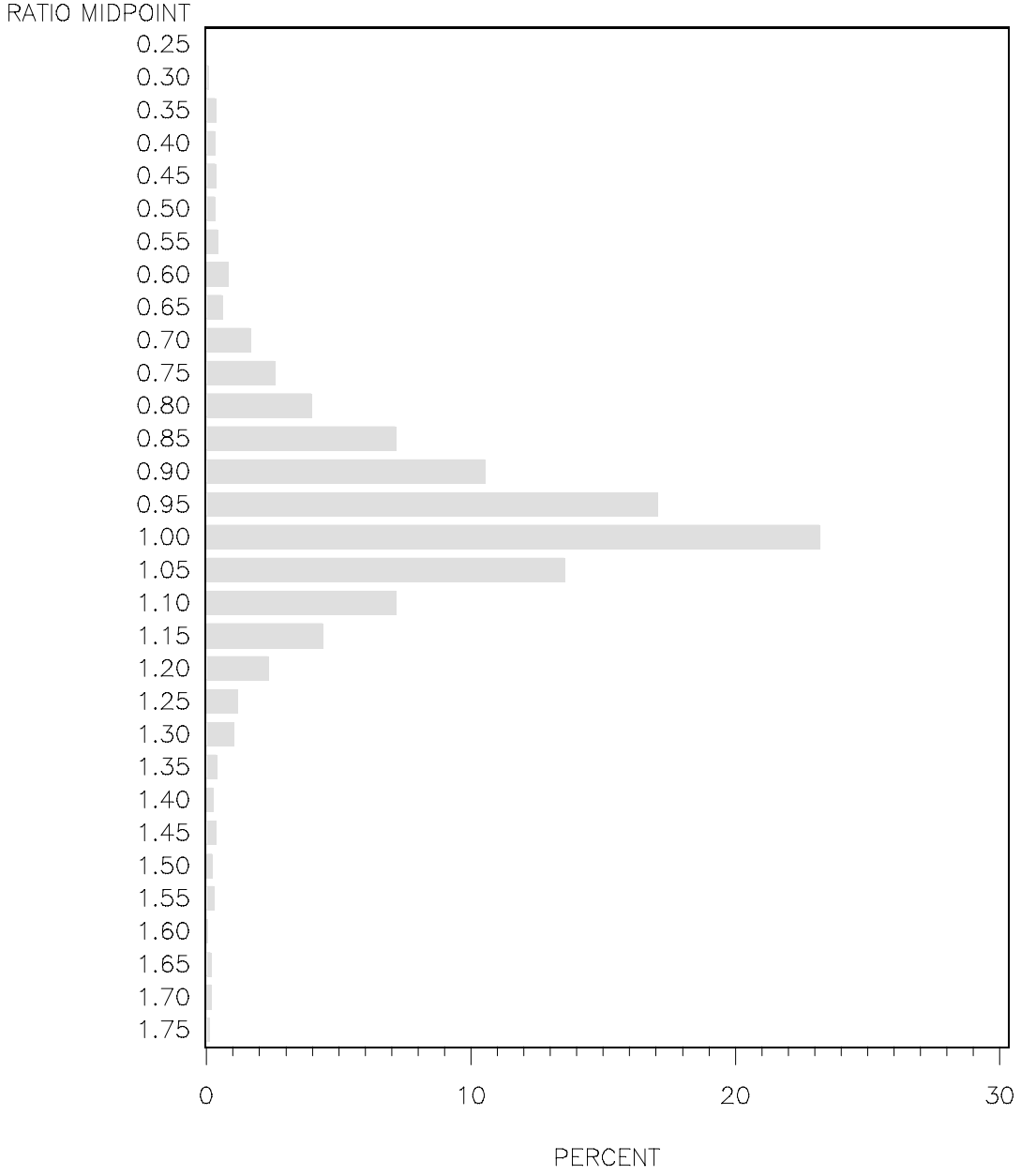
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Clark County

County=Clark



RATIO MIDPOINT	PCT.	CUM. PCT.
0.25	0.00	0.00
0.30	0.03	0.03
0.35	0.31	0.34
0.40	0.29	0.63
0.45	0.30	0.93
0.50	0.28	1.21
0.55	0.39	1.61
0.60	0.79	2.40
0.65	0.55	2.95
0.70	1.63	4.58
0.75	2.55	7.13
0.80	3.94	11.07
0.85	7.12	18.19
0.90	10.49	28.69
0.95	17.02	45.70
1.00	23.17	68.87
1.05	13.51	82.39
1.10	7.14	89.52
1.15	4.36	93.89
1.20	2.30	96.18
1.25	1.15	97.34
1.30	1.00	98.33
1.35	0.37	98.70
1.40	0.21	98.91
1.45	0.30	99.22
1.50	0.20	99.41
1.55	0.25	99.66
1.60	0.02	99.67
1.65	0.12	99.80
1.70	0.14	99.94
1.75	0.06	100.00

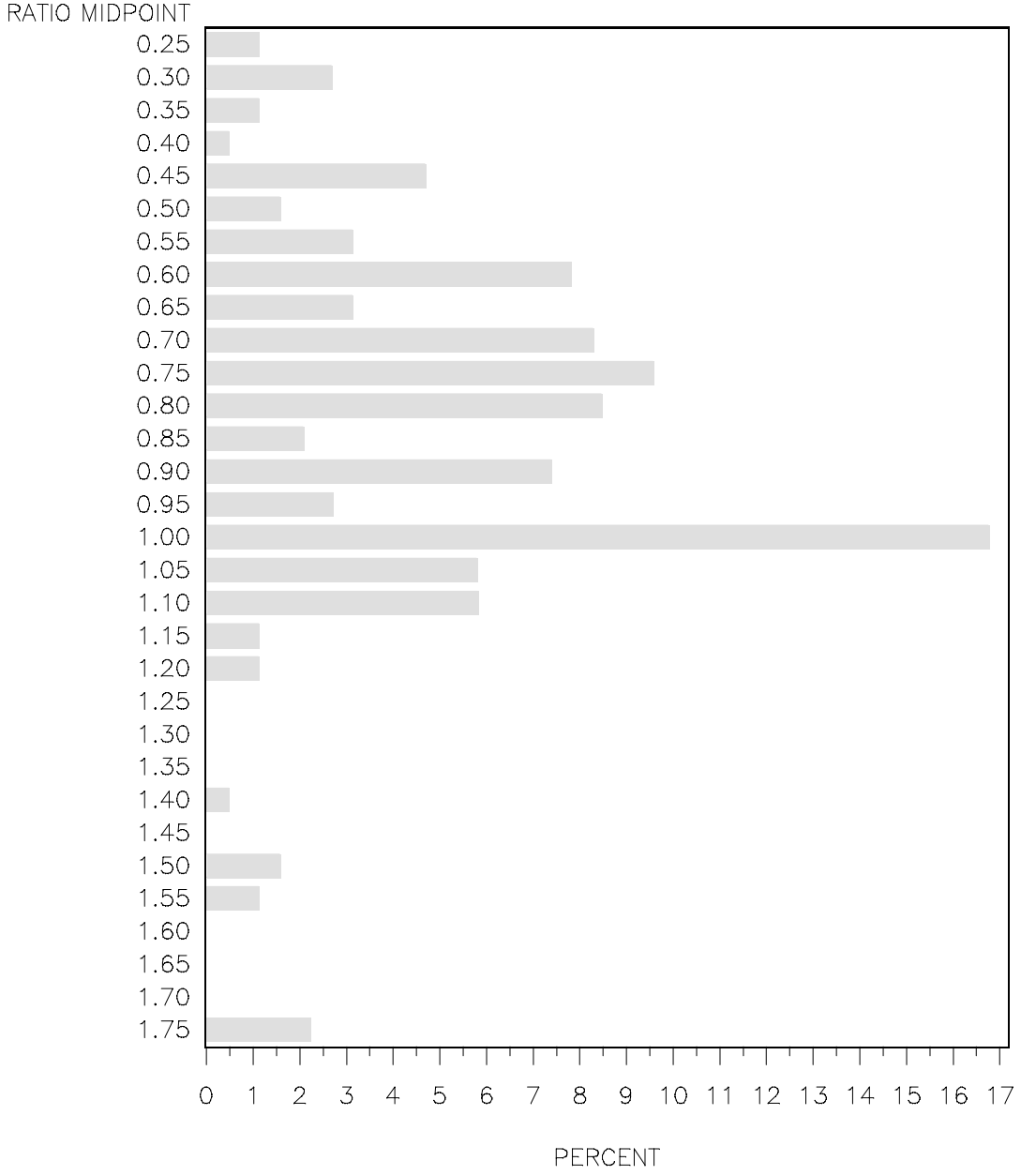
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Columbia County

County=Columbia



RATIO MIDPOINT	PCT.	CUM. PCT.
0.25	1.11	1.11
0.30	2.67	3.78
0.35	1.11	4.89
0.40	0.48	5.36
0.45	4.68	10.04
0.50	1.56	11.60
0.55	3.12	14.72
0.60	7.80	22.52
0.65	3.12	25.64
0.70	8.28	33.91
0.75	9.56	43.48
0.80	8.46	51.93
0.85	2.06	54.00
0.90	7.37	61.37
0.95	2.69	64.06
1.00	16.76	80.82
1.05	5.79	86.61
1.10	5.81	92.42
1.15	1.11	93.53
1.20	1.11	94.64
1.25	0.00	94.64
1.30	0.00	94.64
1.35	0.00	94.64
1.40	0.48	95.11
1.45	0.00	95.11
1.50	1.56	96.67
1.55	1.11	97.78
1.60	0.00	97.78
1.65	0.00	97.78
1.70	0.00	97.78
1.75	2.22	100.00

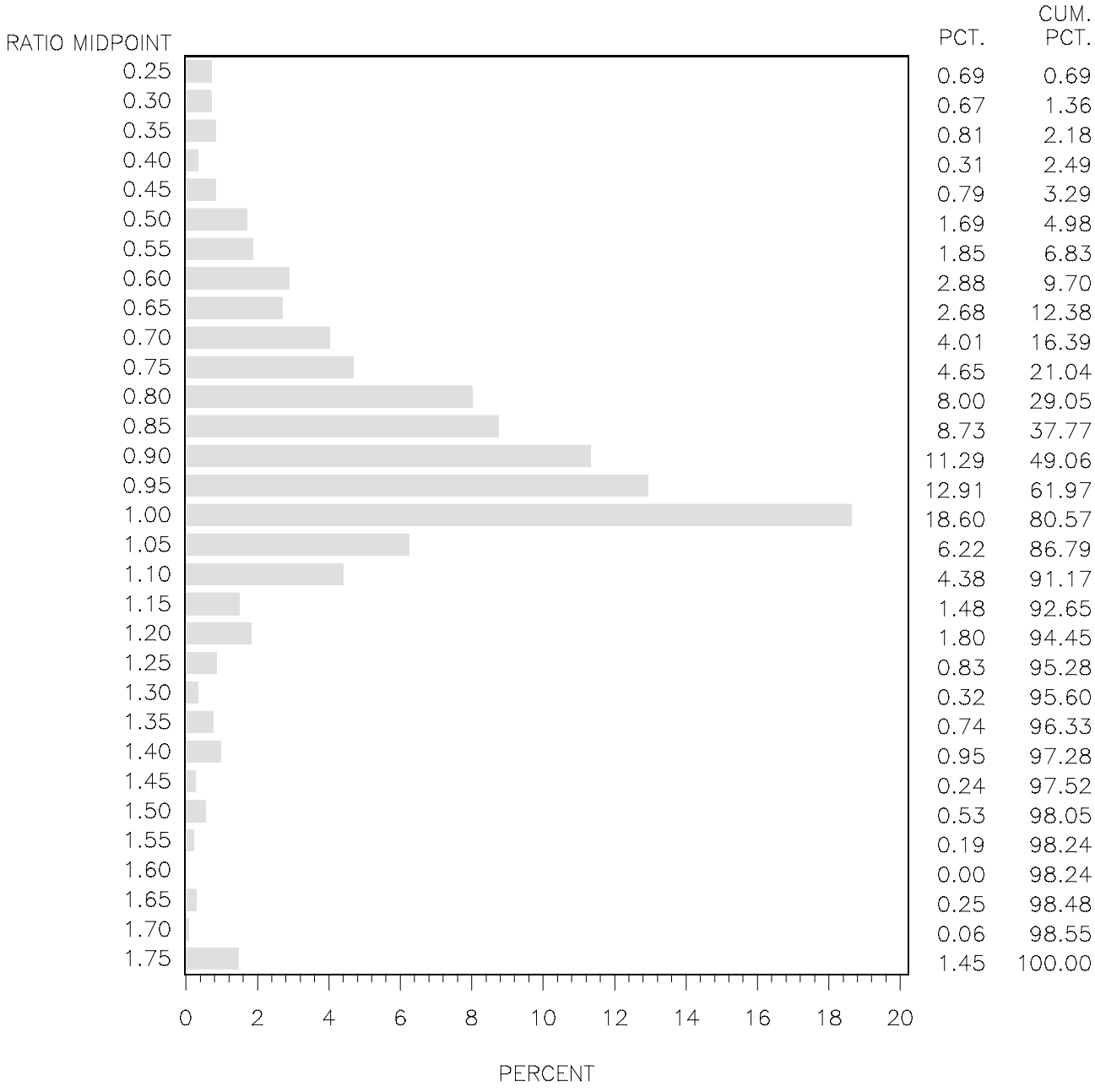
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Cowlitz County

County=Cowlitz



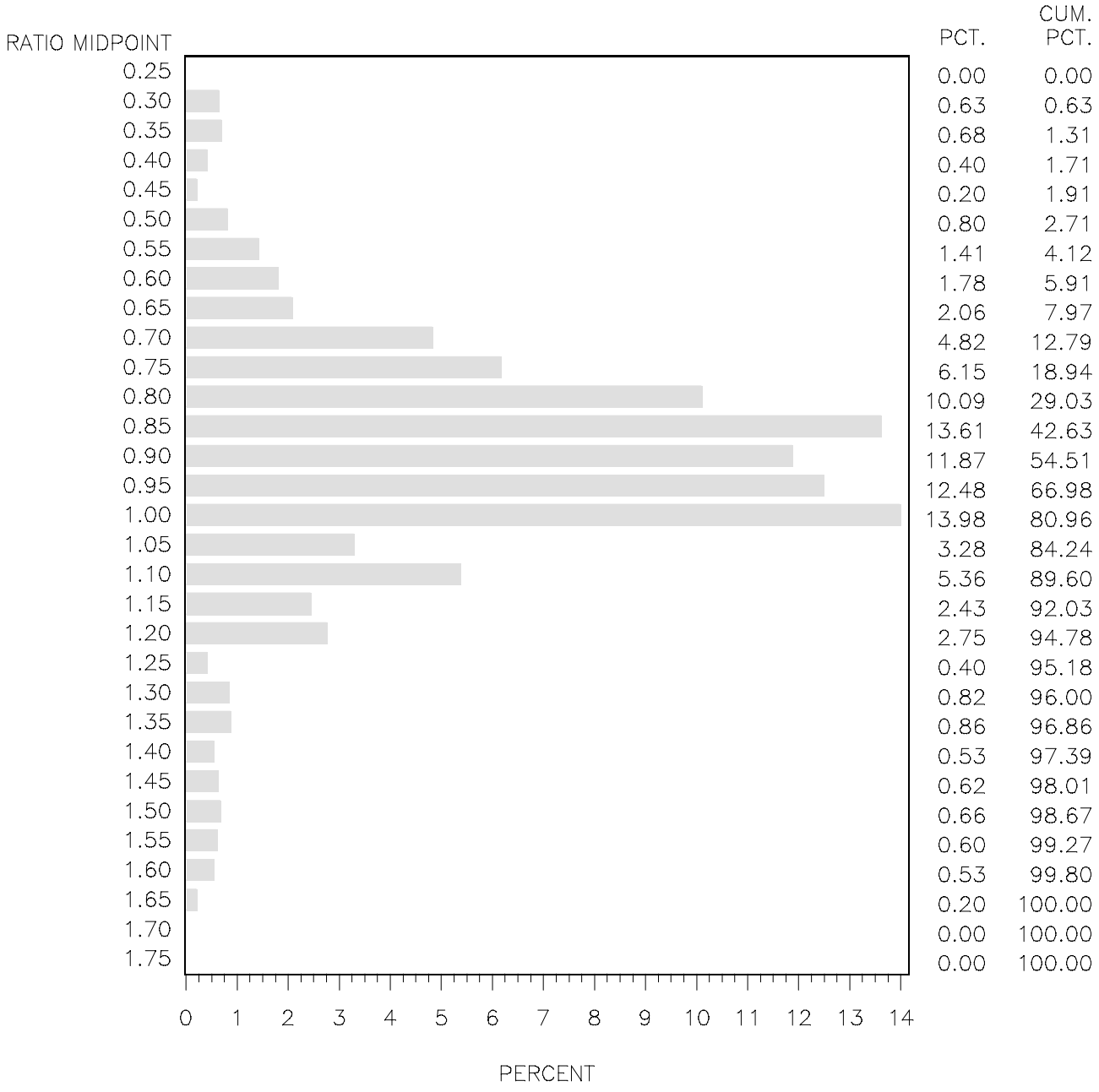
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Douglas County

County=Douglas



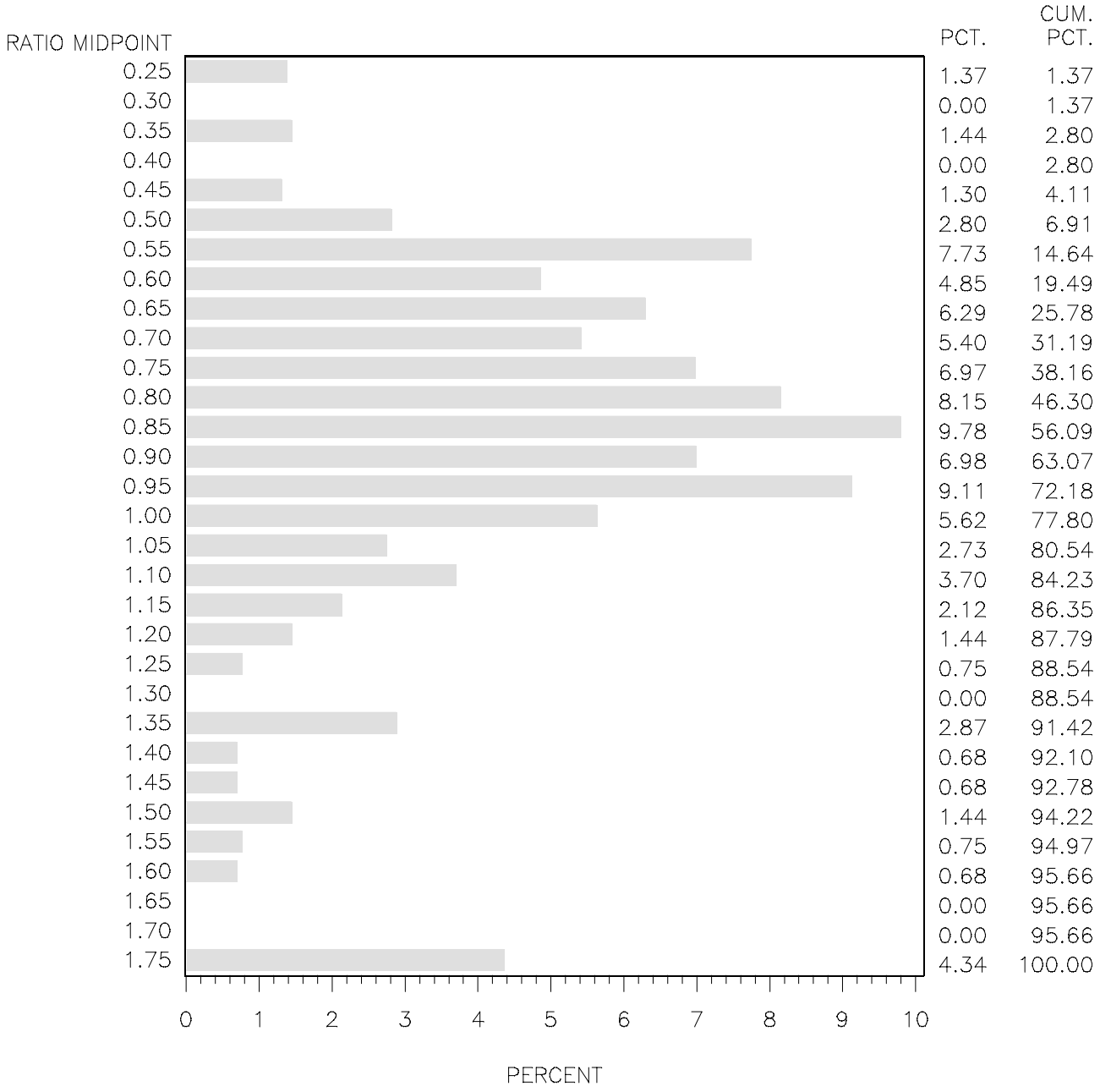
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Ferry County

County=Ferry



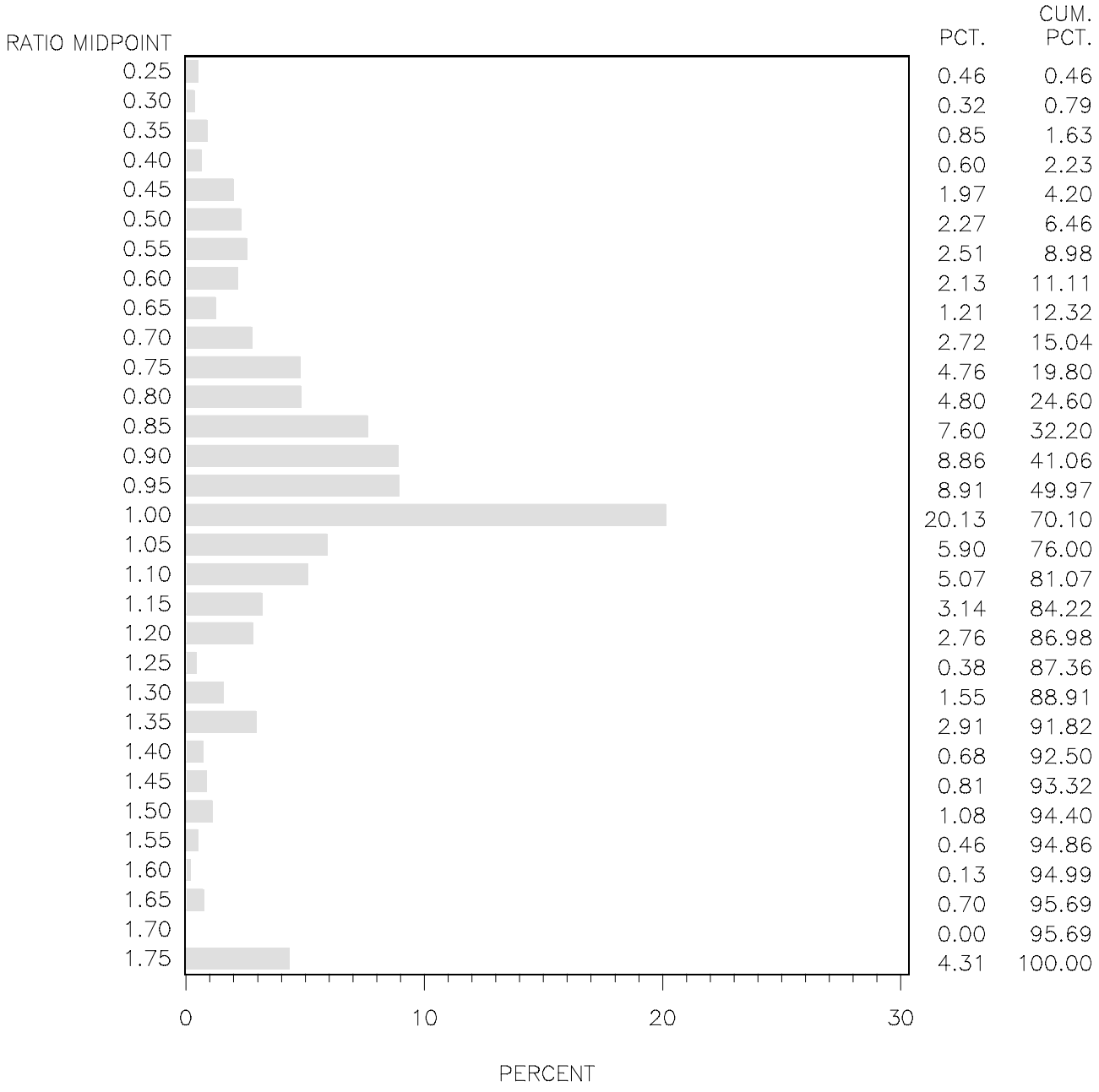
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Franklin County

County=Franklin



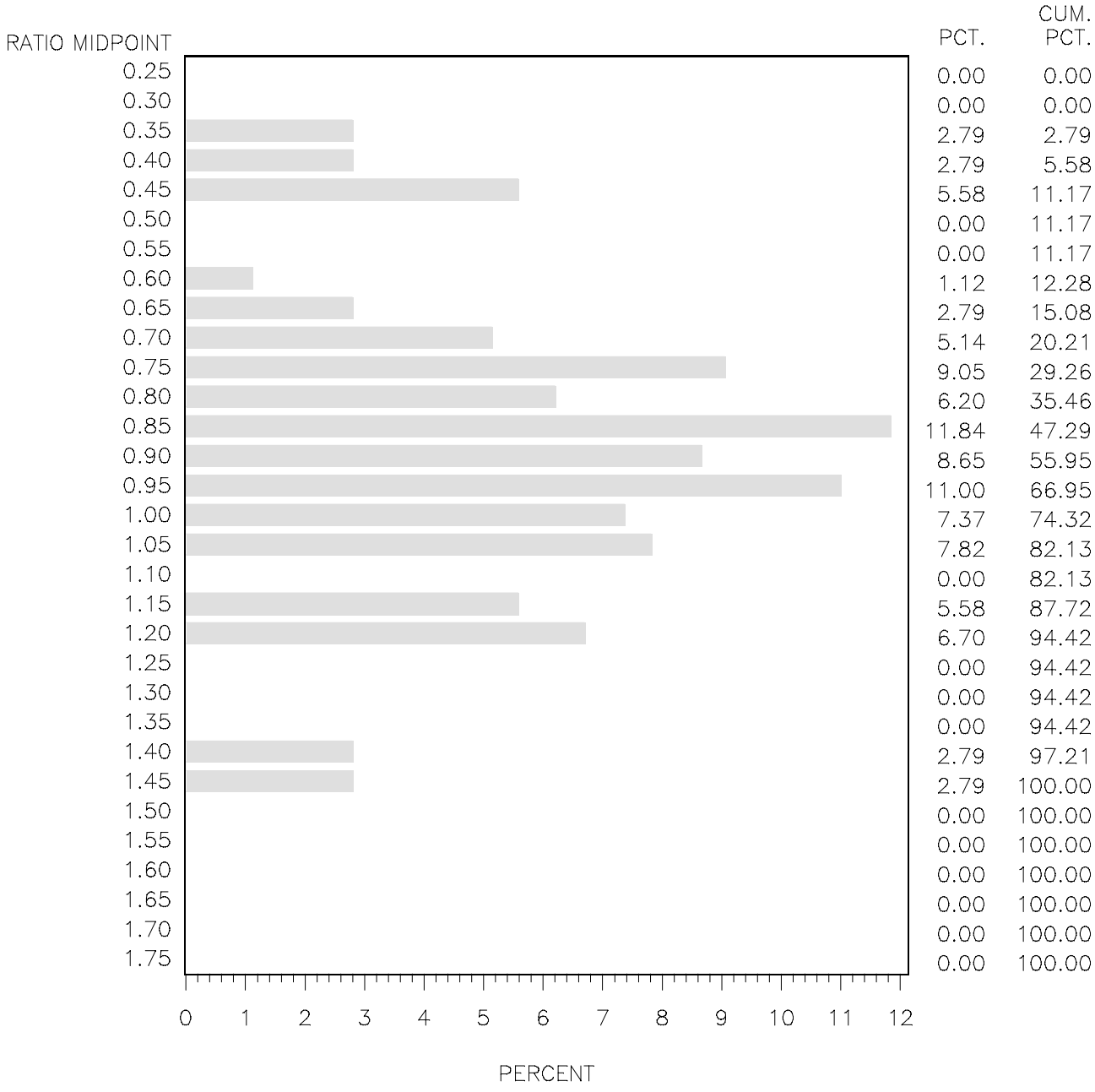
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Garfield County

County=Garfield



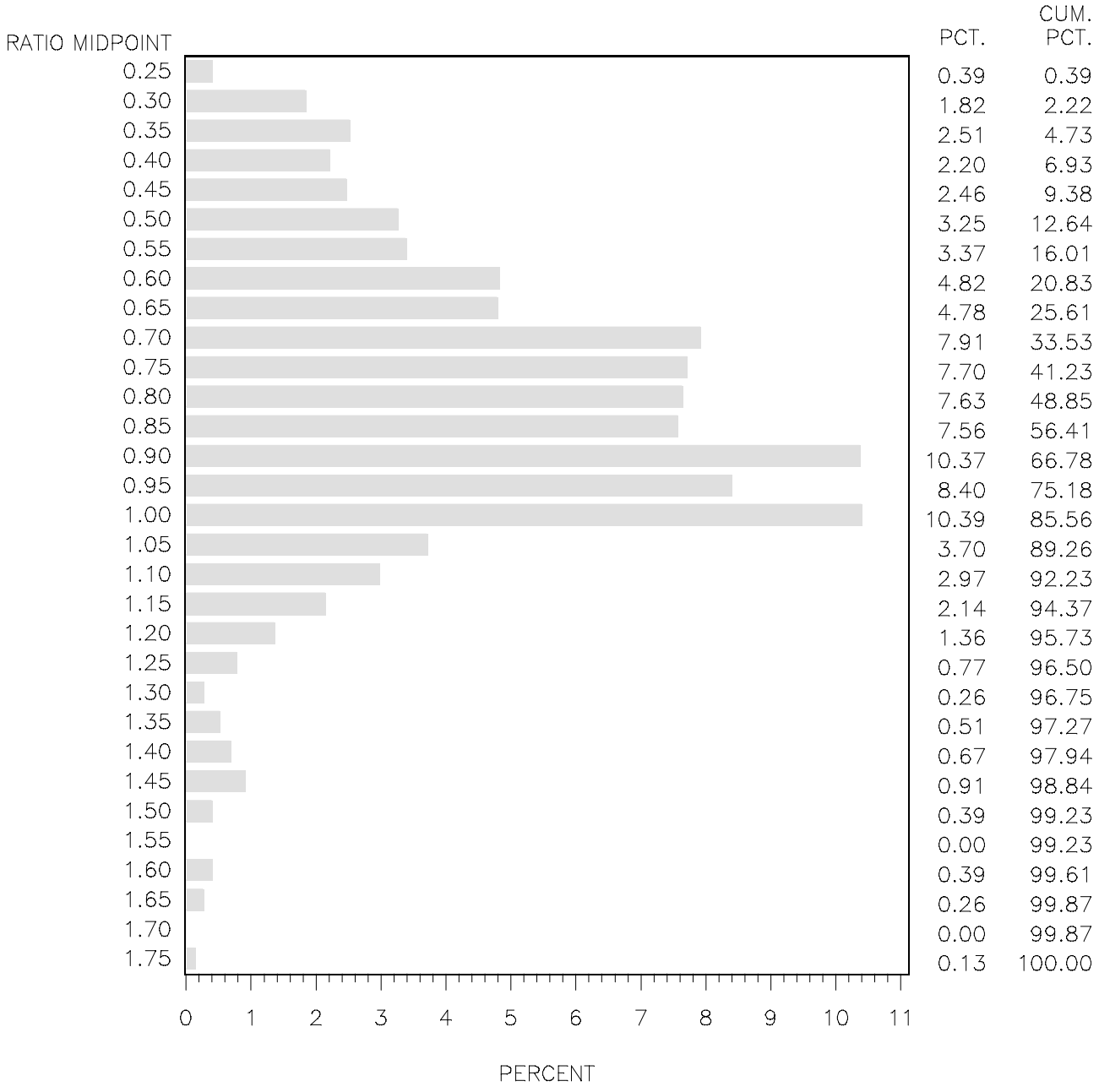
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Grant County

County=Grant



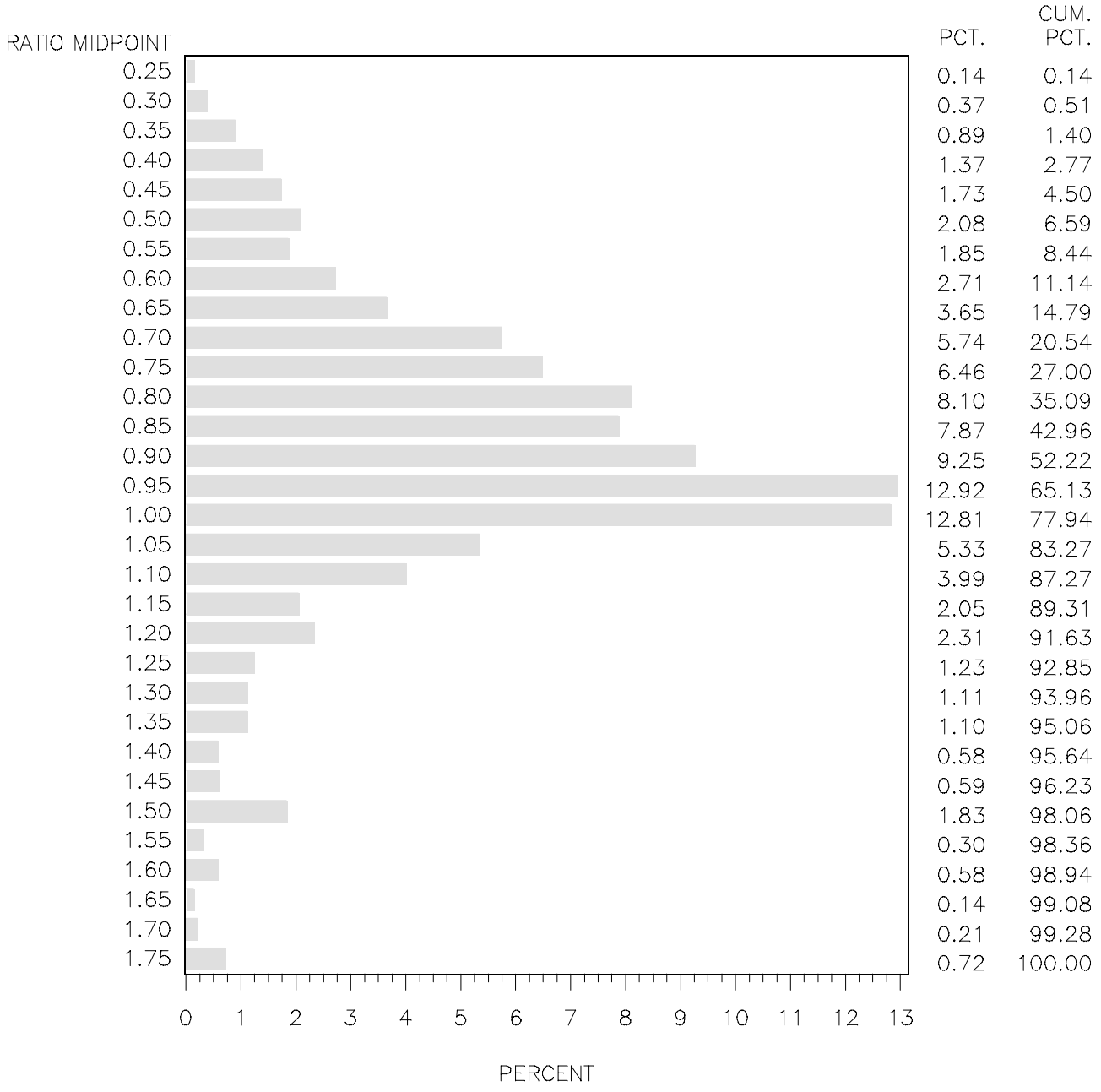
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Grays Harbor County

County=Grays Harbor



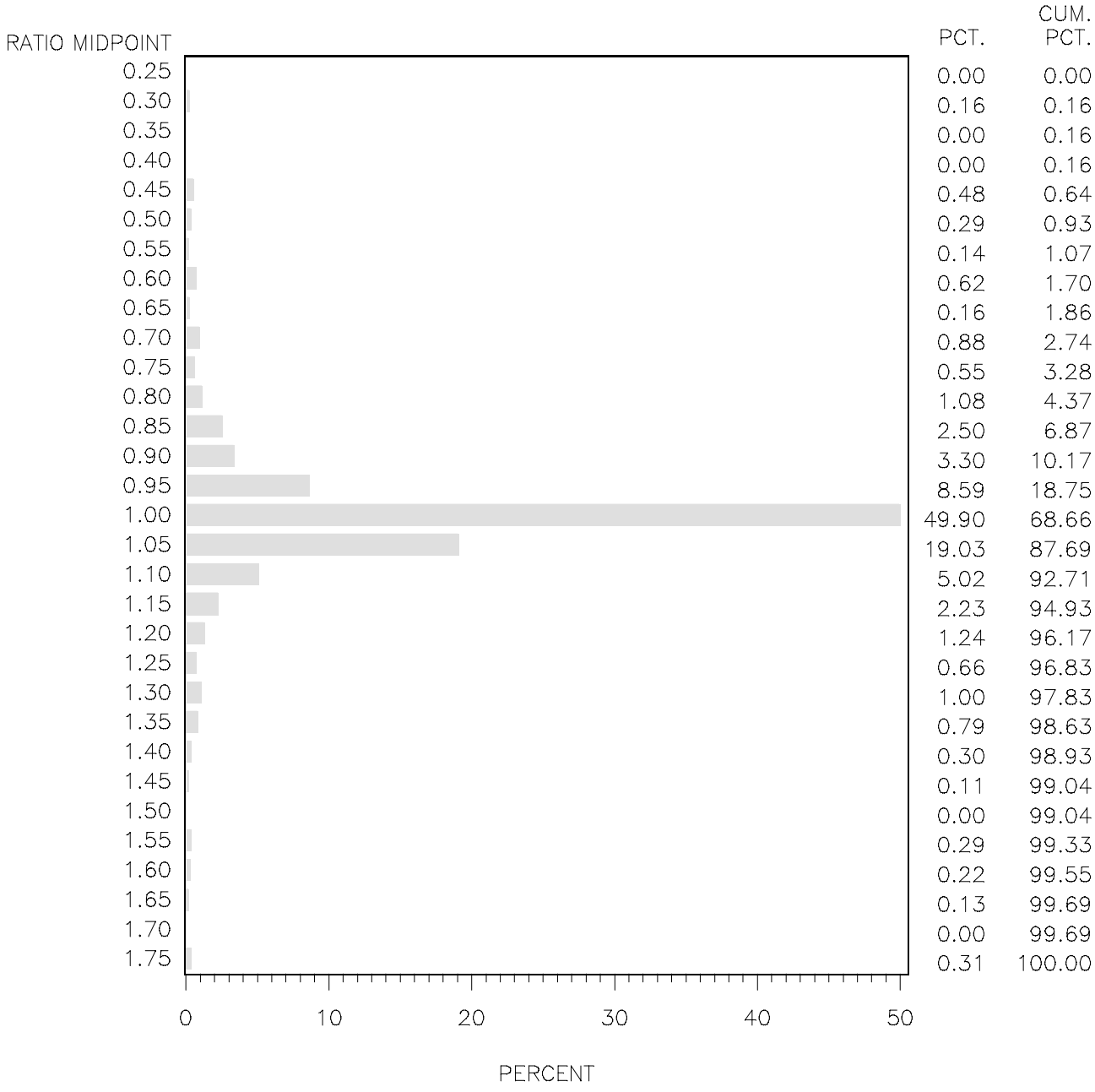
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Island County

County=Island



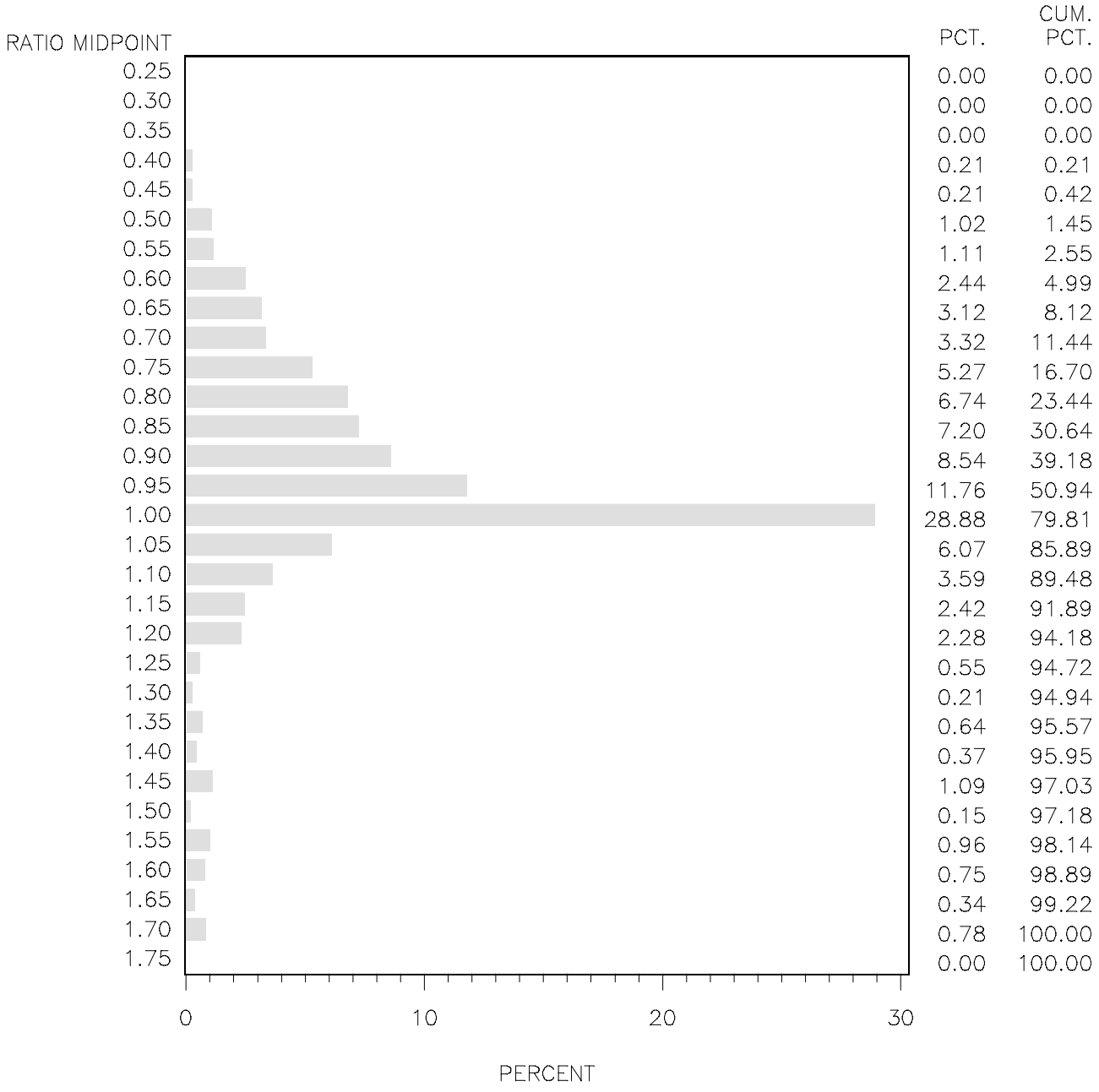
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Jefferson County

County=Jefferson



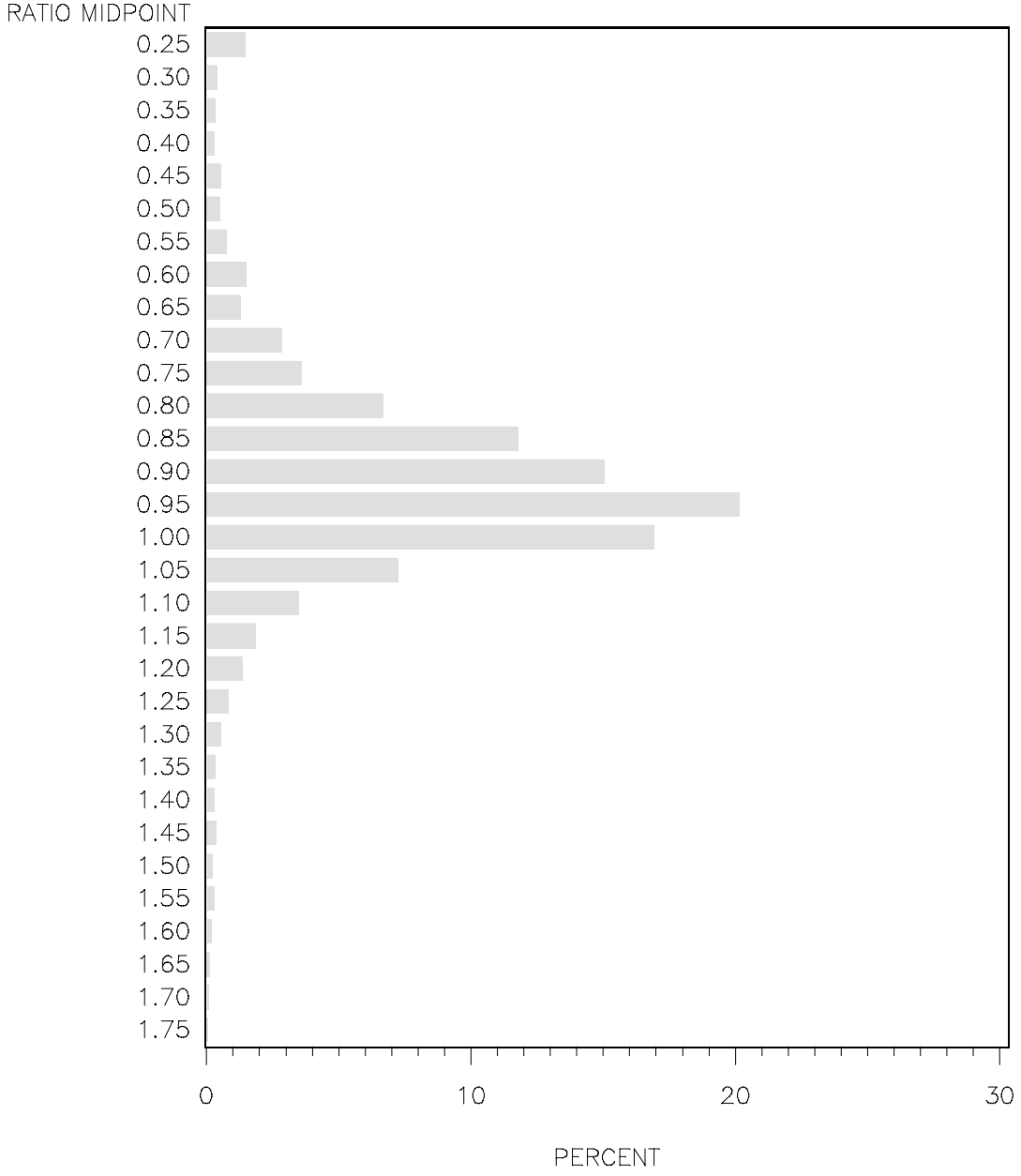
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for King County

County=King



RATIO MIDPOINT	PCT.	CUM. PCT.
0.25	1.42	1.42
0.30	0.37	1.78
0.35	0.29	2.07
0.40	0.23	2.30
0.45	0.49	2.80
0.50	0.48	3.27
0.55	0.70	3.97
0.60	1.47	5.45
0.65	1.24	6.68
0.70	2.80	9.48
0.75	3.55	13.02
0.80	6.62	19.65
0.85	11.72	31.37
0.90	15.00	46.37
0.95	20.13	66.50
1.00	16.88	83.38
1.05	7.19	90.57
1.10	3.45	94.02
1.15	1.80	95.82
1.20	1.31	97.14
1.25	0.80	97.93
1.30	0.49	98.42
1.35	0.30	98.72
1.40	0.24	98.96
1.45	0.32	99.28
1.50	0.18	99.46
1.55	0.25	99.71
1.60	0.14	99.85
1.65	0.08	99.93
1.70	0.05	99.98
1.75	0.02	100.00

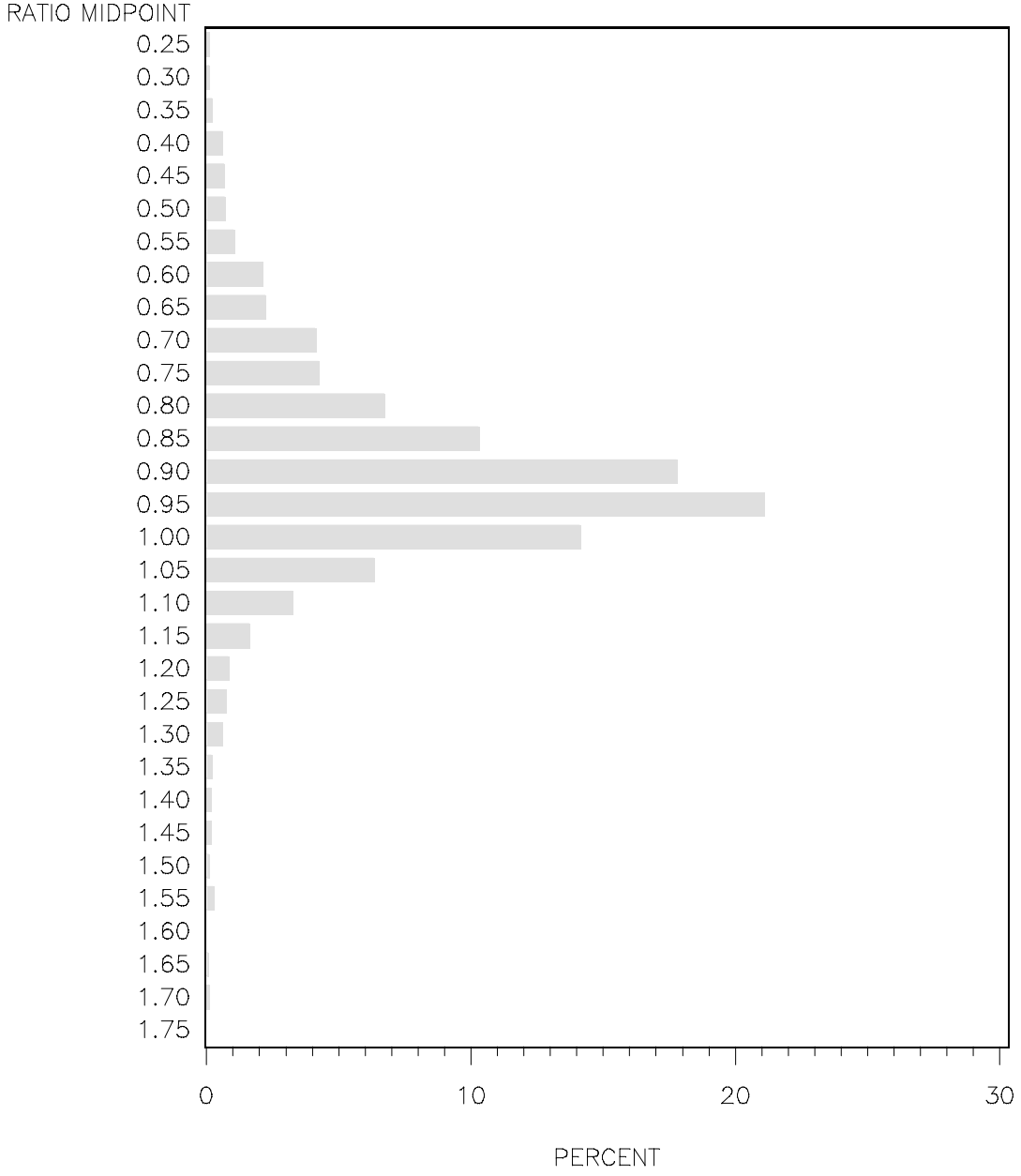
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Kitsap County

County=Kitsap



RATIO MIDPOINT	PCT.	CUM. PCT.
0.25	0.09	0.09
0.30	0.09	0.17
0.35	0.20	0.37
0.40	0.58	0.95
0.45	0.64	1.60
0.50	0.67	2.26
0.55	1.01	3.27
0.60	2.08	5.35
0.65	2.22	7.57
0.70	4.11	11.67
0.75	4.25	15.92
0.80	6.71	22.63
0.85	10.28	32.92
0.90	17.77	50.69
0.95	21.06	71.75
1.00	14.10	85.85
1.05	6.33	92.17
1.10	3.23	95.40
1.15	1.61	97.01
1.20	0.82	97.83
1.25	0.69	98.52
1.30	0.57	99.09
1.35	0.17	99.27
1.40	0.16	99.43
1.45	0.14	99.57
1.50	0.07	99.64
1.55	0.24	99.88
1.60	0.00	99.88
1.65	0.03	99.91
1.70	0.09	100.00
1.75	0.00	100.00

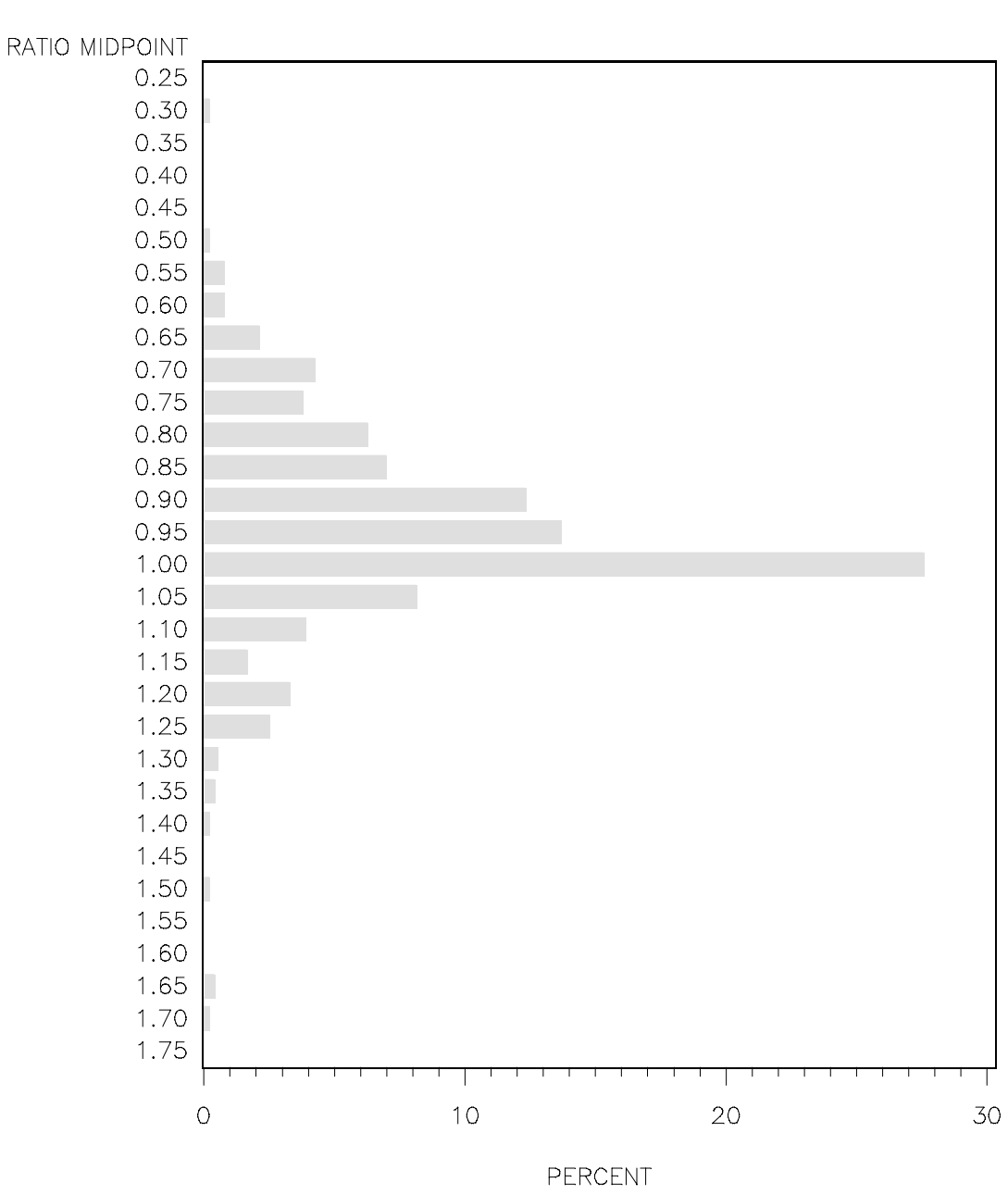
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Kittitas County

County=Kittitas



RATIO MIDPOINT	PCT.	CUM. PCT.
0.25	0.00	0.00
0.30	0.19	0.19
0.35	0.00	0.19
0.40	0.00	0.19
0.45	0.00	0.19
0.50	0.19	0.39
0.55	0.78	1.16
0.60	0.78	1.94
0.65	2.11	4.05
0.70	4.23	8.28
0.75	3.75	12.03
0.80	6.26	18.30
0.85	6.96	25.26
0.90	12.30	37.56
0.95	13.66	51.22
1.00	27.54	78.76
1.05	8.11	86.87
1.10	3.87	90.74
1.15	1.62	92.37
1.20	3.27	95.64
1.25	2.50	98.14
1.30	0.51	98.64
1.35	0.39	99.03
1.40	0.19	99.22
1.45	0.00	99.22
1.50	0.19	99.42
1.55	0.00	99.42
1.60	0.00	99.42
1.65	0.39	99.81
1.70	0.19	100.00
1.75	0.00	100.00

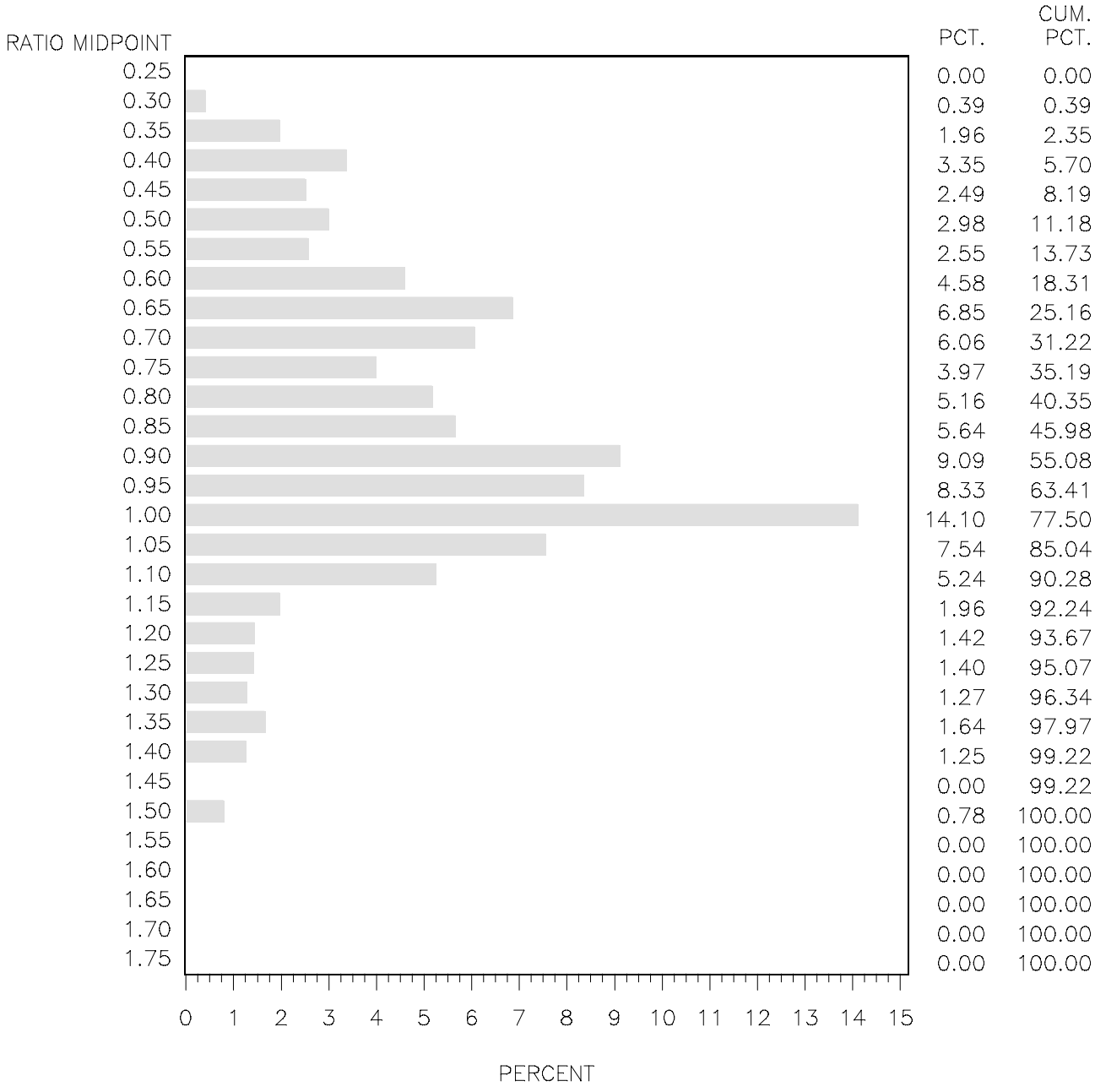
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Klickitat County

County=Klickitat



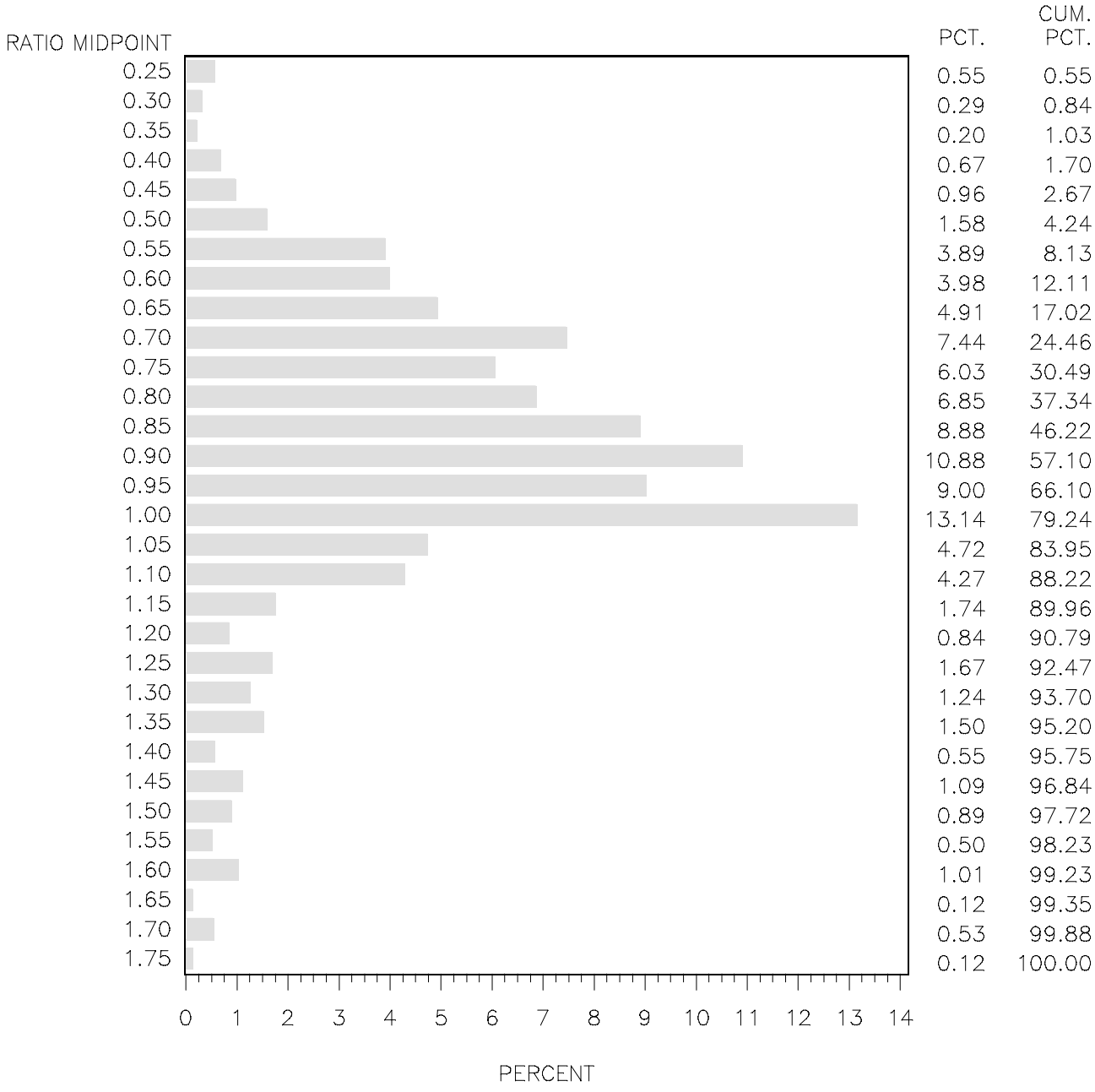
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Lewis County

County=Lewis



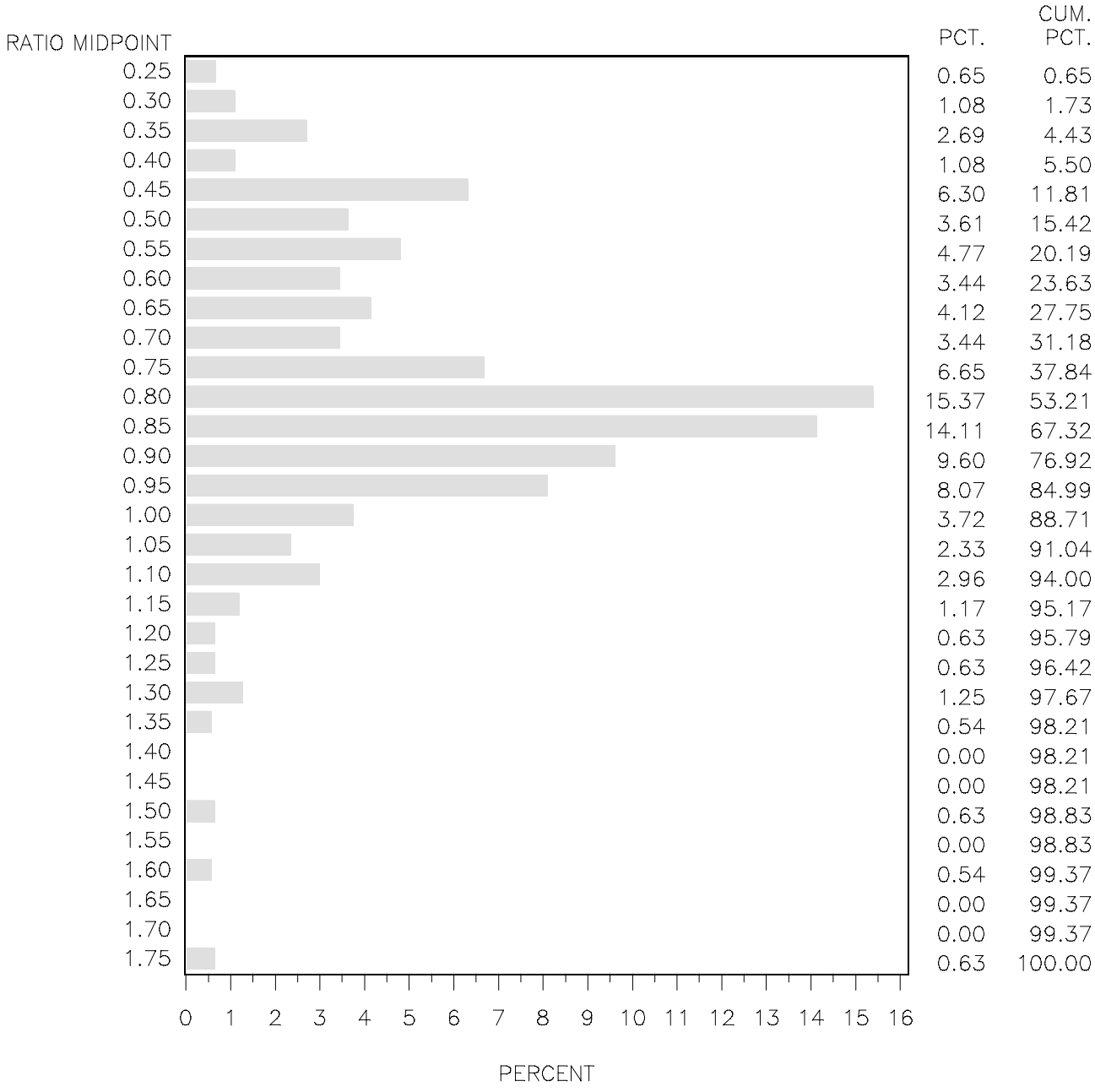
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Lincoln County

County=Lincoln



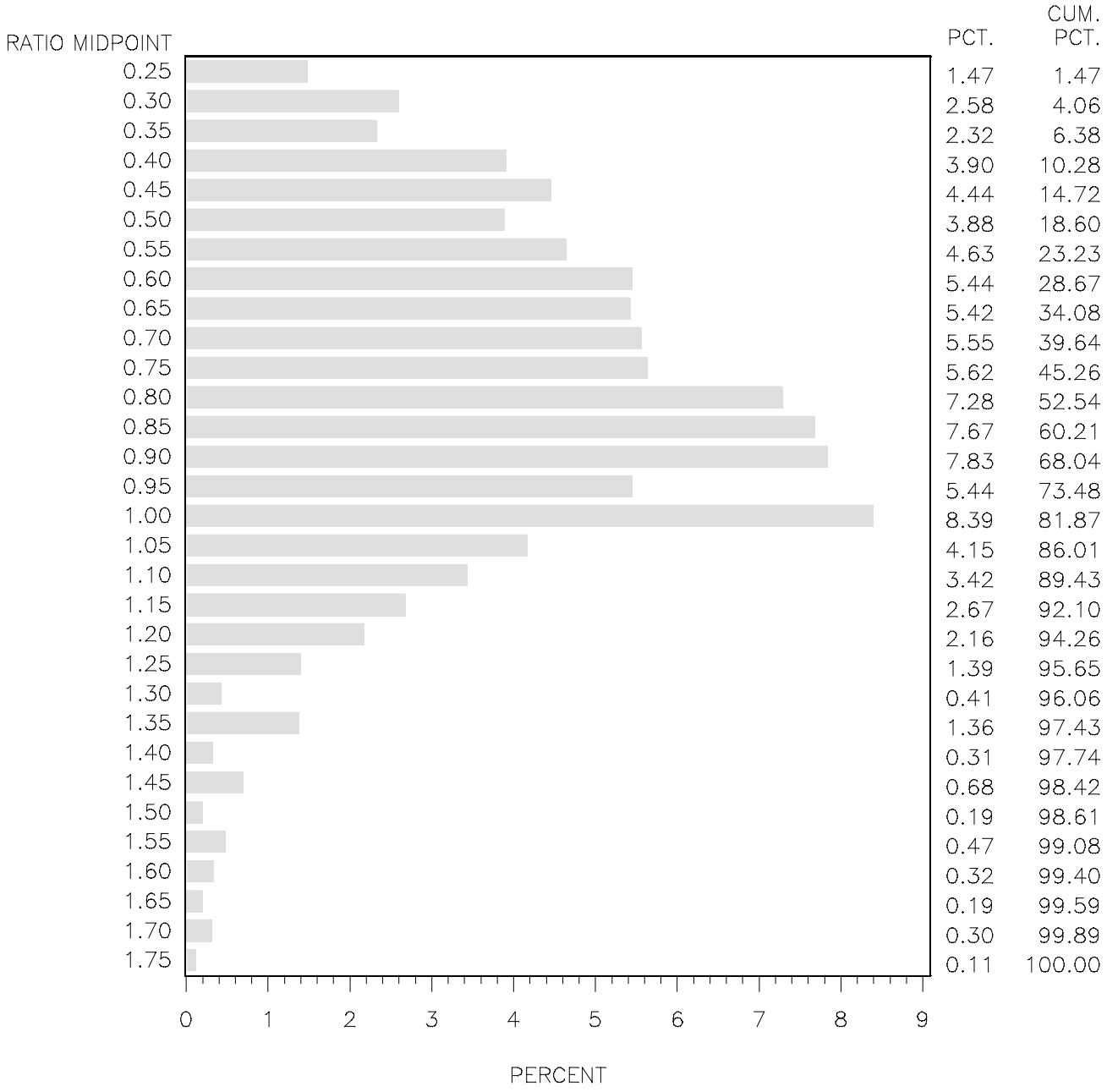
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Mason County

County=Mason



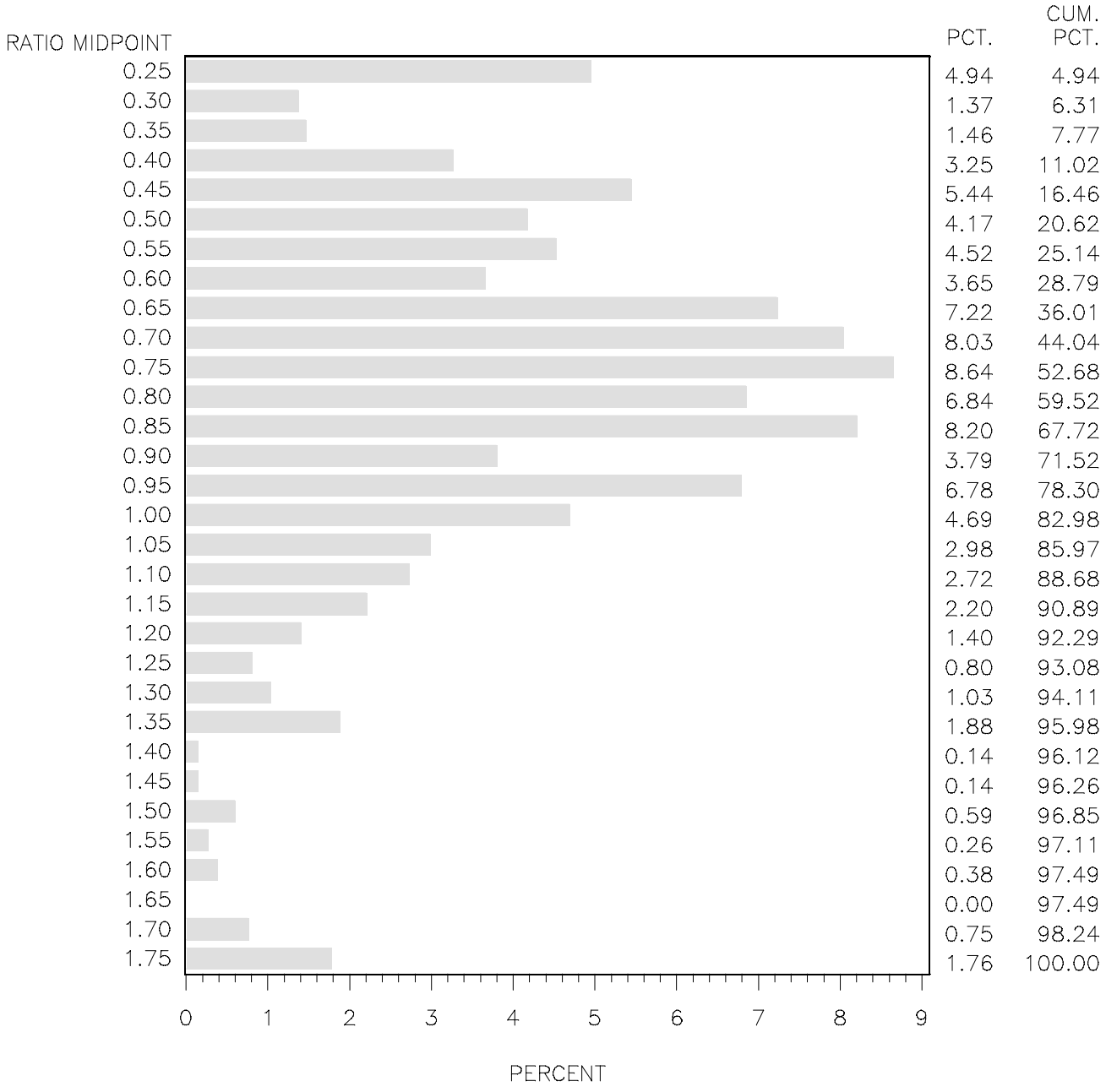
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Okanogan County

County=Okanogan



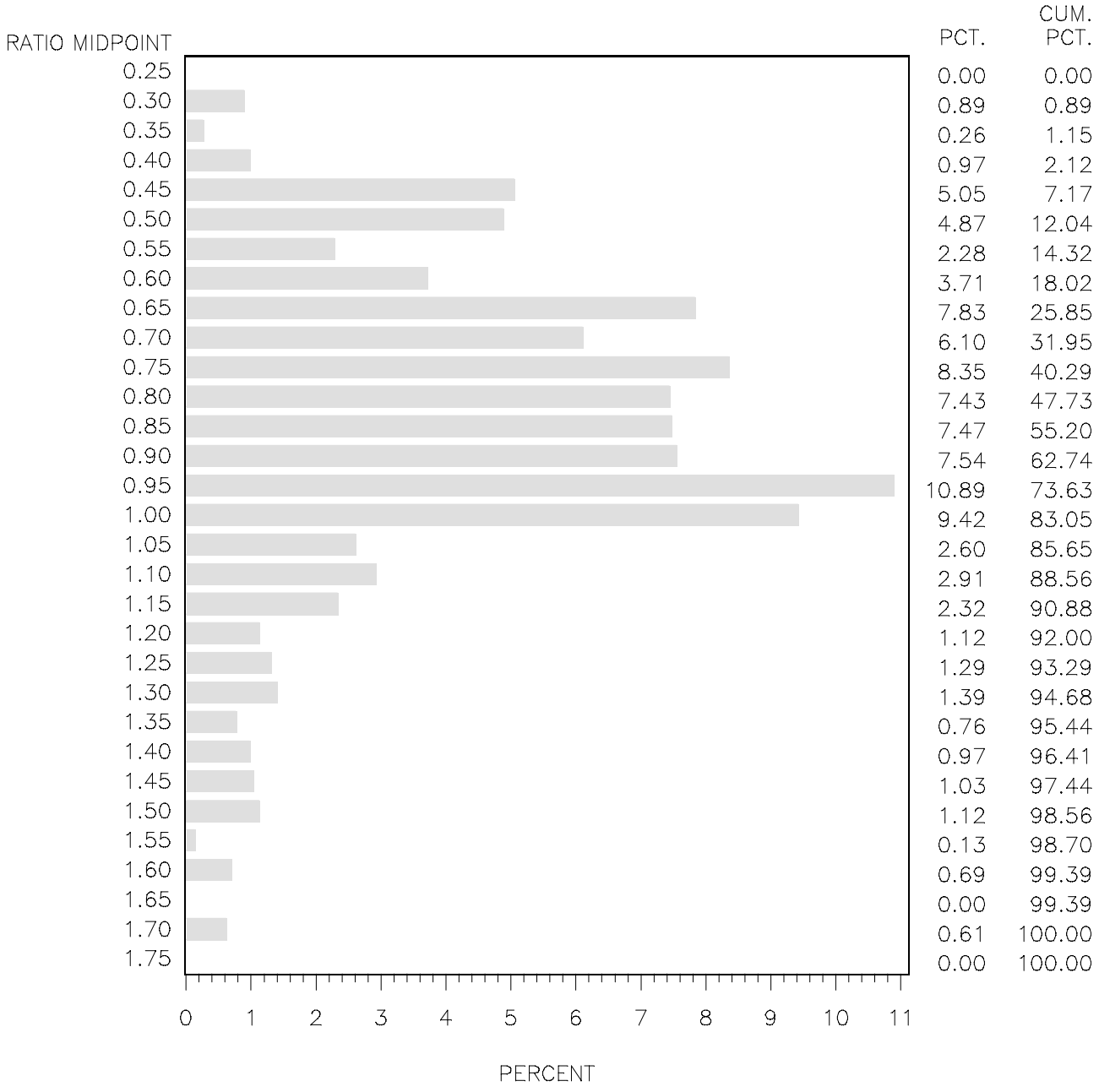
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Pacific County

County=Pacific



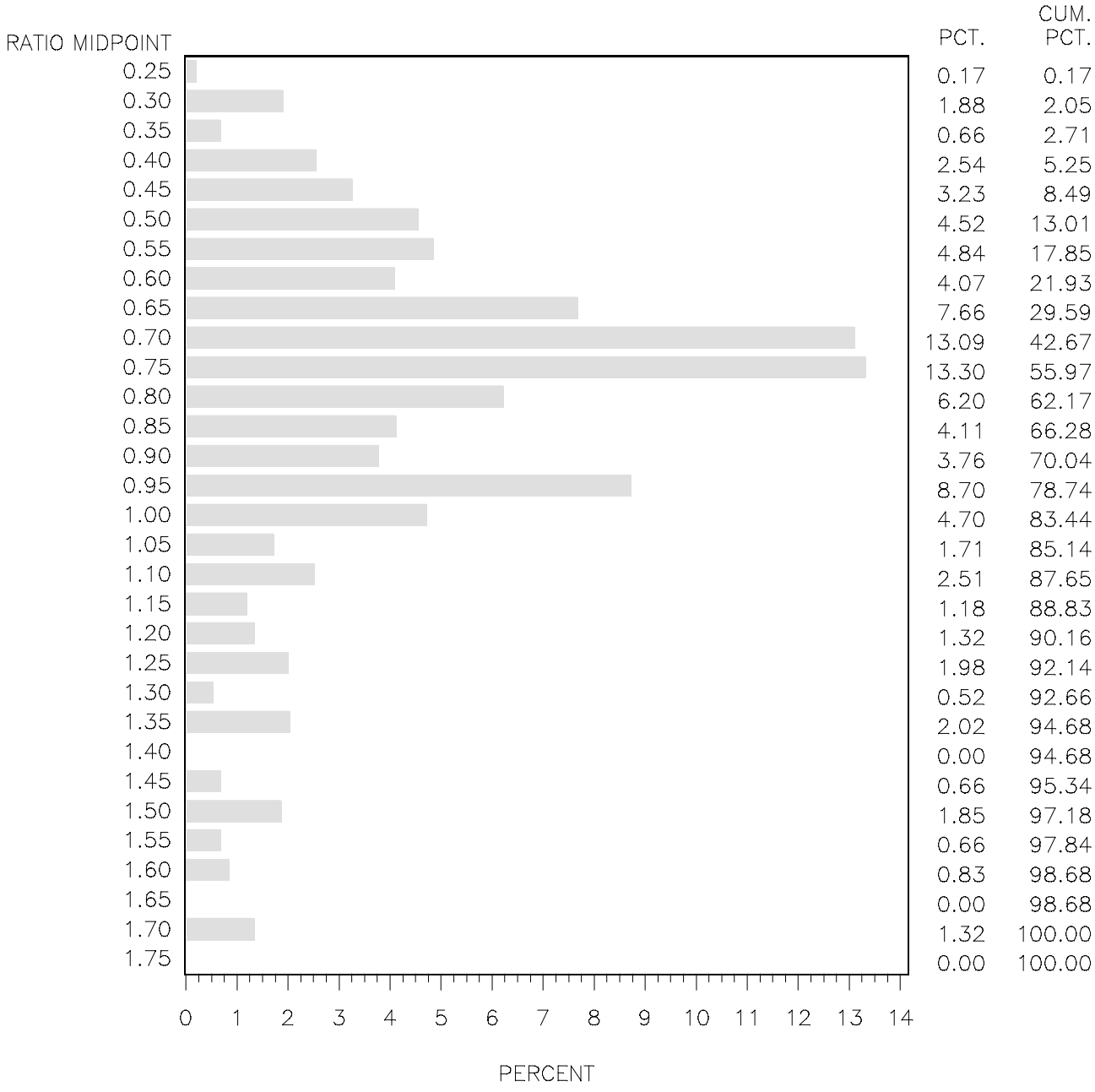
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Pend Oreille County

County=Pend Oreille



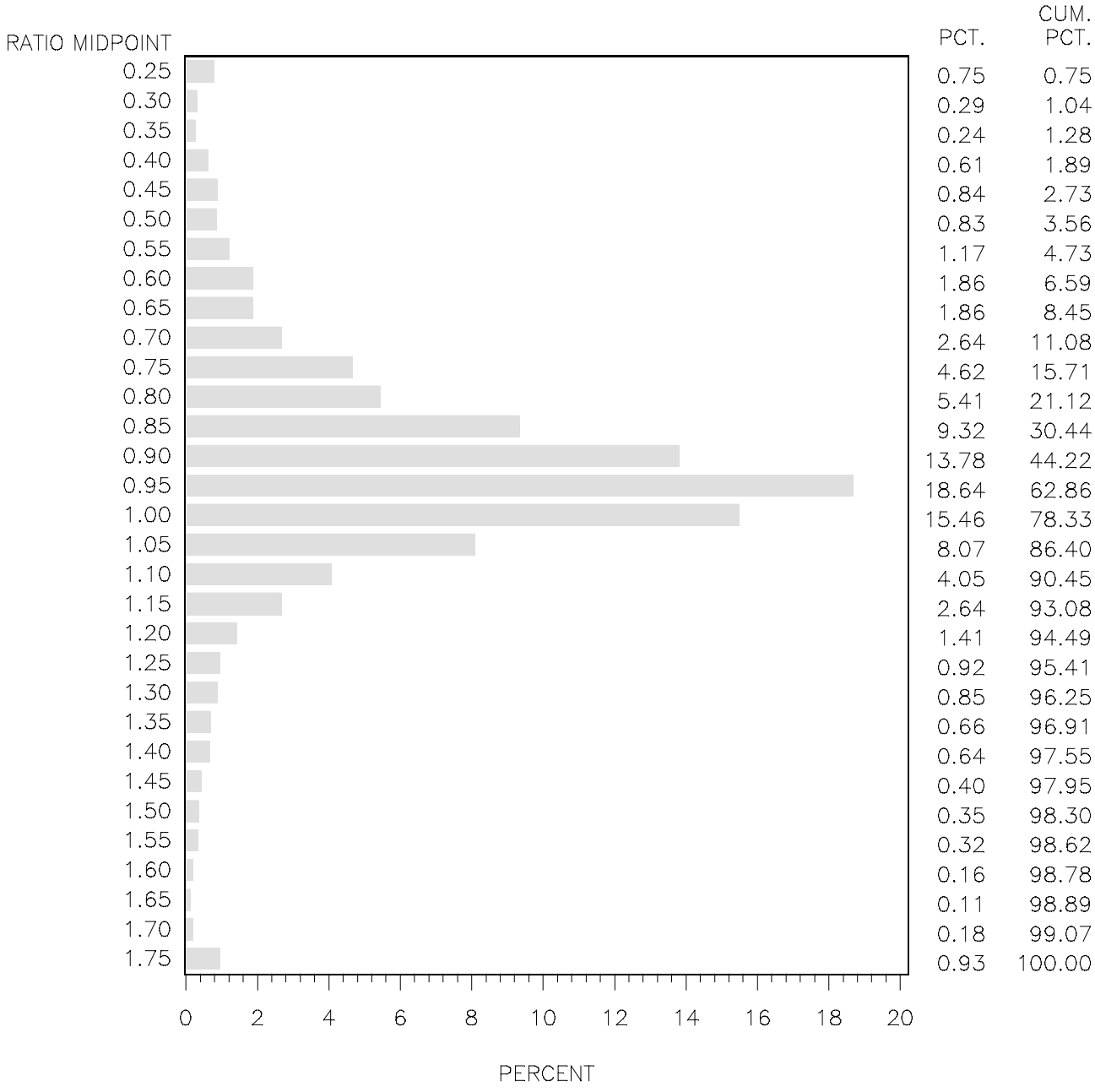
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Pierce County

County=Pierce



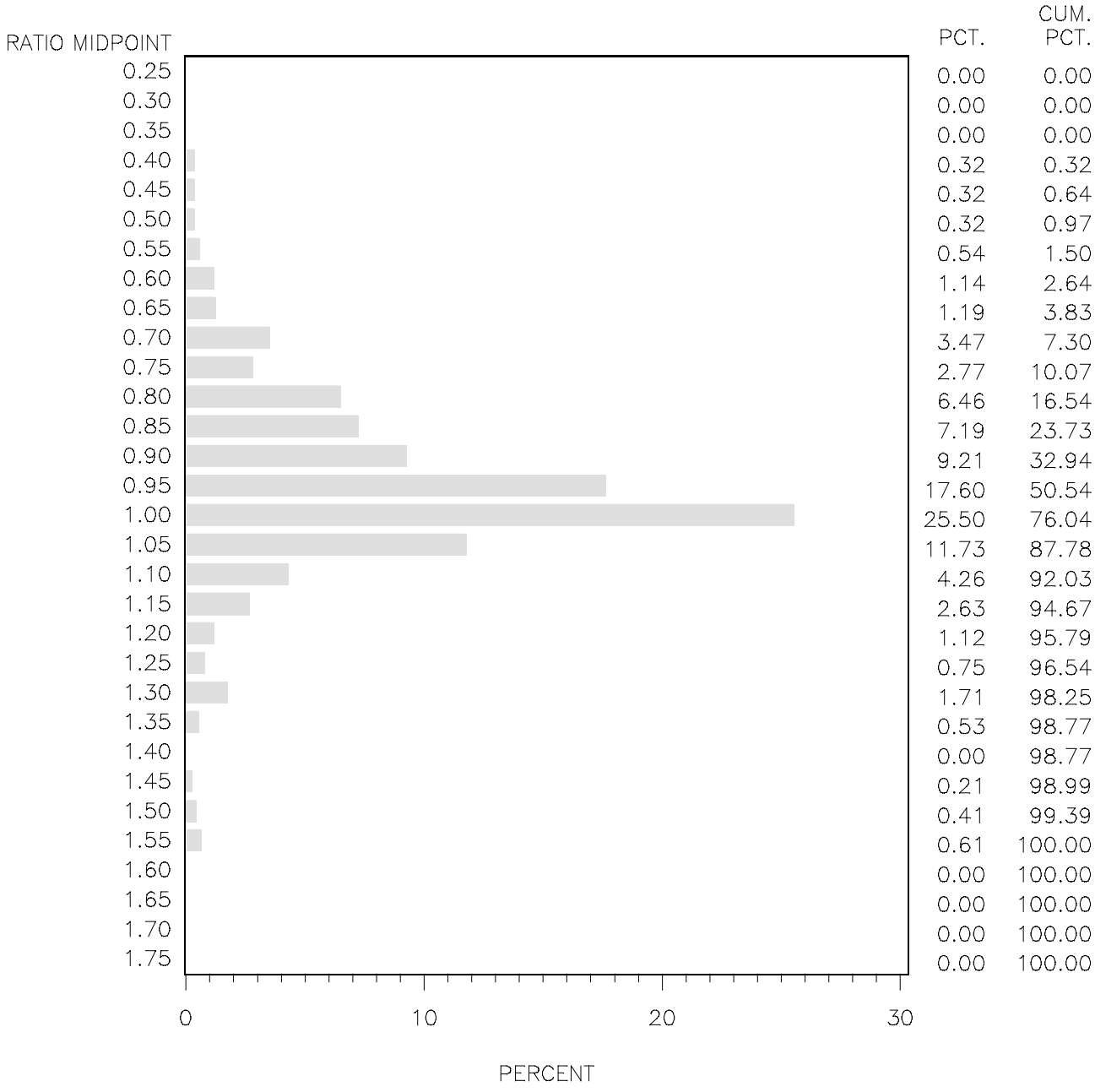
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for San Juan County

County=San Juan



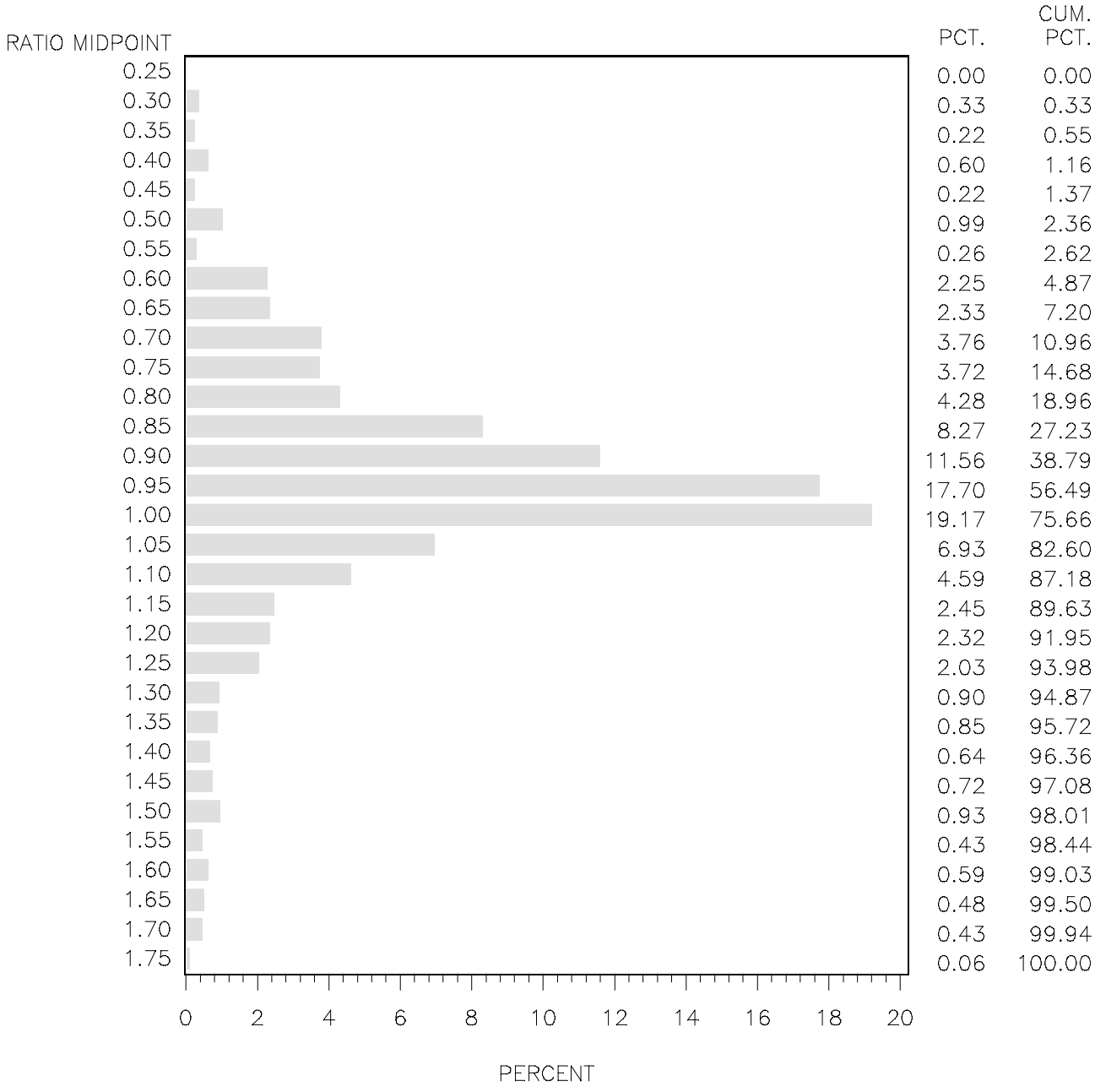
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Skagit County

County=Skagit



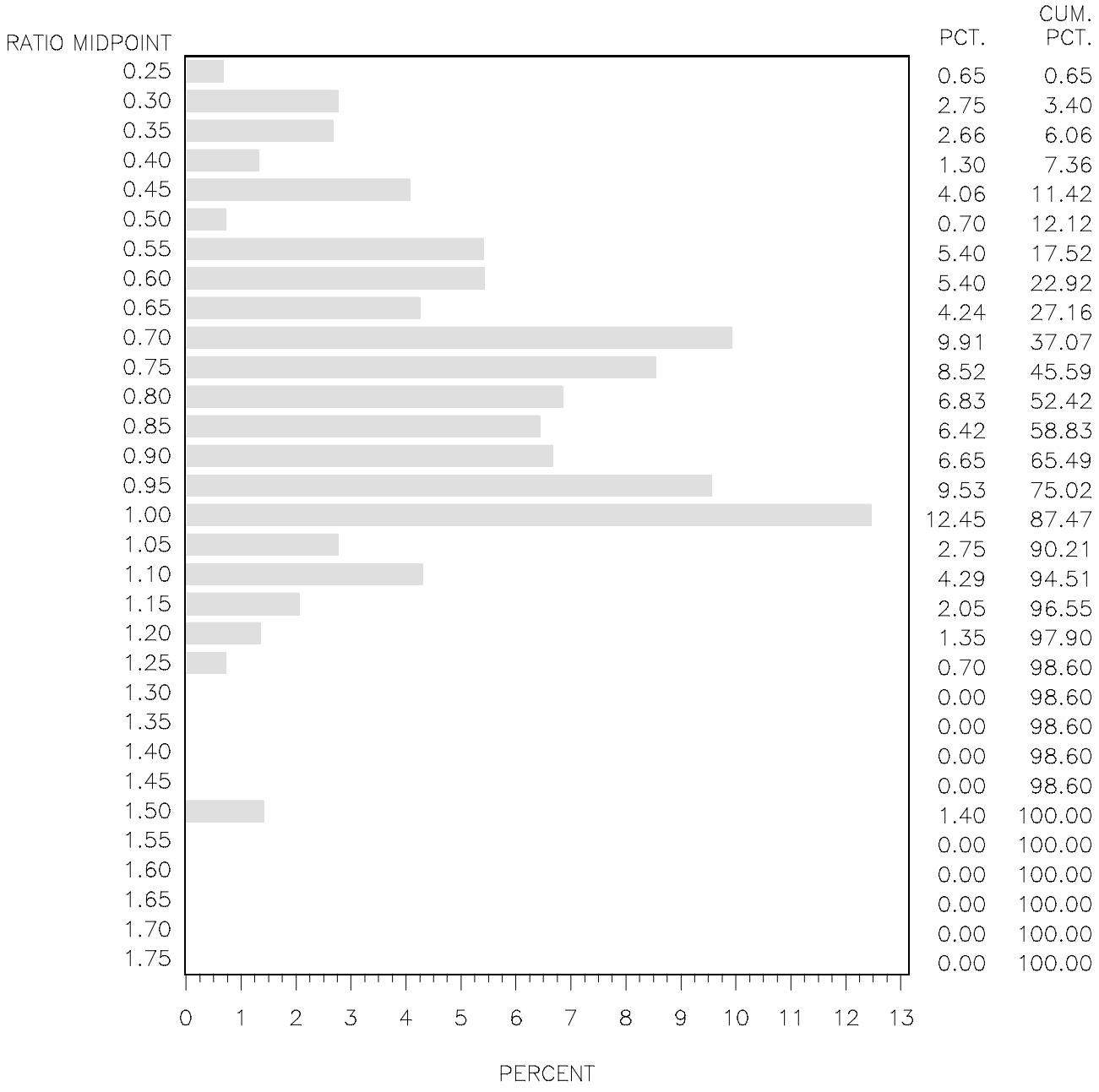
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Skamania County

County=Skamania



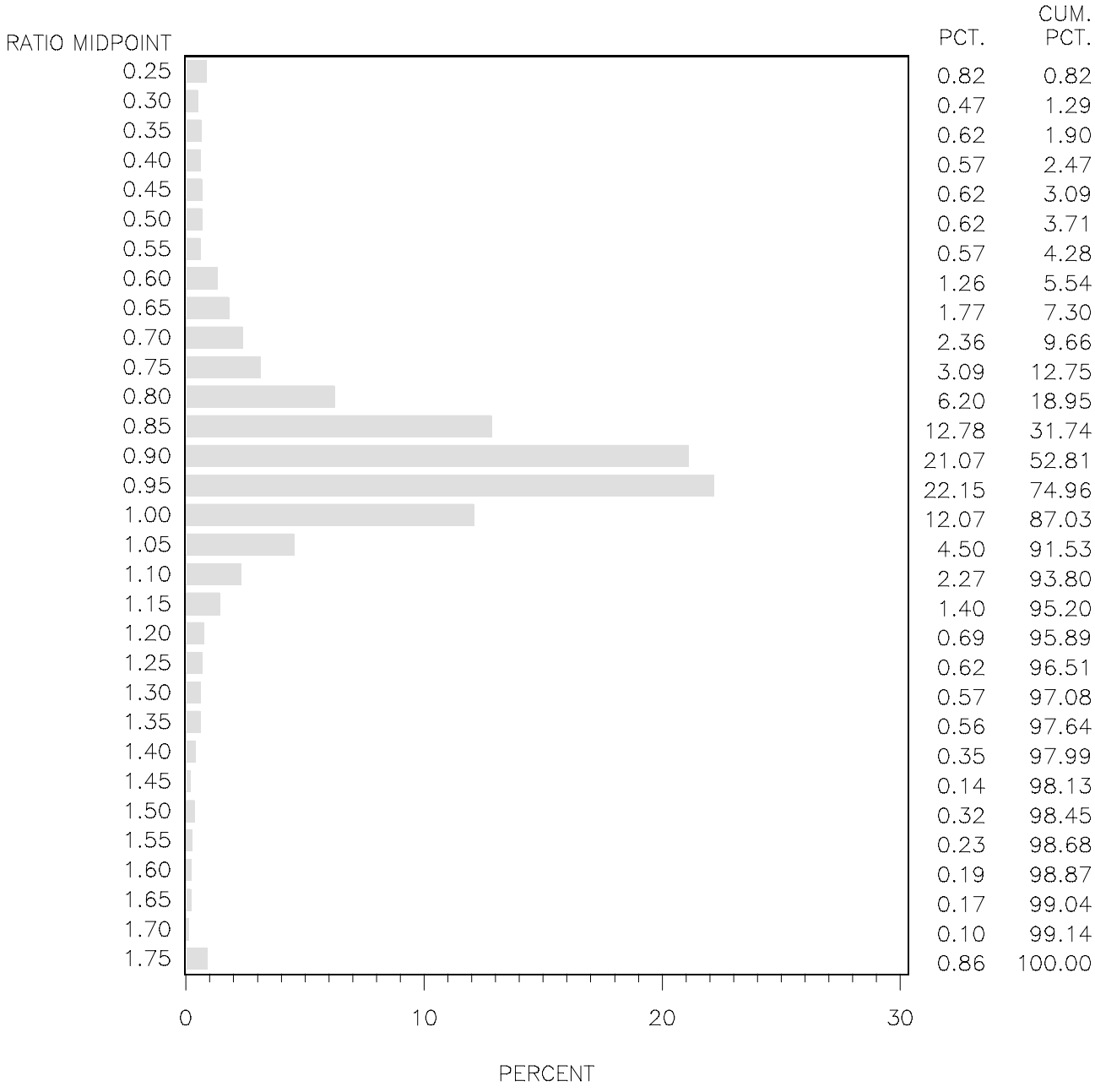
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Snohomish County

County=Snohomish



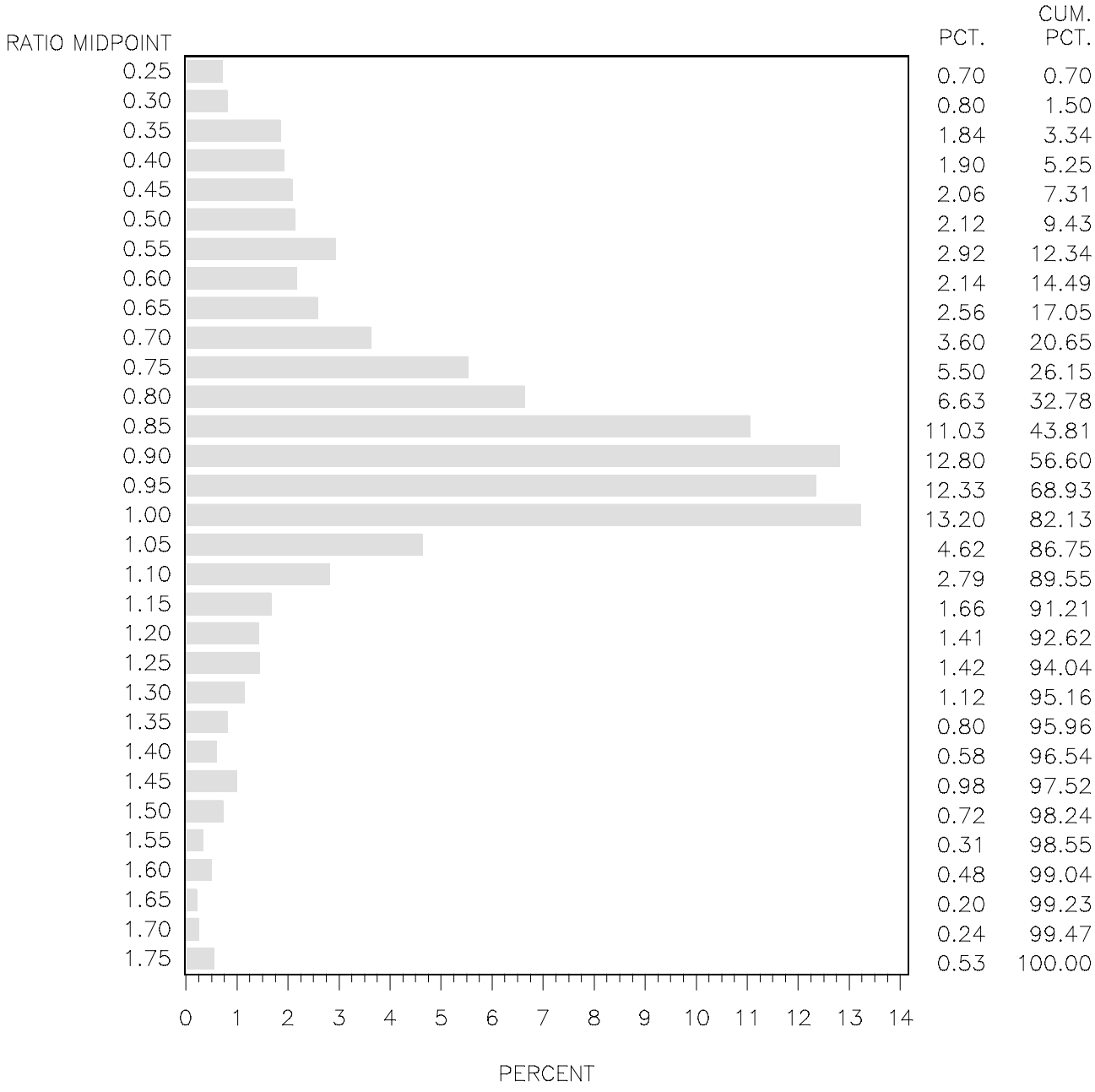
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Spokane County

County=Spokane



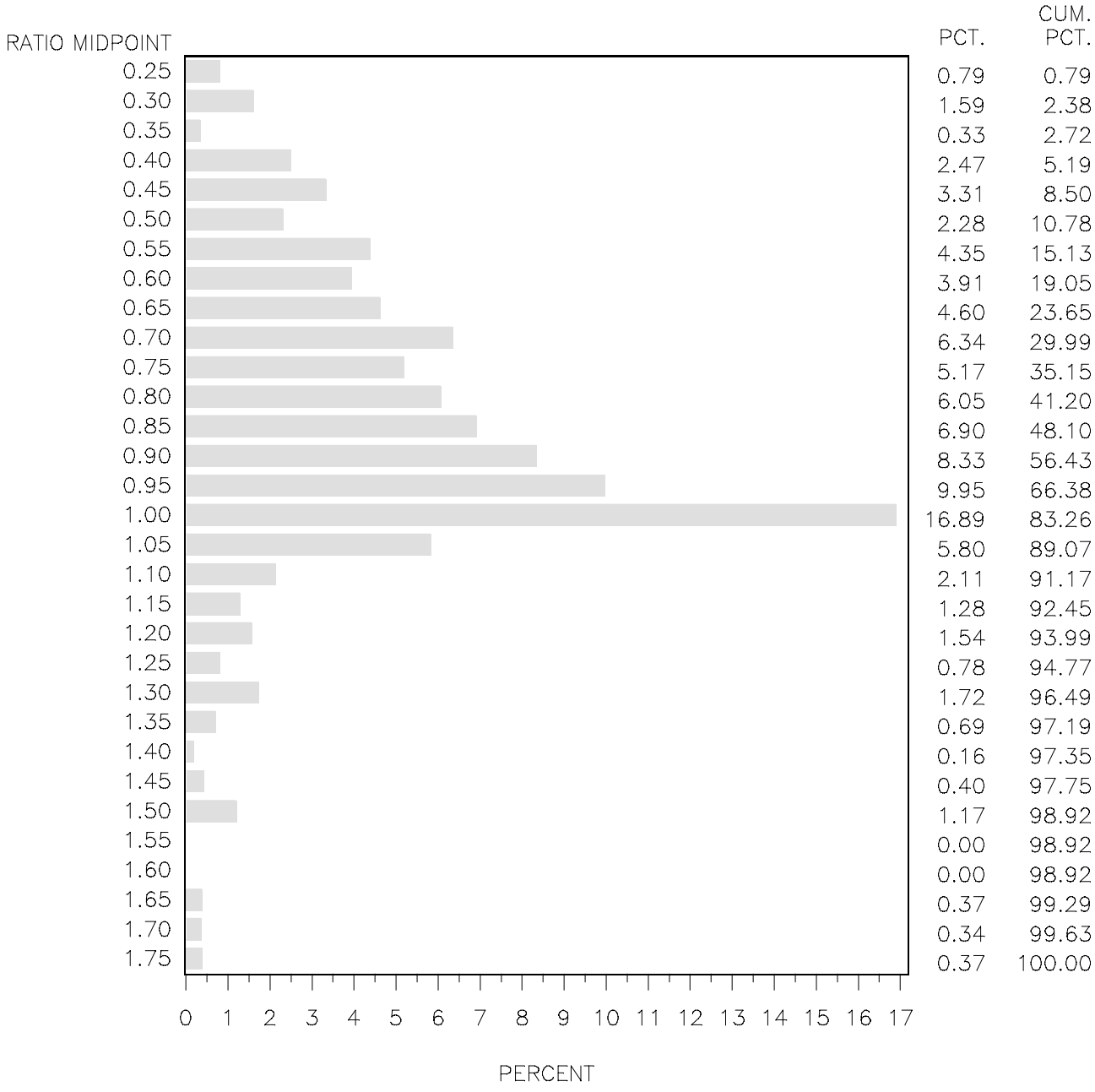
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Stevens County

County=Stevens



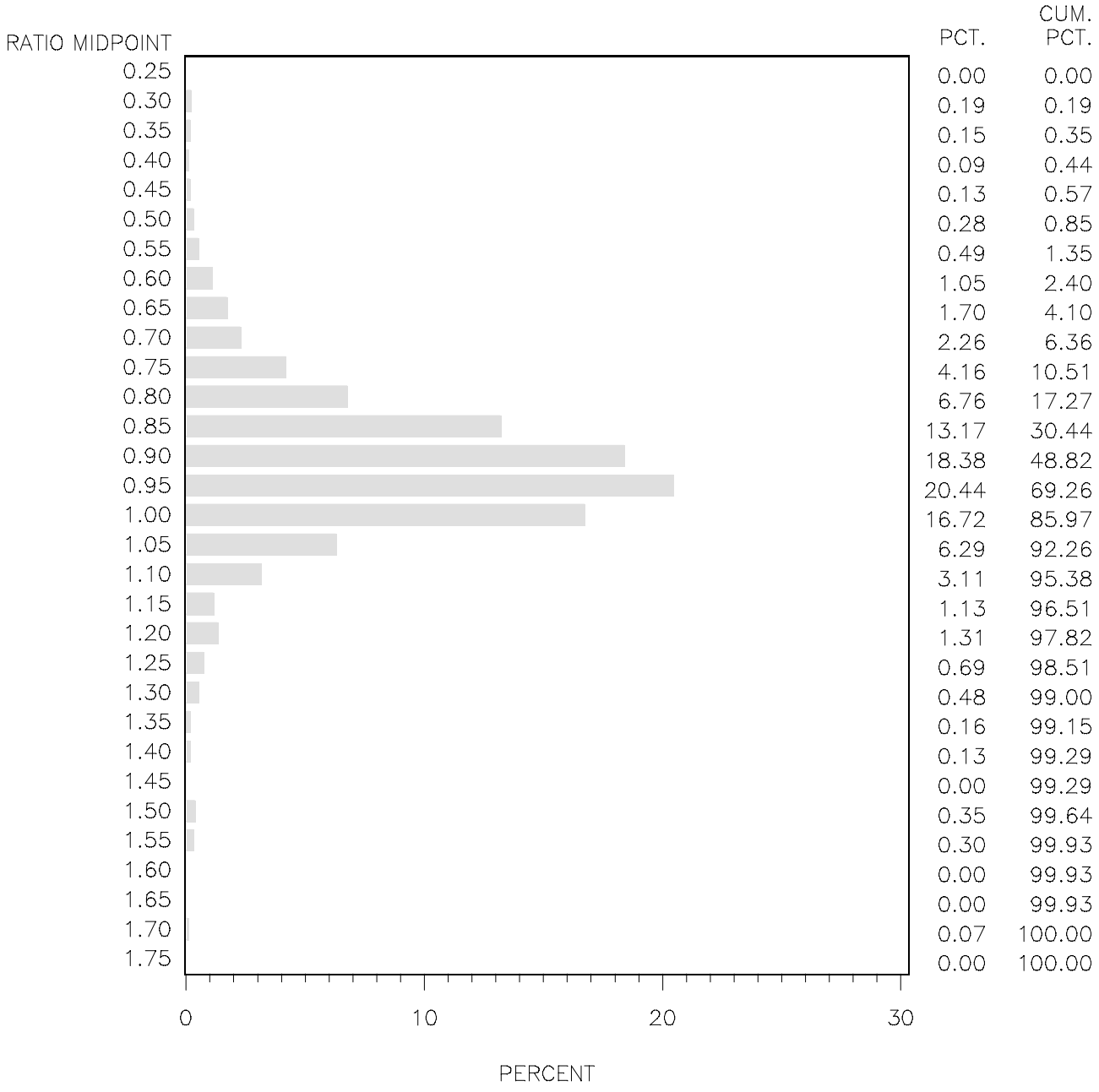
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Thurston County

County=Thurston



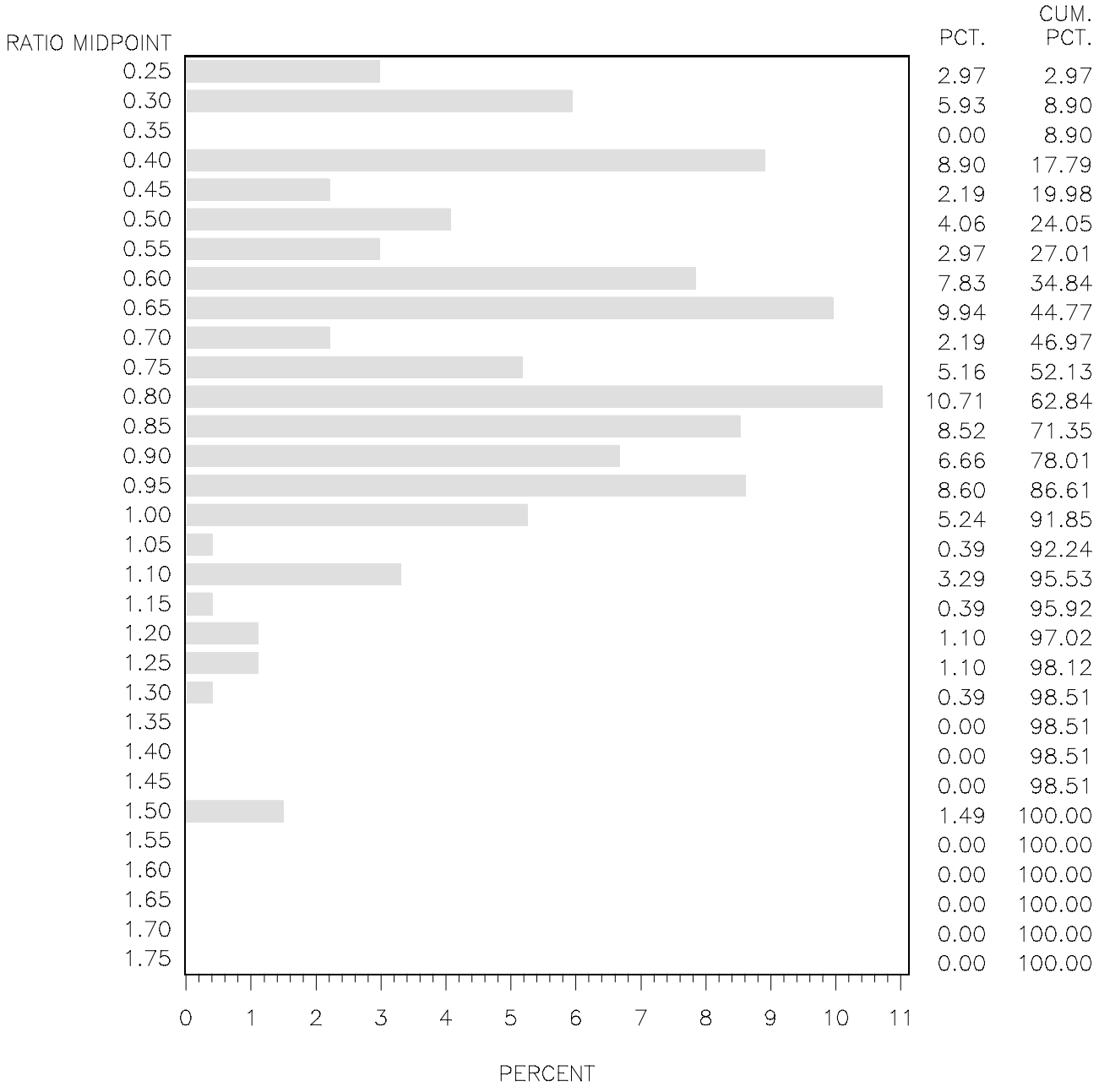
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval – each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Wahkiakum County

County=Wahkiakum



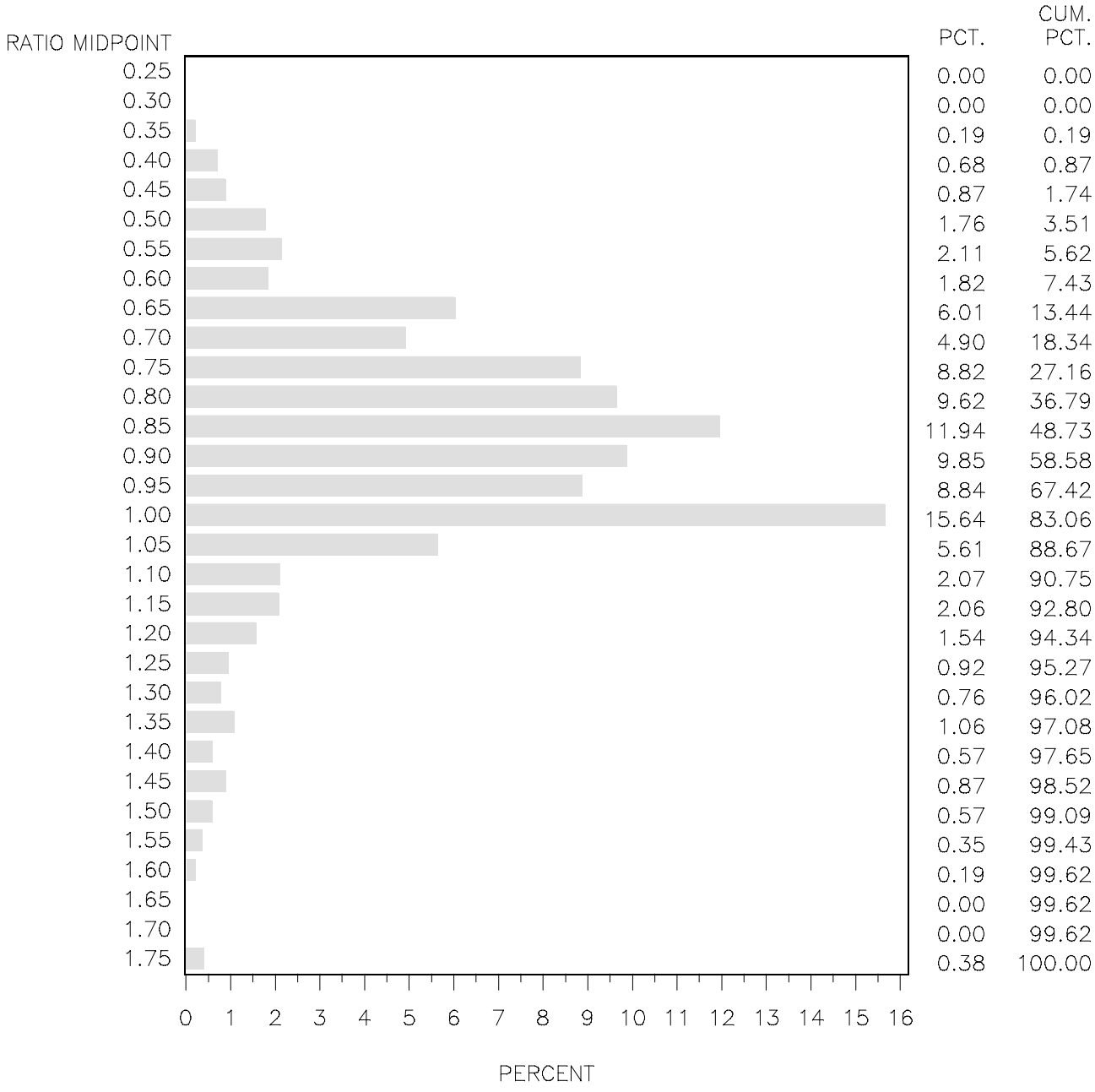
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Walla Walla County

County=Walla Walla



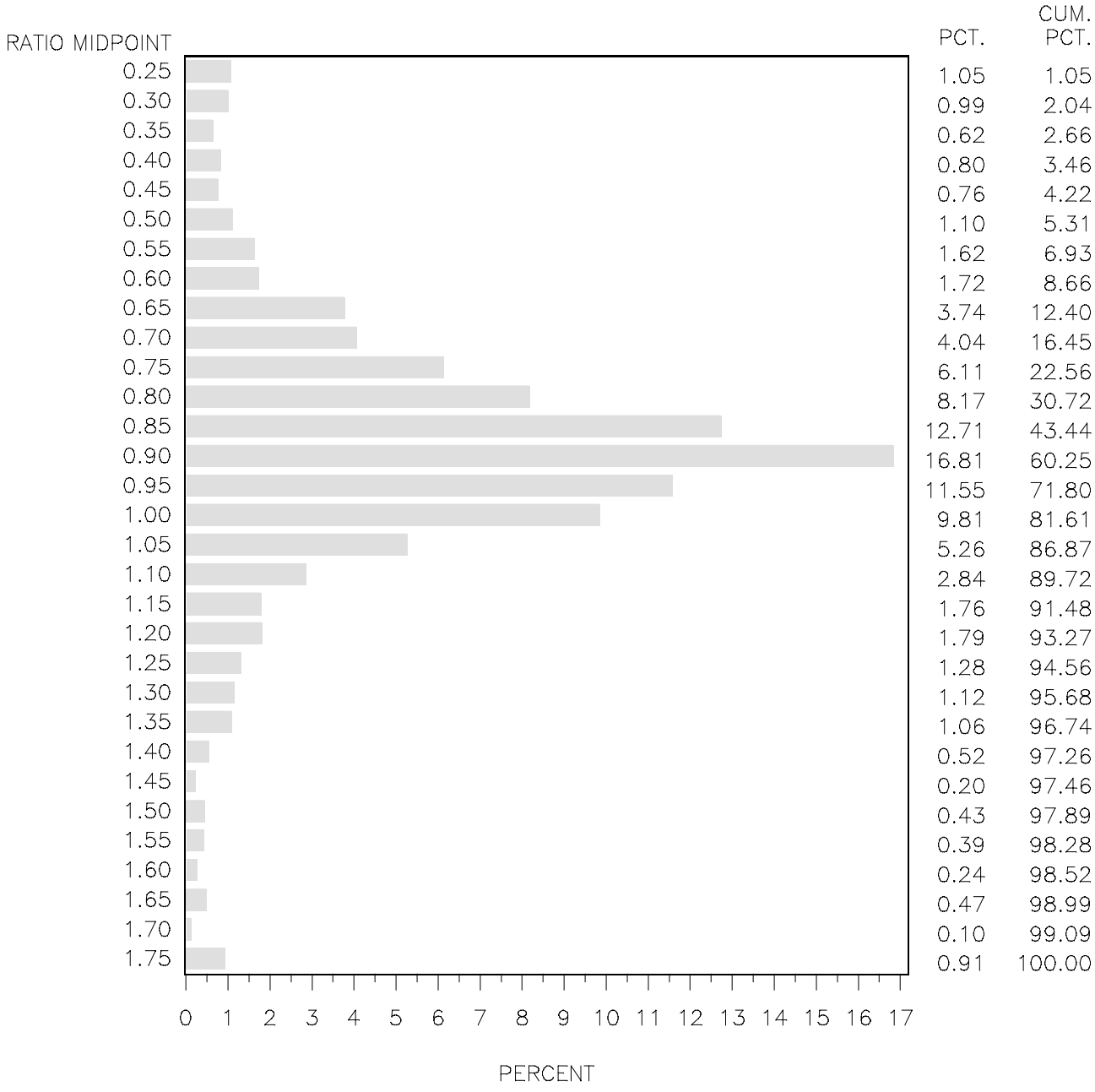
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Whatcom County

County=Whatcom



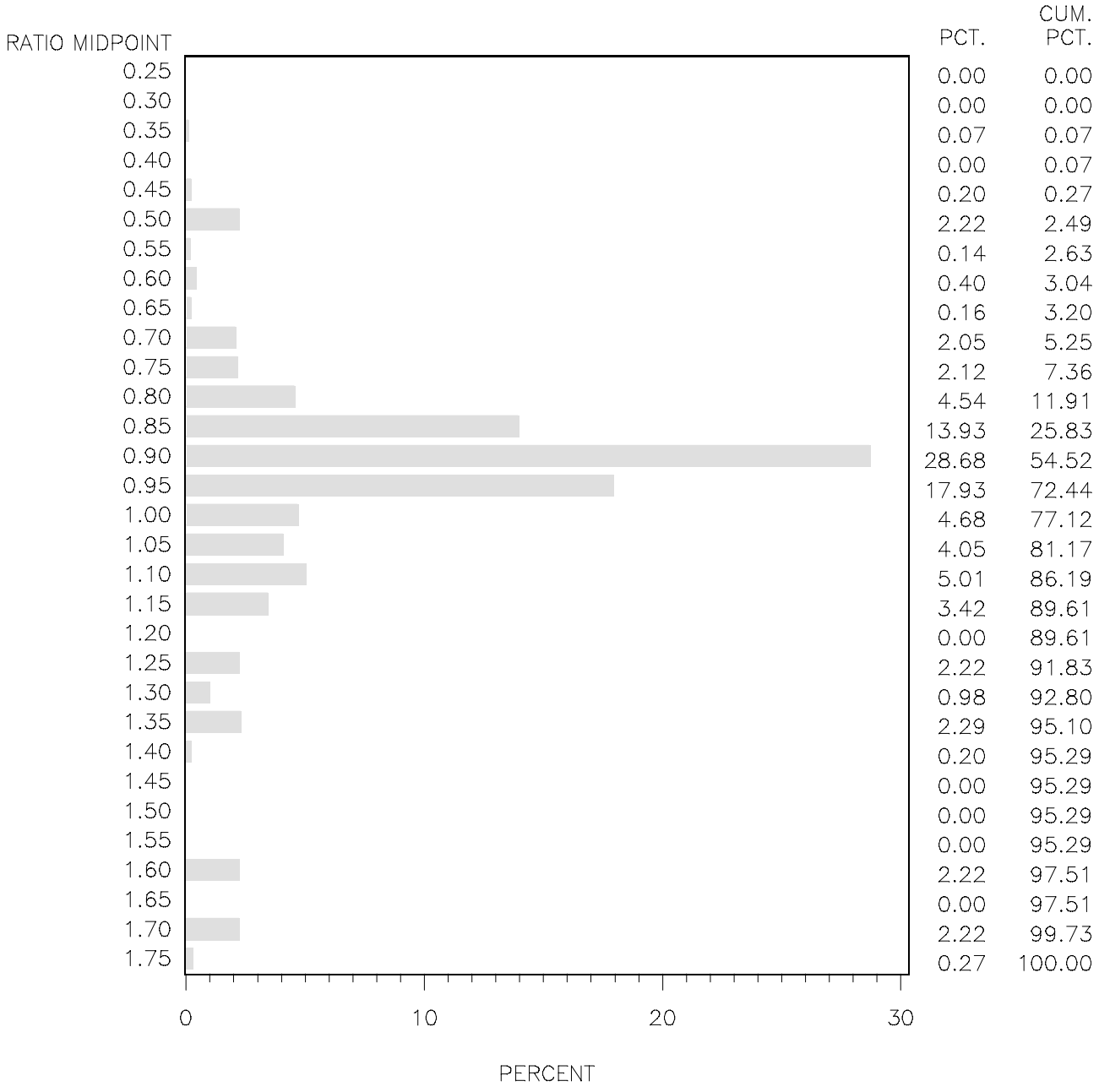
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Whitman County

County=Whitman



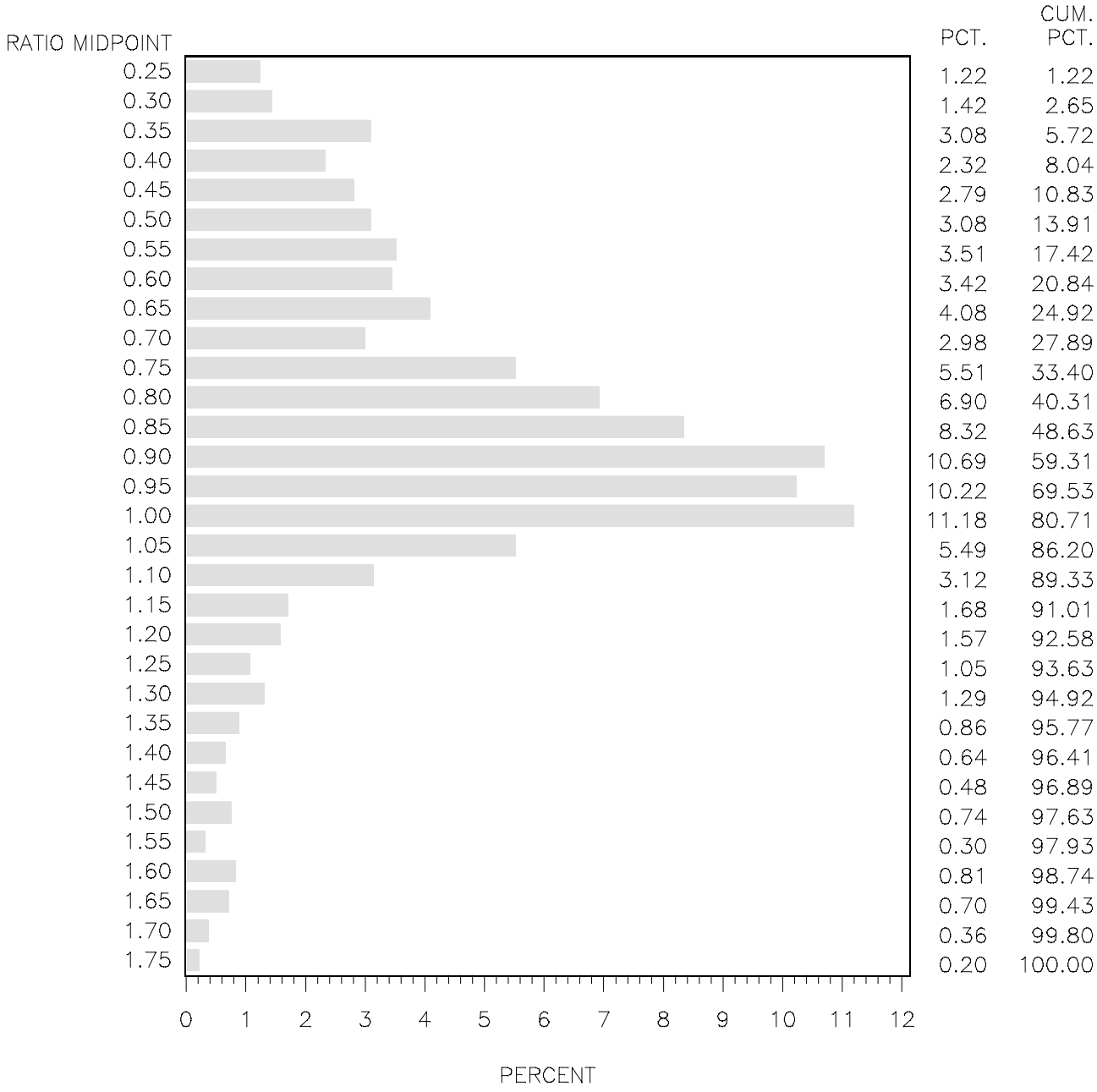
The horizontal axis shows the percent of properties that fall within the interval. The vertical axis is divided into intervals.
The vertical axis is labeled with the midpoint of each interval — each interval is .05 wide.
For example, the interval labeled .90 contains the range 0.875 to 0.925.

Frequency Distribution of Ratios

Ratio of Assessed Value to Sales Value

Distribution for Yakima County

County=Yakima



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.