

SALES RATIO ANALYSIS

Wisconsin Department of Revenue | State and Local Finance Division

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PRESENTER

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Started with Department of Revenue in 2019
Promoted to Equalization Supervisor in 2024



AGENDA

- Overview
- PAD review
- Sales analysis
- Blend groups
- Questions?



SALES RATIO ANALYSIS

Overview of the process



SALES RATIO ANALYSIS

- DOR annual review of real estate sales
 - Assessor determines which sales are useable market sales and usable for DOR ratio studies
- Sales and assessments are analyzed to measure average change in market value by property class
 - Undeveloped, ag forest, forest, and other property classes use large-acre sales analysis to determine average per acre selling price
 - Residential, commercial, and other (ag farm site) property classes use statistical projection to determine percent change



PAD REVIEW

Importance of accurate PAD submission



PAD SUBMISSIONS

- DOR uses PAD submissions to set the economic change
- Accurate DOR analysis relies on accurate information in PAD
 - Inaccurate information may lead to inaccurate equalized values



PAD REVIEW

- DOR may review PAD submissions
 - Obvious overuse of a reject code
 - Rejecting an unusually high percentage of sales
 - Comments that do not explain sufficient reason for reject
 - Common themes in comments used
 - Extreme assessment to sales price ratios



PAD REVIEW

- Review has resulted in rejected sales being deemed usable
 - Over 66,771 sales submitted in PAD in 2024
 - » 13.76% (9,190 sales) were rejected with a code ending in 9
 - » Many had insufficient comments that did not explain reason for reject
- Final sales become a starting point for SRA



IMPACT OF INACCURATE PAD

- Inaccurate PAD submissions could impact on equalized value
- Example:
 - 30 residential sales in a municipality; one sale has error in PAD value
 - » Incorrect assessed value (reported in PAD) = \$320,200
 - Sale ratio = 143%; class ratio = 85.43%
 - DOR economic change to residential class = +4.15%
 - » Correct total assessed value = \$149,900
 - Correct sale ratio = 67%; class ratio = 80.28%
 - Correct DOR economic change to residential class = +5.84%



PAD REVIEW

- Do not use a reject code just because the sale is high dollar or has a high or low ratio
 - Is it an open market sale?
 - » If yes, it is not too high or too low
 - » If no, use an appropriate reject code
 - Is there a reason it has a high or low ratio?
 - » Is there personal property included with the sale? (reject code 56)
 - » New construction or demo after assessment, but included with sale? (reject code 75)



IMPACT OF REJECT OVERUSE

- Overuse of reject codes could impact equalized value
- Example:
 - 103 residential sales in a municipality; 22 are rejected for no market exposure
 - » Aggregate ratio is 92% (81 usable sales)
 - » Economic change to the equalized value is +3%
 - 9 of the 22 rejected sales were listed on MLS, and have market exposure
 - » Aggregate ratio of the 9 sales is 74%
 - » Aggregate ratio is 86% (90 useable sales)
 - » Economic change to the equalized value is +7%



IMPACT OF REJECT OVERUSE

- Impact is 4% difference in equalized value
 - Incorrect equalized value
 - Incorrect apportionment of taxes to the taxation district and surrounding taxation districts
 - Incorrect aggregate ratio to value TIF districts
 - Incorrect aggregate ratio to equate manufacturing assessments
 - Incorrect school district equalized value
- This results in incorrect property taxes for individual property owners



SUMMARY

- Assessor's role in sale validation and providing accurate PAD data is critical to DOR economic calculations
- Accurate reporting
 - Results in more accurate equalized value
 - Provides uniformity between individual properties and between municipalities



SALES ANALYSIS

Analysis of sales in individual taxation districts and blend groups



SALES RATIO ANALYSIS

- The assessment to market relationship is revealed through arm's-length, open market sales



SALES RATIO ANALYSIS

- Elements necessary for the DOR comparison:
 - Sales that are...
 - » Arm's-length
 - » Open market
 - » Useable for ratio studies
 - The sale property's assessment as of January 1 of the calendar year in which the sale occurred, provided by the assessor in PAD
 - Total assessed value of the property class for the previous calendar year
 - Total full value (EQ Base) of the property class for the previous calendar year



SALES RATIO ANALYSIS

- DOR reviews all useable sales to determine economic adjustments
- Need to see all usable sales to get a full picture of the market



RATIO ANALYSIS

- Outlier ratios
 - May impact ratio projections
 - DOR may remove sales from our analysis when sales have extreme ratios compared to other sales in the data set

Price	Ratio
227,000	77.62
340,000	84.26
278,250	90.21
150,000	94.93
177,400	98.87
235,000	147.79



Price	Ratio
200,000	20.75
669,000	44.63
475,00	45.12
500,000	45.74
345,000	47.57
300,000	50.47
350,000	51.43
650,000	53.49
465,500	54.07
556,000	55.25
341,000	58.48
255,000	59.65
386,000	60.88
400,000	62.25
315,000	83.37
140,000	92.29
17,900	322.91

Price	Ratio
200,000	29.25
145,000	63.79
765,000	64.56
760,000	70.72
475,800	71.96
650,000	72.43
395,500	76.18
775,000	78.46
370,000	79.62
595,000	83.85
600,000	83.87
658,000	86.50



Price	Ratio
637,130	49.91
172,500	54.78
585,000	55.98
175,000	56.86
497,500	60.80
130,870	62.66
425,000	63.36
393,000	63.74
589,900	63.99
448,000	64.06
444,900	65.41
737,500	65.63
194,000	65.72
410,000	65.85
323,000	65.94
310,000	65.97
360,000	65.97
460,000	65.98
183,330	66.00
189,000	66.14
740,000	66.28
499,000	66.43

Price	Ratio
505,000	66.63
143,000	66.78
580,000	66.81
130,870	66.86
285,000	67.19
285,000	67.37
525,000	67.43
280,000	68.04
215,000	68.14
226,000	68.36
320,000	68.91
280,000	68.93
695,000	68.99
715,000	69.16
635,000	69.45
585,000	69.83
130,870	70.30
490,000	70.41
650,000	70.54
134,900	70.79
427,500	71.11
287,000	71.25

Price	Ratio
533,000	71.39
604,900	71.91
449,900	72.35
131,900	72.40
575,000	72.50
450,000	73.00
424,000	73.00
815,000	73.25
135,000	73.33
255,000	73.53
480,500	73.57
245,000	74.08
745,000	74.30
680,000	74.49
440,000	74.66
327,000	74.92
390,000	75.13
305,000	76.39
668,000	77.69
160,000	78.13
608,900	78.17
680,000	78.46

Price	Ratio
436,500	78.58
160,000	78.75
150,000	79.00
157,000	79.30
305,000	80.66
297,000	81.48
107,000	81.78
407,500	81.84
300,000	82.00
265,000	82.45
135,900	83.15
399,999	83.25
297,500	83.36
295,000	86.44
289,900	87.44
322,500	88.06
245,000	88.16
130,000	95.38
414,000	98.07
290,000	106.21
130,870	291.89
130,000	448.77



Price	Ratio
240,000	44.96
880,000	54.50
355,355	91.65
373,000	102.41
620,000	127.68



PARTIAL SALES

- Staff checks for partial sales
 - Check for duplicate ratios
 - Sort by parcel number
 - » Check for duplicates with same conveyance dates
- DOR will investigate and may merge these sales for proper analysis
- In this example, the sale had a ratio of 50.45 once merged

Sale ID	Parcel	Conveyance Date	Sale Price	Ratio
202410129930849	056/080836399718	11/08/2024	275,000	100.91
202410129930851	056/080836399718	11/08/2024	275,000	100.91

Price	Ratio
1,695,000	41.24
190,000	47.32
655,000	48.44
2,550,000	49.45
715,000	49.69
510,000	50.02
1,725,000	50.11
1,400,000	50.52
550,000	50.45
605,700	53.29
713,000	55.53
615,000	58.11
720,000	58.56



HIGH DOLLAR SALES

- High dollar value sales
 - May impact ratio projections
 - Staff will compare
 - » Sale price to unpurified median sale price
 - » Sale ratio to unpurified median ratio
 - DOR may remove high dollar sales from our analysis
 - » High dollar sales near median ratio may be left in

Median Sale Price	Median Ratio
250,000	96.27

Price	Ratio
1,485,600	372.74
1,450,000	29.19
837,500	103.90
575,000	81.74
510,000	100.22
380,000	91.66
283,000	99.93
250,000	99.64
205,000	84.24
120,000	108.25
95,000	114.53
84,700	71.07
75,000	96.27
70,000	90.43
50,000	78.60



Median Sale Price	Median Ratio
312,500	88.01

PRICE	RATIO
50,000	26.28
485,000	38.10
1,010,000	42.73
700,000	52.57
400,000	74.00
425,000	76.05
795,000	76.25
405,000	77.79
515,000	82.51
465,000	86.17
280,000	86.47

PRICE	RATIO
175,000	89.54
300,000	89.94
180,000	94.28
225,000	96.79
43,000	96.88
500,000	105.79
78,500	114.95
223,300	126.17
325,000	155.26
225,000	160.57
200,000	183.39



Median Sale Price	Median Ratio
342,500	95.70

PRICE	RATIO
200,000	55.32
450,000	62.43
200,000	75.05
300,000	79.09
650,000	84.34
325,000	85.92
450,000	91.34
2,894,000	93.35
225,000	98.05
2,700,000	101.80
79,000	102.33
360,000	106.39
355,000	107.89
330,000	131.59
330,000	131.59
100,000	161.31



Median Sale Price	Median Ratio
200,000	94.80

Price	Ratio
1,200,000	89.52
1,105,500	70.42
900,000	26.82
750,000	95.84
725,000	102.13
692,500	102.20
663,075	103.62
650,000	84.30
600,000	114.95
556,000	83.31
550,000	90.82
550,000	96.94
534,650	97.56
525,000	94.56
506,590	100.88

Price	Ratio
2,000	14,511.95
4,000	1,140.70
140,000	7.49



Median Sale Price	Median Ratio
570,000	103.99

PRICE	RATIO
18,065,754	31.76
450,000	72.20
1,000,000	77.89
3,800,000	87.70
300,000	93.04
480,000	99.44
1,490,000	100.52
1,046,100	101.66
582,500	101.76
500,000	101.86
397,000	102.40
465,000	102.65
570,000	103.99
570,000	103.99
570,000	103.99

PRICE	RATIO
122,700	104.91
42,100	104.91
390,000	105.58
392,000	107.45
1,200,000	108.06
575,000	109.47
961,000	113.98
4,500,000	131.30
585,000	133.79
2,300,000	140.91
450,000	148.47
6,300,000	152.57
750,000	183.75
100,000	222.93



Median Sale Price	Median Ratio
570,000	103.99

PRICE	RATIO
18,065,754	31.76
450,000	72.20
1,000,000	77.89
3,800,000	87.70
300,000	93.04
480,000	99.44
1,490,000	100.52
1,046,100	101.66
582,500	101.76
500,000	101.8
397,000	102.4
465,000	102.65
570,000	103.99
570,000	103.99
570,000	103.99

PRICE	RATIO
122,700	104.91
42,100	104.91
390,000	105.58
392,000	107.45
1,200,000	108.06
575,000	109.47
902,000	113.28
4,500,000	131.30
585,000	133.79
2,300,000	140.91
450,000	148.47
6,300,000	152.57
750,000	183.75
100,000	222.93



STATISTICAL ANALYSIS

- DOR considers three measures of central tendency in the SRA process
 - Aggregate ratio
 - Median
 - Mean
- Additional considerations
 - Coefficient of dispersion (COD)
 - Coefficient of concentration (COC)
 - Sales volume
 - Unpurified median



STATISTICAL ANALYSIS

- Coefficient of dispersion
- Coefficient of concentration
 - Used for support only

Strata	Agg Ratio	Mean Ratio	Median Ratio	COD	COC
Water Vac	0	0	0	0	0
Non-W Vac	0	0	0	0	0
All Vacant	0	0	0	0	0
Water Imp	0	0	0	0	0
Non-W Imp	93.23	95.96	93.04	9.79	88.89
All improved	93.23	95.96	93.04	9.79	88.89
All Residential	93.23	95.96	93.04	9.79	88.89

Range of Coefficient of Dispersion	Indicated Performance
0-9%	Excellent
10-14%	Good
15-20%	Fair
Above 20%	Poor or Weak



STATISTICAL ANALYSIS

Strata	# of Sales	Agg Ratio	Mean Ratio	Median Ratio	COD	COC
All Res	159	91.64	91.05	91.31	8.52	84.91



STATISTICAL ANALYSIS

# of Sales	Agg Ratio	Mean Ratio	Median Ratio	COD	COC
5	71.69	99.69	57.02	83.08	40



STATISTICAL ANALYSIS

# of Sales	Agg Ratio	Mean Ratio	Median Ratio	COD	COC
5	71.69	99.69	57.02	83.08	40
4	57.07	64.81	55.23	25.18	75



STATISTICAL ANALYSIS

# of Sales Used	# Purified	Agg Ratio	Mean Ratio	Median Ratio	COD	COC
72	0	89.39	95.90	89.55	25.89	50
67	5	90.56	91.31	90.11	17.18	65.22



STRATIFICATION SETS

- Stratification Sets
 - Vacant land versus improved sales
 - Water versus non-water sales
 - Commercial by major use
 - Condo versus non-condo
- PAD submissions are vital in proper stratification sets

Strata	Sales
Water Vac	4
Water Imp	3
All Water	7
Non-W Vac	4
Non-W Imp	12
Non-Water	16
All Residential	23

Strata	Sales
Apartment	4
Office	6
Retail	11
Warehouse	2
Other	0
All Improved	23
All Vacant	5
All Commercial	28



Strata	Count	Aggregate Ratio	Median Ratio
Apartment	23	62.43	75.49
Office	31	74.94	86.58
Retail	29	74.11	88.93
Warehouse	17	76.67	81.71
All Improved	100	72.86	82.90
All Vacant	7	93.8	99.25
All Commercial	107	73.00	84.17



SALES RATIO ANALYSIS

- Analyze up to 3 years of sales
 - May create grids for all sales in 1 year, 2 years, and 3 years
 - Each grid is analyzed independently
 - » Outliers in one grid may not be outliers in all grids
 - Useful when there is low sales volume
 - » DOR rarely creates multiple year grids in districts with significant sales volume



SALES RATIO ANALYSIS

- Taxation district analysis never crosses a revaluation year
 - 2025 revaluation – create a 1-year grid only
 - 2024 revaluation – may create 1- and 2-year grids
 - 2023 revaluation – may create 1-, 2-, and 3-year grids
- Blend groups
 - Can cross revaluation years
 - Require manual calculation to cross a field review project year



BLEND GROUP SALES

Analysis of sales by economic blend group



BLEND GROUPS

THE AREA TREND

Used when the quality or quantity of sales data is too low for reliable ratio projection



BLEND GROUPS

- **Theory** – if one could compare the assessment of a sale property to its sale price, for all sales in the state, one could develop a statewide assessment-to-sales ratio
- Comparing this ratio to the prior year ratio would produce the rate of change statewide



BLEND GROUPS

- Problem with the theory
 - Wisconsin has over 1,800 municipalities each with:
 - » Different levels of assessment
 - » Different revaluation cycles
 - » Different sales mixes
 - » Different market influences



BLEND GROUPS

- DOR solution – blend groups
 - Use full value assessments
 - » Always at 100%
 - » Alleviates concern with crossing revaluation year
 - Additional sales provide more information across property classes
 - Organized considering market influences



Blend Groups should consist of municipalities sharing similar geographical characteristics, subject to similar market forces



BLEND GROUPS

- Taxation district may be in multiple blend groups
 - Blend groups may differ by class
 - » Residential
 - » Commercial
 - » Undeveloped, Ag Forest, Forest, Other (farm sites) Land
 - » Other (farm sites) Improvements
 - Other improvement blend groups are typically county-wide
 - Split districts may be in blend groups in multiple counties



BLEND GROUPS

- Not all taxation districts are in blend groups
 - Cities or villages with significant sales volume may have no blend group
 - » May be excluded due to tendency to dominate
 - » May be included with townships that are intertwined
 - May vary by class



BLEND GROUPS

- City of Madison
 - No Class 1 or Class 2 blend group
 - Included in blend group for Class 5-7 land and Class 7 improvements
- City of Beloit
 - No Class 1 blend group
 - Included in blend group for Class 2 with intertwined townships
 - Included in blend group for Class 5-7 land and Class 7 improvements



BLEND GROUPS

- Blend groups formally are changed only once a year in January
 - Consideration given to
 - » Multi-year changes in taxation district trends compared to blend group trends
 - » Field review study
 - » Assessor concerns and provided documentation



BLEND GROUPS

- Necessary elements for analyzing sales by Blend Group:
 - Arm's length transactions
 - Sale prices directly comparable to the assessments
 - Full value of each individual property
 - » Calculated using
 - Assessment as of January 1 of the year of sale
 - Class ratio for the taxation district



BLEND GROUPS

- **Total Assessment** – provided by assessor via PAD
- **Class Ratio** – Final 70.05 ratio (Major Class Comparison Report)
- **Full Value** – assessment / class ratio
- **Price** – sale price
- **Ratio** – full value assessment / sale price
 - May be DOR FSAS improvement value for other (farm site) improvements

Tax District	Total Assessment	Class Ratio	Full Value	Sale Price	Ratio
13034	312,000	89.70	347,810	515,000	67.54
13040	40,000	87.72	46,285	75,000	61.71
13006	404,000	81.09	498,242	795,000	62.67
13034	101,600	89.70	113,261	160,000	70.79
13034	369,100	89.70	411,464	590,000	69.74
13040	93,100	87.72	106,135	140,000	75.81
13060	109,100	61.92	176,196	232,000	75.95



BLEND GROUPS

- DOR analyzes blend group sales just like taxation district sales
 - May purify extreme ratio or high dollar sales
- Resulting ratios have different meaning
 - Equated ratios are compared to 100% full value

Agg Ratio	Mean Ratio	Median Ratio	COD	COC
93.11	92.56	93.36	8.54	74.19



BLEND GROUPS

- Blend groups project on 100% full value
 - Agg Ratio: $100 / 93.11 = 1.074$
 - » Indicates a 7% increase to full value
 - Mean Ratio: $100 / 92.56 = 1.080$
 - » Indicates an 8% increase to full value
 - Median Ratio: $100 / 93.36 = 1.071$
 - Indicates a 7% increase to full value

Agg Ratio	Mean Ratio	Median Ratio	COD	COC
93.11	92.56	93.36	8.54	74.19



TAXATION DISTRICTS

- Taxation district project on assessed value
 - Prior year class ratio 97.25
 - Agg Ratio: $97.25 / 93.23 = 1.0431$
 - » Indicates a 4% increase
 - Mean Ratio: $97.25 / 95.96 = 1.013$
 - » Indicates an 1% increase
 - Median Ratio: $97.25 / 93.04 = 1.0452$
 - » Indicates a 4% increase

Agg Ratio	Mean Ratio	Median Ratio	COD	COC
93.23	95.96	93.04	9.76	88.89



NEXT STEP – ECONOMICS



THANKS!

Any questions?





Mission

Strengthen Wisconsin through fair tax and lottery administration, while educating and serving the public, our customers and communities.

Vision

To be the premier agency in providing innovative, accessible resources, and exceptional customer service built on a foundation of trust, inclusivity and creativity.

Values

- Integrity
- Knowledge
- Innovation
- Empathy
- Inclusivity
- Security

