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2019 Cook County Sales Ratio Study

Measuring Property Tax Assessment Equity

In order to measure the accuracy of their valuation estimates, an assessor's office will analyze recent market sales within an area and compare the actual sale price of each property against its estimated value (i.e. its fair market value[1]).

By dividing the assessed value by the actual selling price—what is referred to in the assessment industry as the "assessment-to-sale-price ratio" or just "ratio"—the office can determine whether they over- or under-estimated a property's market value.

For example, consider a property that is assessed at $100,000. If the property sells for $200,000, its ratio would be 0.5 ($100,000 divided by $200,000) and it would be under-assessed. If the property, however, only sells for $50,000, its ratio would be 2.0 ($100,000 divided by $50,000) and it would be over-assessed. The detailed analysis that utilizes statistical measures to identify assessment inequities is referred to as a "ratio study".

The IAAO Standard on Ratio Studies states that properties should be assessed at 100% of market value (a ratio equal to 1.0 or 100%) but may be assessed between 90% and 110% of market value (a ratio between .90 and 1.10). To illustrate, a property that has a market value of $100,000 should be assessed at $100,000,but assessed values between $90,000 and $110,000 are acceptable. The median ratio is the middle ratio of a listing of ratios based on their value. It is useful in ratio studies because it is not heavily influenced by outliers.

Assessment inequity exists when patterns of relative under- or over-assessing emerge. Assessors study these patterns of inequity to identify where assessment accuracy may be improved. Horizontal inequity refers to inconsistent ratios across classifications (e.g. property types, neighborhoods, construction time-periods) or across seemingly similar properties. Assessors utilize a statistic called the coefficient of dispersion (COD) to effectively measure how "spread out" assessed levels are. The COD is calculated around the median assessment ratio

[1] In Cook County, the first step of assessments for all property classes is to determine the full estimated market value of the property. Estimated market values should generally be close to 100% of arms-length sale prices. To calculate Assessed Value, a fractional rate is applied. These rates, set by Cook County Ordinance, are 10% for residential property classes (including apartment buildings), 25% for commercial property classes, and varies for incentive property classes. For ease of analysis, in this study, the term "assessed value" refers to estimated market values (before they are transformed by assessment rates), which should generally be close to 100% of sale prices.

and is defined by the IAAO as the average percentage deviation of the ratios from the median ratio. This statistic helps assessors evaluate the consistency of their work, as lower CODs indicate more consistent, equitable valuations. Larger CODs indicate a higher variation and less equitable valuations. According to IAAO's Standard on Ratio Studies, COD values for a variety of property types in a large jurisdiction such as Cook County should fall between 5% and 15%, but an upper limit of 20% when comparing varying kinds of property is acceptable.

Vertical inequity refers to inconsistent ratios across properties of different values. The two types of vertical inequity assessors test for are regressivity—when higher-value properties enjoy relatively lower ratios— and progressivity—when lower-value properties receive the benefit. The price-related differential (PRD) is a statistical measure that tests assessments for evidence of vertical inequity. IAAO's Standard on Ratio Studies states that an acceptable PRD value lies between .98 and 1.03. PRD values above this range suggest assessment regressivity, while values below suggest assessment progressivity.

Analysis

This ratio study was conducted according to the IAAO Standard on Ratio Studies approved April of 2013. The sales database as received from Cook County Assessor's Office (CCAO) included all sales from 2019, the assessed values of those sale properties at each of the three assessment levels (CCAO Initial values mailed to property owners, CCAO Final values after CCAO appeals, and – the final stage used to determine property tax rates and bills – BOR Final values after BOR appeals) and the appropriate assessment rates.

The study began by refining that database. Sales of less than $100 were removed along with any sale whose assessed value at the Board of Review (BOR) level was 0. Next all multi-parcel sales were removed due to a lack of sufficient information to determine an appropriate value. Repeat sales of the same parcel within that twelve-month period were also removed for the same reason. Finally, the database was reduced to include only those properties in the norther third of the county.

A market value estimate was calculated by dividing the aggregate assessed value at the three levels ending with the BOR by the level of assessment specified in the sales listing by the county. Each of these three market value estimates were used to generate ratios using the SPSS software. The sales were further trimmed according to the IAAO Standard on Ratio Studies.

Two other steps were taken to adjust the number of parcels used: (1) parcels were eliminated at the CCAO Final and BOR levels when their market value matched that of the previous level and (2) parcels were eliminated at the BOR level when the market value was equal to the selling price. This reduced the samples at the CCAO Final and BOT levels to only those parcels whose

values were changed and when the change at the BOR level was not “chasing” the selling price. The results will be discussed below.

This report begins with a report of ratios for all sales at each of the assessment levels.

	Count	Mean	Weighted Mean	Median Ratio	Price Related Differential	Coefficient of Dispersion
CCAO Initial	17,834	.975	.981	.960	.994	.164
CCAO Final	2,564	.909	.943	.915	.964	.182
BOR	2,598	.945	.839	.937	1.127	.136

The median ratio at the CCAO Initial level reveals an overall level of appraisal very close to 100% of market value, which indicates a sound overall appraisal. Even though it falls slightly with each succeeding level, the final median of .945 is well within the acceptable range of 0.90 to 1.10.

Even though the median shows an acceptable appraisal level, the overall quality of a mass appraisal is dependent on measures of variability around that median. The ideal would be for every ratio to fall exactly at 100%. When they invariably do not, we look to measures of variability to establish whether the variations fall within established industry ranges

The Coefficient of Dispersion (COD) is the measure of choice within the mass appraisal industry to establish the level of variability. Although the exact range will vary somewhat by property type, the final measure in virtually all cases should be below 0.20. In other words, individual ratios should not vary from the median more than 20%.

The measures from the overall study are clearly within the industry standard of acceptability even though they change with each appeal level.

Finally, the Price Related Differential (PRD) reflects the degree to which properties at different price levels are appraised differently. One of the fundamental principles of mass appraisal is the use of standardized methods and approaches. The result of that application should be the equitable treatment of all properties regardless of their selling price. The PRD reflects an attempt to measure whether and to what extent properties are treated differently according to their price level.

It is calculated by dividing the mean by the weighted mean ratio for a group of properties. The ideal PRD measure is 1.00 and the acceptable range is from 0.98 to 1.03. Ratios falling below the lower limit of 0.98 tend to indicate that higher priced properties are being over appraised in relation to lower priced properties, a situation referred to as progressivity. The opposite is true when the PRD exceeds 1.03, with lower priced properties being over appraised in relation to higher priced properties, which is called regressivity. Because the majority of sales in virtually any database tend to reside at the center, the

tendency of any comparison methodology is to pull the value of the lower priced properties up while pulling the value of the higher priced properties down.

The Price Related Differential is best at the CCAO Initial level. The measure at the CCAO Final level indicates a bias against the higher priced properties while this measure at the BOR level goes very severely in the opposite direction, favoring the higher priced properties.

The chart on the following page displays the results by class at each level using the primary ratio statistics. Notice how the statistics change. Also note how the number of appeals drops at the CCAO Final level, then increases at the BOR. This would indicate that owners whose value did not change from the CCAO Initial to the CCAO Final levels appealed to the BOR, resulting in a value change.

Take for an example, property in class 208. At the CCAO Initial level the median was very close to 100%, the PRD was only slightly high at 1.035 and the Coefficient of Dispersion was at a very low level at .142. There was very little change and the CCAO Final level with the COD creeping up slightly. At the BOR level the PRD increases to 1.053, indicating a bias against lower valued properties.

This type of analysis is helpful in focusing county efforts on those property types where there is an apparent problem.

Shading in the Count column indicates a sample less than 30, or a sample small enough to produce questionable results. The green shading indicates a ratio statistic within acceptable limits.

	CCAO Initial					CCAO Final					BOR			
	Count	Median	Price Related Differential	Coefficient of Dispersion		Count	Median	Price Related Differential	Coefficient of Dispersion		Count	Median	Price Related Differential	Coefficient of Dispersion
100	212	0.455	0.869	0.717		16	0.900	0.960	0.208		11	0.873	1.046	0.112
202	642	0.933	1.041	0.165		21	0.991	1.053	0.210		38	0.839	1.034	0.158
203	3337	0.973	1.031	0.154		218	0.969	1.020	0.161		346	0.905	1.029	0.141
204	751	0.992	1.036	0.165		82	0.966	1.028	0.186		95	0.922	1.041	0.155
205	581	0.979	1.043	0.192		64	1.028	1.043	0.166		61	0.935	1.030	0.166
206	482	1.033	1.038	0.188		132	1.006	1.030	0.176		96	0.931	1.052	0.174
207	497	0.962	1.014	0.109		32	0.939	1.005	0.155		45	0.913	1.018	0.095
208	237	1.069	1.035	0.142		53	1.000	1.034	0.172		51	0.980	1.053	0.134
209	124	0.989	1.061	0.204		26	1.012	1.116	0.221		21	0.831	1.076	0.213
210	53	0.996	1.009	0.168		3	0.934	0.880	0.177		4	1.033	1.026	0.170
211	255	0.928	1.021	0.144		29	0.950	1.025	0.154		42	0.863	1.025	0.140
212	13	1.017	1.098	0.252		5	0.492	0.982	0.645		1	0.541	1.000	0.000
213	4	13.688	2.966	0.613		1	9.452	1.000	0.000					
234	1193	0.982	1.018	0.124		87	0.983	1.008	0.124		151	0.915	1.015	0.113
241	18	0.334	0.861	0.668										
278	1807	1.005	1.015	0.112		222	0.990	1.018	0.109		289	0.938	1.023	0.112
295	1353	0.967	1.003	0.102		22	0.847	0.976	0.159		104	0.994	0.997	0.066
299	5886	0.922	1.005	0.144		1506	0.882	1.014	0.164		1106	0.951	0.993	0.096
314	6	0.740	0.983	0.073							2	0.648	1.174	0.154
318	4	1.205	1.059	0.138							3	0.789	1.069	0.132
399	9	0.772	1.101	0.229										
517	107	1.041	1.260	0.543		9	1.000	0.850	0.256		30	0.679	1.323	0.499
522	10	1.793	1.331	0.485		1	0.670	1.000	0.000		4	1.974	1.016	0.423
523	16	0.966	1.325	0.445		1	0.136	1.000	0.000		6	1.287	1.113	0.206
528	5	0.836	1.297	0.491		1	1.000	1.000	0.000		2	0.387	1.487	0.513

529	10	1.043	0.966	0.212	2	0.877	0.894	0.222	7	0.704	1.014	0.146
531	7	5.369	0.949	1.535	1	14.753	1.000	0.000	6	2.943	0.822	0.787
580	2	2.390	1.000	0.404	1	1.398	1.000	0.000	2	1.769	1.000	0.241
589	16	1.053	0.981	0.093	2	0.484	1.038	0.074	4	0.798	0.975	0.099
590	6	0.834	1.054	0.445	1	1.001	1.000	0.000	1	0.173	1.000	0.000
592	20	1.196	1.276	0.445	5	1.000	0.909	0.361	5	1.079	1.571	0.434
593	121	1.140	1.276	0.255	17	0.713	1.132	0.413	43	0.774	1.330	0.281
597	12	1.330	1.285	0.585	1	3.916	1.000	0.000	6	1.025	1.529	0.537
599	21	1.334	1.008	0.228	3	1.000	0.928	0.193	8	1.000	0.975	0.157
663	17	0.923	1.332	0.174					8	0.710	1.457	0.234
	17834	0.960	0.994	0.164	2564	0.915	0.964	0.182	2598	0.937	1.127	0.136

Major Class Types

Major Class 1: Vacant (10% level of assessment)
Major Class 2: Residential, including 2-6 unit Multi-Family (10% level of assessment)
Major Class 3: Multi-Family with 7 or more units (10% level of assessment)
Major Class 5: Commercial & Industrial (25% level of assessment) **industrial**
Major Class 6: Industrial Incentive (variable level of assessment, 10%+)

Property Classes and Descriptions

Class Code	Class Description	Major Class	Class Type	Assessment Level
NA	Exempt property	0	Exempt and Railroad	NA
NA	Railroad property	0	Exempt and Railroad	NA
100	Vacant land	1	Vacant	10%
190	Minor improvement on vacant land	1	Vacant	10%
200	Residential land	2	Residential	10%
201	Residential garage	2	Residential	10%
202	One story residence, any age, up to 999 sq. ft.	2	Residential	10%
203	One story residence, any age, 1,000 to 1,800 sq. ft.	2	Residential	10%
204	One story residence, any age, 1,801 sq. ft. and over	2	Residential	10%
205	Two or more story residence, over 62 years, up to 2,200 sq. ft	2	Residential	10%

206	Two or more story residence, over 62 years, 2,201 to 4,999 sq. ft.	2	Residential	10%
207	Two or more story residence, up to 62 years, up to 2,000 sq. ft.	2	Residential	10%
208	Two or more story residence, up to 62 years, 3,801 to 4,999 sq. ft.	2	Residential	10%
209	Two or more story residence, any age, 5,000 sq. ft. and over	2	Residential	10%
210	Old style townhouse, over 62 years	2	Residential	10%
211	Two to six residential apartments, any age	2	Residential	10%
212	Two to six mixed-use apartments, any age, up to 20,000 sq. ft.	2	Residential	10%
213	Cooperative	2	Residential	10%
234	Spllit level residence, with a lower level below grade, all ages, all sizes	2	Residential	10%
241	Vacant land under common ownership with adjacent residence	2	Residential	10%
278	Two or more story residence, up to 62 years, 2,001 to 3,800 sq. ft.	2	Residential	10%
295	Individually owned row houses or townhouses, up to 62 years	2	Residential	10%
299	Condominium	2	Residential	10%
314	Two-or-three-story, non-fireproof building with corridor apartment or California type apartments, no corridors exterior entrance	3	Multi Family	10%
318	Mixed-use commercial/residential building with apartments and commercial area totaling seven units or more with a square-foot area of over 20,000 square feet	3	Multi Family	10%
399	Rental condominium	3	Multi Family	10%
517	One-story commercial building	5A	Commercial	25%
522	One-story, non-fireproof public garage	5A	Commercial	25%
523	Gasoline station	5A	Commercial	25%
526	Commercial greenhouse	5A	Commercial	25%
527	Theatre	5A	Commercial	25%
528	Bank building	5A	Commercial	25%
529	Motel	5A	Commercial	25%
531	Shopping center	5A	Commercial	25%
580	Industrial minor improvement	5B	Industrial	25%
589	Industrial condominium unit	5B	Industrial	25%
590	Commercial minor improvement	5A	Commercial	25%
592	Two-or-three-story building containing part or all retail and/or commercial space	5A	Commercial	25%
593	Industrial building	5B	Industrial	25%

597	Special commercial structure	5A	Commercial	25%
599	Commercial condominium unit	5A	Commercial	25%
663	Industrial building	6B	Industrial Incentive	NA