

# Price Related Differential (PRD) in Residential Assessments



Nebraska Department of Revenue – Property Assessment Division

Statewide Equalization

April 26, 2023

<https://revenue.nebraska.gov/PAD>

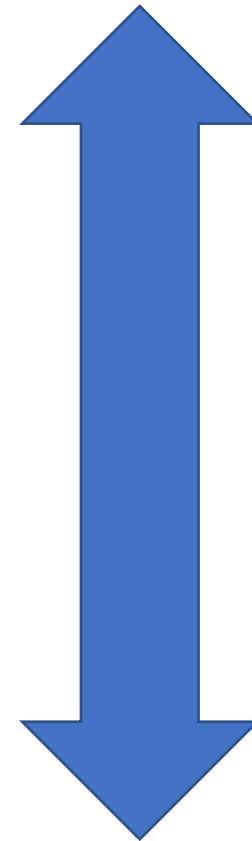
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# What is the Price Related Differential (PRD)?

## Measure of Vertical Equity

- Compares the assessment of Low Dollar properties to the assessment of High Dollar properties to determine if they are assessed at a similar assessment level.



# History of the PRD

Developed by U.S. Census Bureau to Determine if any relationship existed between levels of assessed value and sale price ranges.

1957

1980

Included in the Definition Section of the First IAAO Standard on Ratio Study, PRDs with the range of 90 – 110% were considered to be inconclusive indicators of regressivity

1990

IAAO Standard on Ratio Studies set acceptable threshold for the PRD to be 98% to 103%, with cautions regarding sample size, sample dispersion, and extreme values.

2007

IAAO Standard on Ratio Studies added a warning that the PRD and weighted mean are sensitive to high prices sales, even when their ratios do not appear unusual.

IAAO Standard introduces the Price Related Bias (PRB) as an alternative and perhaps more reliable test of vertical equity.

2013

2015

Bob Denne discusses the PRD and PRB at the IAAO Annual Conference and suggests that the thresholds for the PRB in the IAAO Standard may need to be changed

2016

Jason Carter discusses the PRD and PRB in Fair & Equitable Magazine evaluating the inherent problems associated with each and calling for the assessment profession to develop improved measures of vertical equity.

# What Cautions do the Professional Literature Provide?

- *The weighted mean and price-related differential (PRD) are sensitive to sales with high prices even if the ratios on higher priced sales do not appear unusual relative to other sales. (IAAO 2013, 12)*
- *When samples are small, have high dispersion, or include properties with extreme values, the PRD may not provide an accurate indication of assessment regressivity or progressivity. (IAAO 2013,19)*



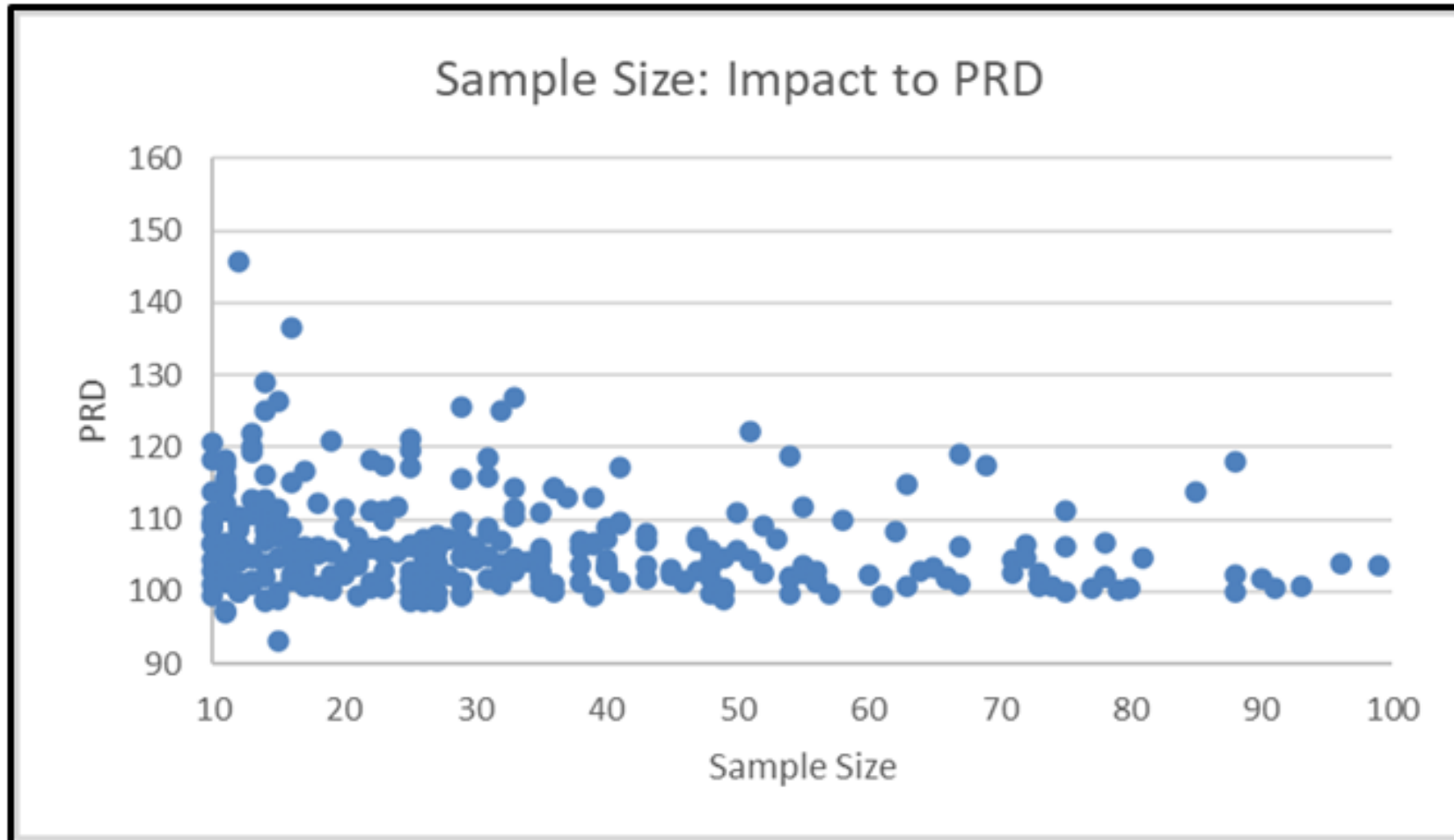
# Analytical Process of the Property Assessment Division (Division)



# Sample Size

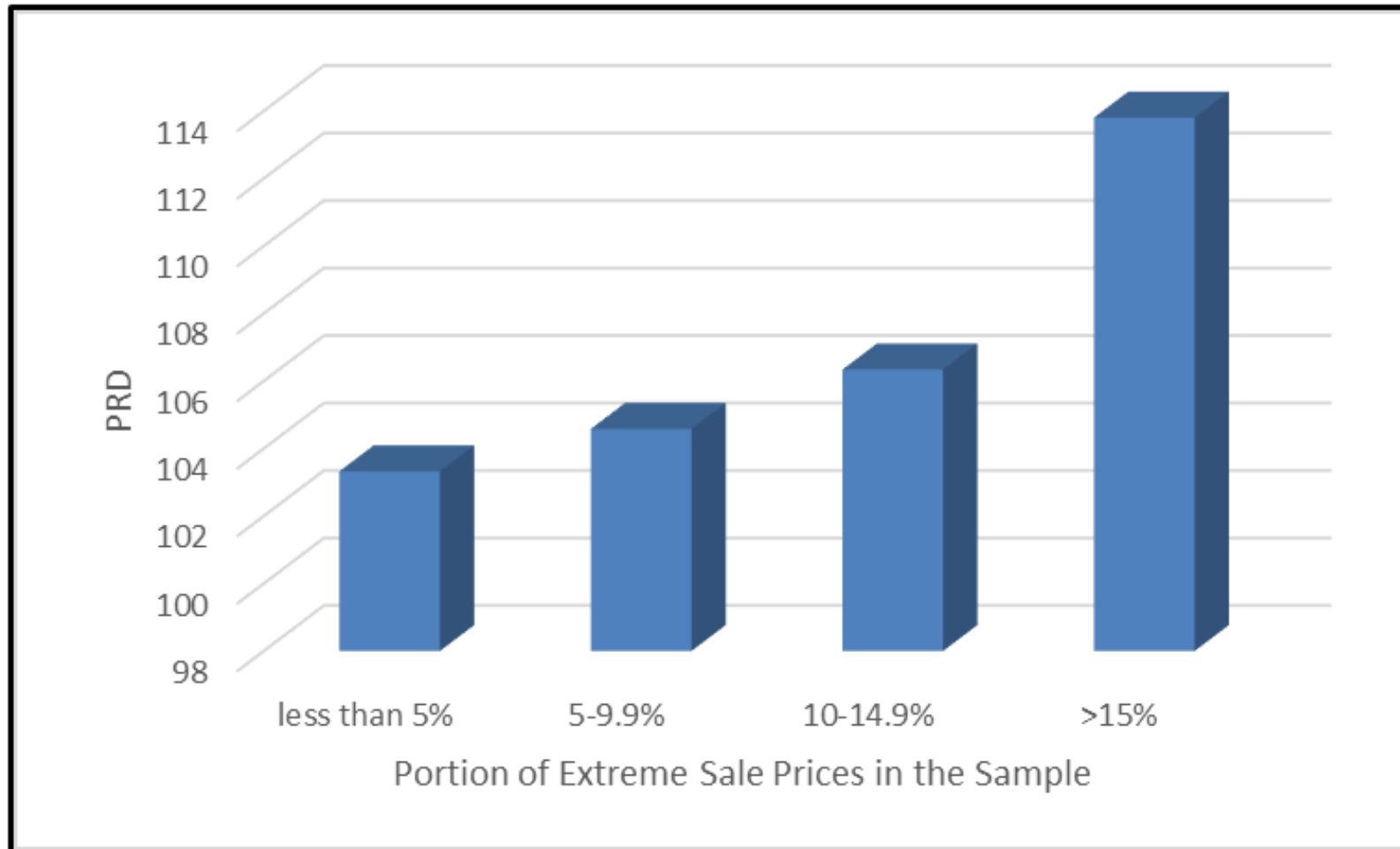
<b>Sample Size</b>		<b>Total # Samples</b>	<b>Average PRD</b>	<b>% of samples with PRDs &gt; 103%</b>
	10	13	108.62	77%
11	25	125	107.62	65%
26	50	108	105.65	60%
51	100	58	104.88	40%
101	500	52	102.92	37%
501	50000	31	101.59	10%

# Sample Size





# Extreme Sale Prices



# Extreme Sale Prices – Antelope County

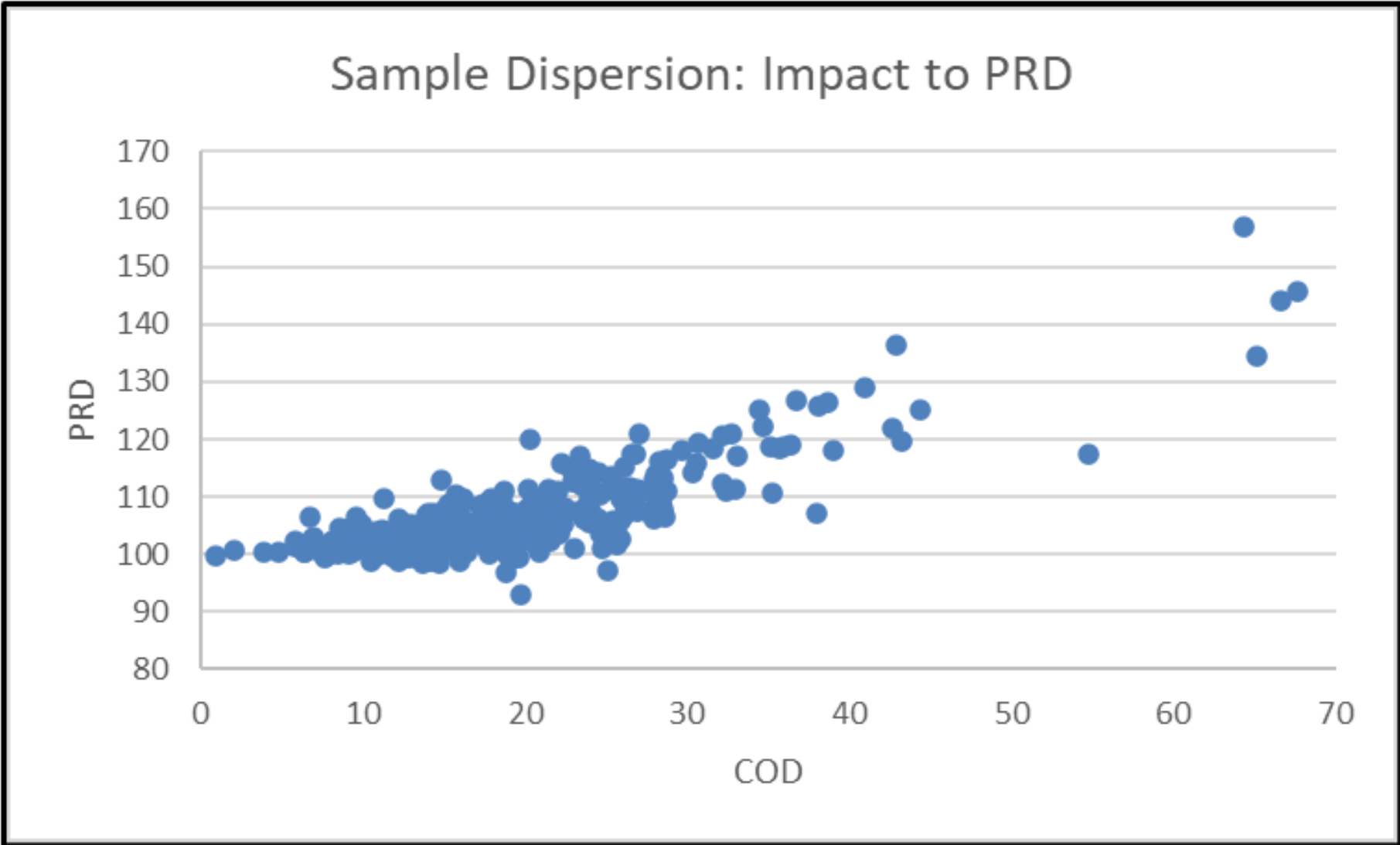
- 138 Residential Sales
- 3 extreme low dollar sales impact the PRD
  - Sales prices \$5,000 to 9,000
  - Ratios 234% to 813%
  - When removed PRD drops from 111% to 103.75%
  - Is this regressive?

# Extreme Sale Prices – Antelope County (cont.)

Does the Sale Price Substratum Show a Regressive Pattern?

__Incremental Ranges__	COUNT	MEDIAN	MEAN	WGT.MEAN	COD	PRD	MIN	MAX
0 TO 4,999	2	445.63	445.63	323.33	82.33	137.83	78.75	812.50
5,000 TO 14,999	4	194.18	181.25	171.68	28.94	105.57	96.25	240.39
15,000 TO 29,999	7	126.50	130.80	132.78	28.36	98.51	68.61	184.48
30,000 TO 59,999	32	100.52	101.88	102.03	15.54	99.85	51.45	140.32
60,000 TO 99,999	31	102.94	105.77	105.27	17.60	100.47	58.52	172.51
100,000 TO 149,999	26	93.41	88.33	87.92	15.48	100.47	34.97	121.71
150,000 TO 249,999	29	94.32	94.15	94.73	15.38	99.39	50.83	144.16
250,000 TO 499,999	7	95.71	98.12	96.90	15.38	101.26	73.98	120.44
500,000 TO 999,999								
1,000,000 +								
____ALL____	138	97.74	107.14	96.60	25.12	110.91	34.97	812.50

# Sample Dispersion



# Sample Dispersion – Garden County

__Incremental Ranges__			COUNT	MEDIAN	MEAN	WGT.MEAN	COD	PRD
0	TO	4,999						
5,000	TO	14,999	3	94.92	88.07	89.91	09.52	97.95
15,000	TO	29,999	8	96.00	138.91	124.19	60.01	111.85
30,000	TO	59,999	25	106.10	121.20	118.92	29.29	101.92
60,000	TO	99,999	25	93.79	88.98	89.51	09.73	99.41
100,000	TO	149,999	14	92.91	91.59	91.24	07.62	100.38
150,000	TO	249,999	14	88.86	89.19	89.59	09.78	99.55
250,000	TO	499,999	3	91.94	88.70	87.21	07.34	101.71
500,000	TO	999,999						
1,000,000	+							
<u>ALL</u>			92	95.04	102.47	94.35	21.28	108.61

# Sample Dispersion – Madison County

DATE OF SALE *		COUNT	MEDIAN	MEAN	WGT.MEAN	COD	PRD	MIN	MAX
RANGE	_____Qtrts_____								
01-OCT-20 To 31-DEC-20		142	106.95	115.69	105.46	18.85	109.70	60.75	361.64
01-JAN-21 To 31-MAR-21		129	99.74	106.82	100.46	17.48	106.33	51.46	309.16
01-APR-21 To 30-JUN-21		232	96.97	101.59	96.62	16.00	105.14	50.69	389.42
01-JUL-21 To 30-SEP-21		190	95.94	101.52	95.10	17.44	106.75	41.87	289.18
01-OCT-21 To 31-DEC-21		148	93.53	96.29	91.95	16.40	104.72	52.03	185.90
01-JAN-22 To 31-MAR-22		127	93.32	95.87	92.30	17.77	103.87	51.14	232.33
01-APR-22 To 30-JUN-22		167	84.99	90.21	84.86	19.44	106.30	21.60	294.19
01-JUL-22 To 30-SEP-22		142	84.83	91.69	86.61	19.07	105.87	42.29	212.04

?

# Regressivity in the 2023 Reports & Opinions

- Overall 58 counties had a PRD that was greater than 103%
- 21 were determined to not be regressive through statistical testing
  - 5 had inconclusive determinations of regressivity
  - 32 have a regressive pattern in the data

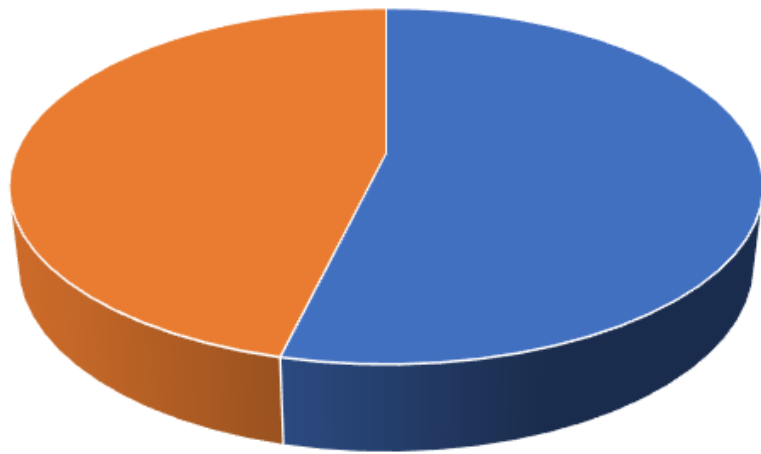
# Improvements in the PRD – Some Examples

- Adams County
- Clay County
- Hayes County
- Nemaha County
- Sherman County



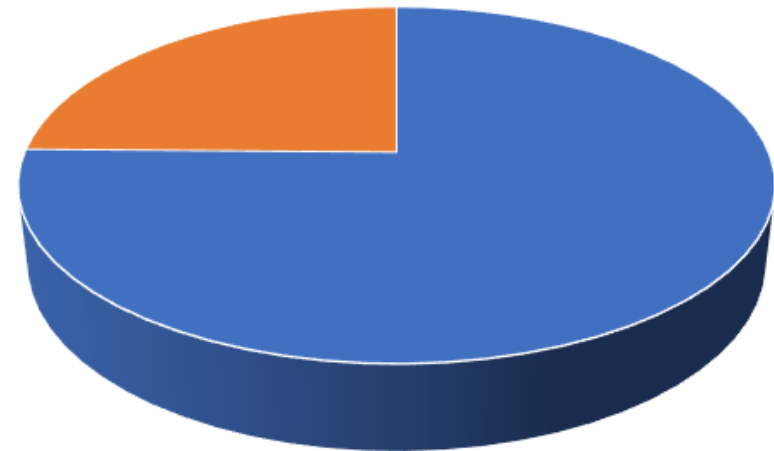
# Improvements in the PRD – All Counties

PRD Improved 2022 to 2023  
Report & Opinion



■ Improved ■ Not Improved

PRD Improved 2023 Study Period  
Preliminary to Final Valuation



■ Improved ■ Not Improved

# Regressivity in other states

	Total # Counties	# Counties with PRD >103	Maximum PRD	Range of Sample Sizes
Iowa	99	85	162%	56-8960
Idaho	44	16	114%	21-4231
Illinois	102	83	149%	28-32488
Kansas*	105	41	124%	15-325
Nebraska	93	58	188%	7 - 1,277
New Mexico	33	9	139%	12-1263
New York**	577	307	N/A	N/A
North Dakota	53	44	615%	30-154
South Dakota	66	47	179%	06 - 35
Texas	107	25	115%	39 - 6288
Utah	29	2	105%	20 - 14722
Virginia Suburban	94	53	126%	11- 4766
Virginia Urban	89	30	141%	1 - 14264

\*PRDs from Kansas are produced from trimmed samples

\*\*New York publishes ratio studies by municipality

# Addressing Vertical Equity

## Improve Statistics

Excessively Trim Sales

Selectively Reappraise  
Sales

## Improve Equity

Improve Property Listings

Update Appraisal Tables

Educate

# Conclusions...

- The PRD is highly influenced by a number of factors
  - Contains an inherent upward bias when samples are small, contain extreme selling prices or too much dispersion
  - The PRD will continue to be analyzed; however, cautions will be provided when it is not meaningful

## Conclusions (cont.)...

- Commission can trust the Division will continue a thorough analysis of ratio studies and assessment practices and will seek improvement when warranted.
- Commission is encouraged to not make conclusions regarding the efforts of the Division or county assessors based on the calculated PRD alone.

Questions?