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An Evaluation of Property Tax Regressivity in St. Louis County (2009 – 2019), Excluding the City of St. Louis

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KEY FINDINGS

- Property assessments in St. Louis County are moderately regressive, less so than in many other large jurisdictions evaluated by the Center, and demonstrate marked improvement over local levels from previous years.
- On average, the county's lowest-valued homes (bottom 10%) receive assessments just equal to their actual sale price, while the county's highest-valued homes (top 10%) receive assessments equal to under 80% of sale price, in 2019 these values were approximately 95% and 85%, respectively.
- A majority of properties, regardless of property value, are under-assessed, leaving significant amounts of property value untaxed. The benefit of this under-assessment and potential under-taxation continue to disproportionately favor higher-valued properties.

INTRODUCTION

The property tax is the single largest source of revenue for American local governments. Cities, counties, school districts, and special districts raise roughly $500 billion per year in property taxes, accounting for 72% of local taxes and 47% of local own-source general revenue, nationwide.[1] Whether residents rent or own, property taxes directly or indirectly impact almost everyone.

In many cities, however, property taxes are inequitable: low-value properties face higher tax assessments, relative to their actual sale price, than do high-value properties, resulting in regressive taxation that burdens low-income residents disproportionately. The Center for Municipal Finance at the University of Chicago has evaluated the regressivity of property

[1] *U.S. Census Bureau, 2016 Annual Surveys of State and Local Government Finances. https://www.census.gov/data/datasets/2016/econ/local/public-use-datasets.html.*

assessment in 14 of America's largest cities and counties. The following report highlights the system in St. Louis County, exclusive of the city of St. Louis, between 2009 and 2019.[2]

Our review of St. Louis County property tax assessments demonstrates modest regressivity compared to other large jurisdictions. Moreover, our results demonstrate improvements in most measures of regressivity over time. Similarly, all three primary industry measures of assessment accuracy and regressivity have been within acceptable limits for several years and continue to trend toward more equitable levels. Nevertheless, property assessments continue to leave hundreds of millions of dollars worth of property value untaxed every year.

In St. Louis, assessments are conducted separately at the municipal and county levels. This review was limited to properties located within St. Louis County, exclusive of properties within the city of St. Louis proper.[3] The report at hand relies on data provided by the St. Louis County Assessor in response to a FOIA request by St. Louis Public Radio. The data covers assessments conducted between 2009 and 2019. The analyses that follow use only "arms-length" transactions, generally meaning only traditional, market-rate sales involving buyers and sellers with no previous relationship (rather than, for example, sales between relatives or foreclosure auctions). For these analyses, we use the assessor's classification of arms-length transactions.[4]

The standard approach for evaluating the quality and fairness of assessments is through a sales ratio study.[5] The *sales ratio* is defined as the assessed value of a property divided by its sale price. A sales ratio study evaluates the extent of regressivity in a jurisdiction, along with other

[2]This evaluation is limited to assessment procedures used on *residential* properties and does not include commercial, industrial, or agricultural property.

[3] It should be noted that the Center has separately conducted a review of property assessments in both St. Louis County and the city of St. Louis as part of a previous evaluation. This earlier work relied on a separate data set which included properties within both St. Louis County and the city of St. Louis, and covered a different period of time.

[4] For an explanation and example of how the measures used in this paper may vary depending on local versus IAAO definitions of "arms-length" see the Center's previous work regarding St. Louis and St. Louis County assessments, which can be found at www.propertytaxproject.uchicago.edu/papers.

[5] *See* International Association of Assessing Officers. 2013. *Standard on Ratio Studies*. https://www.iaao.org/media/standards/Standard_on_Ratio_Studies.pdf.

aspects of assessment performance, by studying sales ratios for properties that sold within a specific time period. A system in which less expensive homes are systematically assessed at higher sales ratios than more expensive homes is *regressive*.

This report presents a basic sales ratio study for St. Louis County based on data provided by the local assessor's office. Following a conceptual review of regressivity, our findings are broken into three categories: 1) the results of our sales-ratio study, 2) an overview of the general revenue implications of local regressivity, and 3) the application of industry-standard measures of regressivity to the local data.

Understanding Assessment Regressivity and Its Consequences

The property tax is, in principle, an *ad valorem* tax, meaning that the tax is proportional to the value of the property. Most textbook discussions of the property tax proceed as though a property's value is well known. But this is seldom the case. For a property that has sold recently, the sale price is usually a reasonable approximation of its market value. But only a small proportion of properties change hands in any given year— roughly 3-9% of all homes each year according to our data. For the vast majority of properties, which have not sold recently, the value must somehow be estimated. This is the job of local assessors.

In most large jurisdictions, assessors rely on statistical models to assess residential property. This procedure is, essentially, as follows:

- The local assessor compiles a list of all of the properties which have sold recently and identifies important characteristics of each property such as square footage, the number of bedrooms, the size of the yard, the age of the property, etc.
- The assessor estimates the relationship between a property's features and its' market value, using data from the sample of recently sold properties. For instance, each additional square foot of building space adds some amount to the sale price, an additional bathroom adds a certain amount of value, and so on. A statistical model, such

as a regression, is created to estimate the relationships between all potentially relevant property features and the sale price.

- This statistical model is used to estimate the values of all similarly situated homes that haven't sold, based on their features. That is, the assessor assumes that the relationship between property features and prices for the sold properties would have been the same for the unsold properties. For example, if, among properties that sold, the average price for a 2,000 square foot, 3-bedroom home was $100,000, the assessor assumes that other 2,000 square foot, 3-bedroom homes that weren't sold are worth $100,000. In principle, these comparisons should be limited to homes within the same neighborhood, since the price of similar homes can vary significantly across locations, particularly in larger communities.
- The assessed value from this process becomes the basis on which property taxes are levied. Various exemptions and deductions may be applied at this stage.
- These assessments may be adjusted after the fact as the result of appeals by property owners.

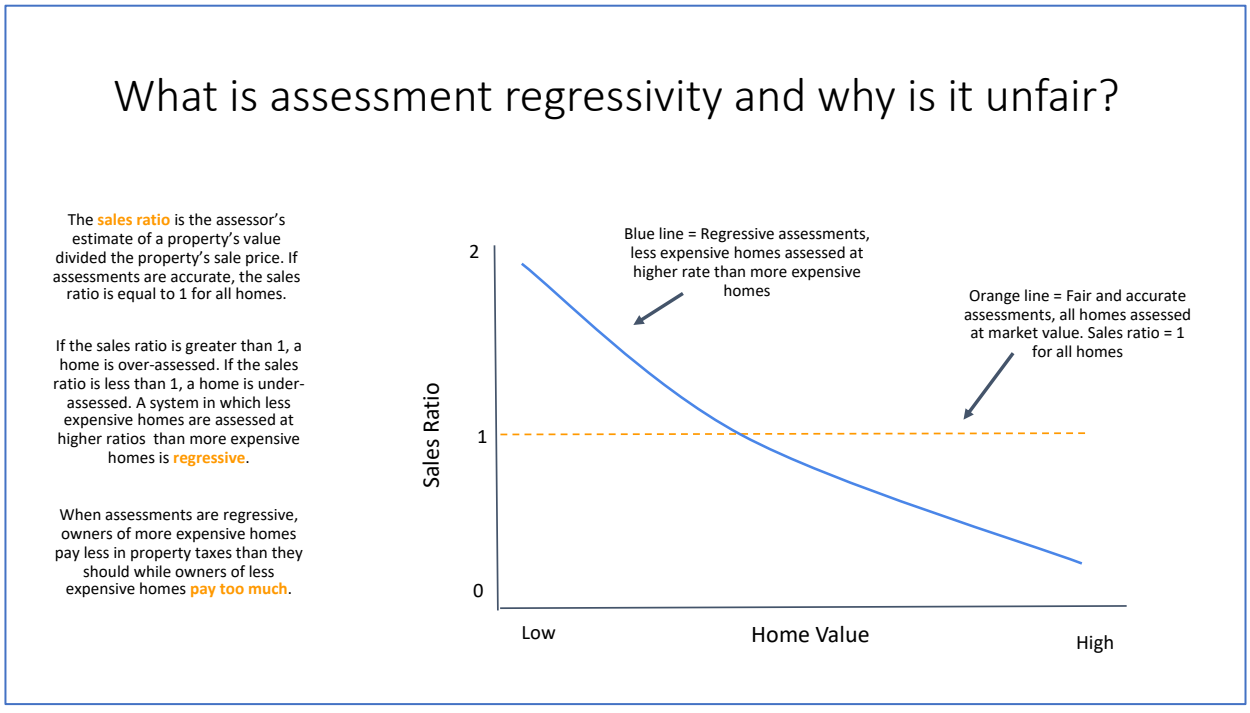
When assessment is conducted accurately, the resulting property taxes indeed constitute an *ad valorem* tax. However, when property assessment is inaccurate, the resulting property taxes will also be inaccurate. Over-assessed properties will be over-taxed, while under-assessed properties will be under-taxed. Although no assessment system is perfectly accurate, we are especially concerned with a particular type of inaccuracy known as *regressivity*. Assessments are regressive when low-value homes are assessed at a higher percentage of their true market value than are high-value homes.

To understand regressive assessment and its consequences, it is useful to contrast it with fair assessment. A common way of diagnosing regressivity is to compare the *sales ratio* for homes with different sale prices.[6]

[6] Because accurate sale prices are only known for properties that have recently sold, the sales ratio can only be computed for properties that have recently sold.

Figure 1 shows what the average sales ratio should look like in a properly functioning assessment system, as well as what can go wrong when assessments are regressive. If assessments were perfectly accurate, every home would be valued at exactly 100% of its value, meaning that the sales ratio would be 1 for every property, as depicted by the dashed orange line. Of course, no assessment system if perfect. But if the average sales ratio is equal across the spectrum of prices, even an imperfect system will be unbiased with respect to price, meaning that owners of both more and less expensive property will pay their fair share of taxes on average. However, when the average sales ratio is higher for low-priced homes than for high-priced homes, as depicted by the solid blue line, assessments are regressive. Regressive assessments lead to regressive taxation, in which owners of low-value property pay too much in taxes while owners of high-value properties pay too little.

Figure 1: Understanding Assessment Regressivity



A simple numerical example illustrates the consequences of assessment regressivity. Suppose the average home that sold for $100,000 is actually assessed at $120,000. Meanwhile, the average home that sold for $1 million is assessed at $800,000. Suppose, the statutory tax rate is 1% of assessed value. In this scenario, the $100,000 home pays $1,200 in taxes each year, for an effective tax rate of 1.2 percent. The $1 million home pays $8,000 in taxes, for an effective tax rate 0.8 percent. The result is that the low-priced home has a 50% higher tax rate than the high-priced home (1.2/0.8 = 1.5).

Graphs such as the one shown in Figure 1 are a useful way to visually detect assessment regressivity. For more formal evaluations, the industry has developed several statistical tests for assessment regressivity. As discussed below, the measures most commonly used by professional assessors are the coefficient of dispersion (COD), price-related differential (PRD) and the coefficient of price-related bias (PRB). In addition, academic researchers have developed several more sophisticated statistical tests for assessment regressivity.[7] While none of these tests is perfect, collectively they can be used to evaluate the likely extent of assessment regressivity in a given jurisdiction.

SUMMARY OF FINDINGS

Assessments in St. Louis County are regressive. On average, the lowest-valued properties in the county (the bottom 10%) have been assessed at levels roughly equal to the property's actual sale price, while the county's highest-valued homes (the top 10%) are generally assessed at less than 80% of their sale price. Importantly though, regressivity has been improving, with the spread between the assessment ratios of the county's lowest- and highest-valued homes falling by more than half by 2019. In addition, industry-standard metrics for evaluating regressivity indicate that the remaining regressivity is within acceptable levels. While local levels of assessment regressivity have fallen substantially and are currently within acceptable levels,

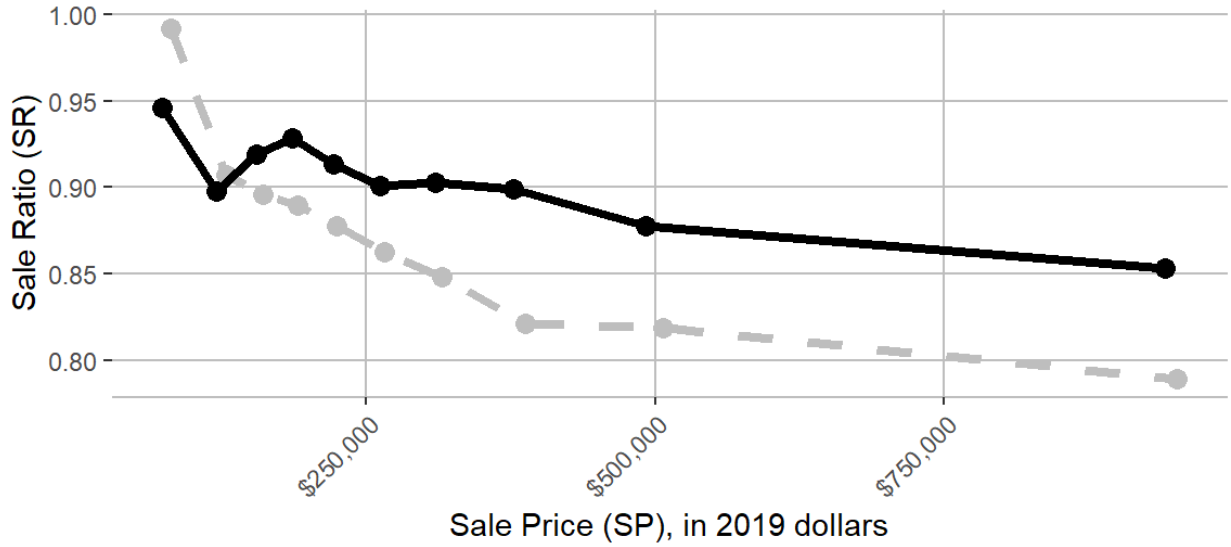
[7] *For a review, see,* Horizontal and Vertical Inequity in Real Property Taxation Author(s): G. Stacy Sirmans, Dean H. Gatzlaff and David A. Macpherson Source: Journal of Real Estate Literature, Vol. 16, No. 2 (2008), pp. 167-180, https://www.jstor.org/stable/44105042.

remaining inaccuracy and modest regressivity continue to leave significant quantities of property value untaxed and do so in a way that disproportionately favors higher-valued properties.

Sales Ratio Evaluation

The relationship between assessments and sale prices is regressive if less valuable homes are assessed at higher rates (relative to the value of the home) than more valuable homes. Figure 2 below demonstrates this relationship as it exists in St. Louis County. For Figure 2, property sales have been sorted into deciles (10 bins of equal size based on sale price), each representing 10% of all properties sold in the county. Each dot represents the average sale price and average sales ratio for each respective decile of properties sold. Figure 2 also compares the most recent values for 2019 (solid line) with the average values across all years of observation, 2009 through 2019 (dashed line). All values were adjusted for inflation to 2019 dollars to facilitate comparisons. If sale prices are a fair indication of market value and assessments are fair and accurate, Figure 2 would be a flat line with a constant sales ratio, meaning that the value of is unrelated to the accuracy of its assessments. A downward sloping line indicates that less expensive homes are over-assessed compared to more expensive homes and is evidence of regressivity.

Figure 2: Assessment Ratio by Sales Price[8]



For 2019, the highest ten percent of sales were assessed at 90.1% of the rate of assessment applied to the lowest ten percent of sales. Top decile rate: 85.3%. Bottom decile rate: 94.6%.

As Figure 2 demonstrates, St. Louis County's lowest-valued (bottom decile) homes have average assessment ratios more than 20 percentage points higher than the average rates applied to the community's highest-valued homes (top decile). The lowest-valued properties have been assessed, on average, at approximately 99% of their sale price, while the highest-valued homes have received assessments of approximately 78% of sale price, on average. By 2019, this difference had been cut by more than half to approximately 95% and 85% respectively. Not only have sales ratios for lower-valued homes been reduced, sales ratios for higher-valued homes have increased. It should be noted, though, that while reducing assessment rates for low-valued homes may improve regressivity, any assessment reduction below 100% creates inaccuracy.

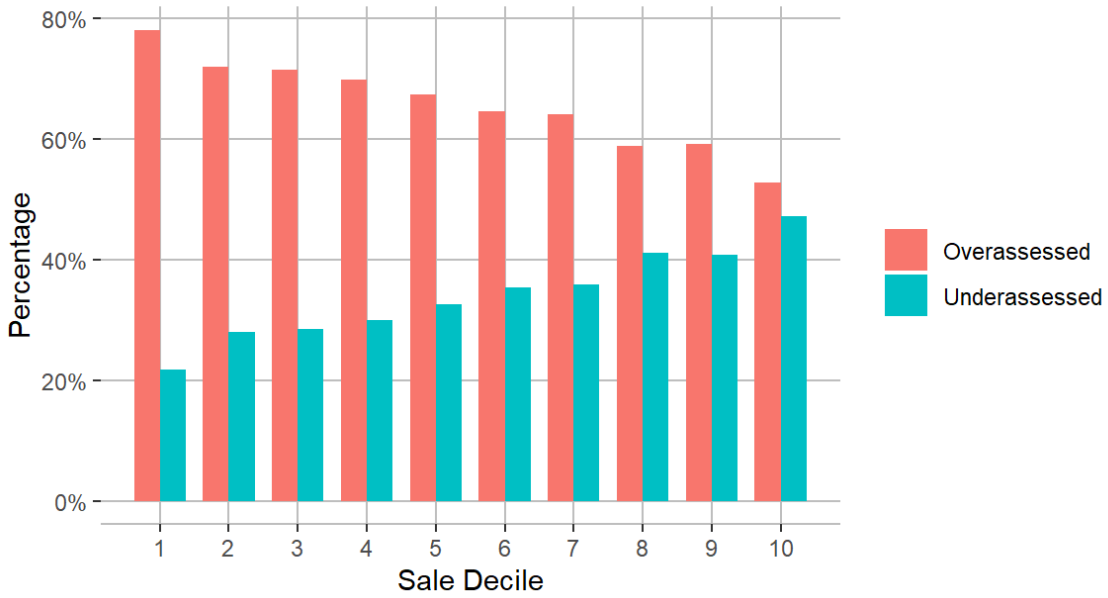
Figure 3 below demonstrates the relative proportion of properties in each decile that were over- or under-assessed. Missouri, like a number of other states, limits the portion of assessed value on which property taxes can be applied; "taxable value" is required to be equal to 19% of

[8] As discussed on Page 11 below, St. Louis only applies property taxes to the first 19% of a property's market value. As such, the values in this graph and the related discussion have been scaled so that 19% of a property's real-world value is equivalent to a 1.0 Sales Ratio. In other words, a $100,000 home that is assessed at $19,000 would be considered to have a sale ratio of 1.0.

a property's market value. Thus, in St. Louis County, properties are considered "over-assessed" when their assessed value exceeds 19% of their sale price, while properties are considered "under-assessed" when their assessed value is less than 19% of sale price.

As Figure 3 shows, each decile contains both properties what were over- and under-assessed in any given year. However, the relative proportion of homes that are over- or under-assessed varies significantly based on the value of the property in question. While nearly 80% of St. Louis County's lowest-priced (bottom decile) homes received overassessments, just over 20% of similarly priced homes benefited from underassessment. Conversely, more than 50% of St. Louis County's highest-priced (top decile) homes enjoyed underassessments while only approximately 45% of similarly priced homes received overassessments.

Figure 3: Percent of Property Over-/ Under-Assessed by Decile



Industry Standards

The preceding section provides graphical evidence of regressivity in property assessments but it does not provide a statistical evaluation. In this section, we report several standard statistics used in the evaluation of assessment quality.

The International Association of Assessing Officers (IAAO) provides standards for assessments including standards for uniformity and regressivity (*aka* vertical equity). *Uniformity* refers to the overall level of variability in sales ratios across properties. Regressivity refers to the correlation between sales ratios and sale prices. The three main standards are[9]:

- Coefficient of Dispersion (COD) is a measure of uniformity based on the average percentage deviation of the ratios from the median, expressed as a percentage of the median. For example, given a COD of 15%, a property worth $100,000 has a 50% chance to be assessed between $85,000 and $115,000. Higher values of COD indicate less uniformity in assessments.

- Price-Related Differential (PRD) is a measure of vertical equity calculated by dividing the mean sales ratio by the weighted mean ratio, where the weight is the sale price. For example, assume a jurisdiction contains two homes, one worth $100,000 assessed at 12% and one worth $1,000,000 assessed at 8% of the fair market value. The mean ratio would be 10% (12% + 8% divided by 2) while the weighted mean ratio would be 8.4% (12% * 100,000 + 8% * 1,000,000 divided by 1,100,000). The resulting PRD (10% divided by 8.4%) would be 1.20. Higher values of PRD indicate greater regressivity.

- Coefficient of Price-Related Bias (PRB) is a regression-based measure that estimates the relationship between the sales ratio and a given proxy for actual property value determined by giving equal weight to market value and assessed value. In other words, PRB predicts the change in assessment ratio that can be expected to result from a 100% change in this value proxy. For example, a PRB of 0.031 indicates that assessment ratios increase by 3.1% when the home value increases by 100%. Higher values of PRB indicate greater regressivity.

[9] International Association of Assessing Officers. 2013. *Standard on Ratio Studies*. https://www.iaao.org/media/standards/Standard_on_Ratio_Studies.pdf.

Table 1: IAAO Standards

Parameter	Acceptable Minimum	Acceptable Maximum
COD	5.00	15.00
PRD	0.98	1.03
PRD	-0.05	0.05

While no jurisdiction can achieve perfect assessments, remaining within industry-acceptable limits, particularly with regard to COD, PRD, and PRB measures, is an important tool in evaluating equity and uniformity. Table 2 below shows the most recent levels for all three of these measures, compared with industry recommendations.

Table 2: St. Louis County's COD, PRD, and PRB Levels (2019)

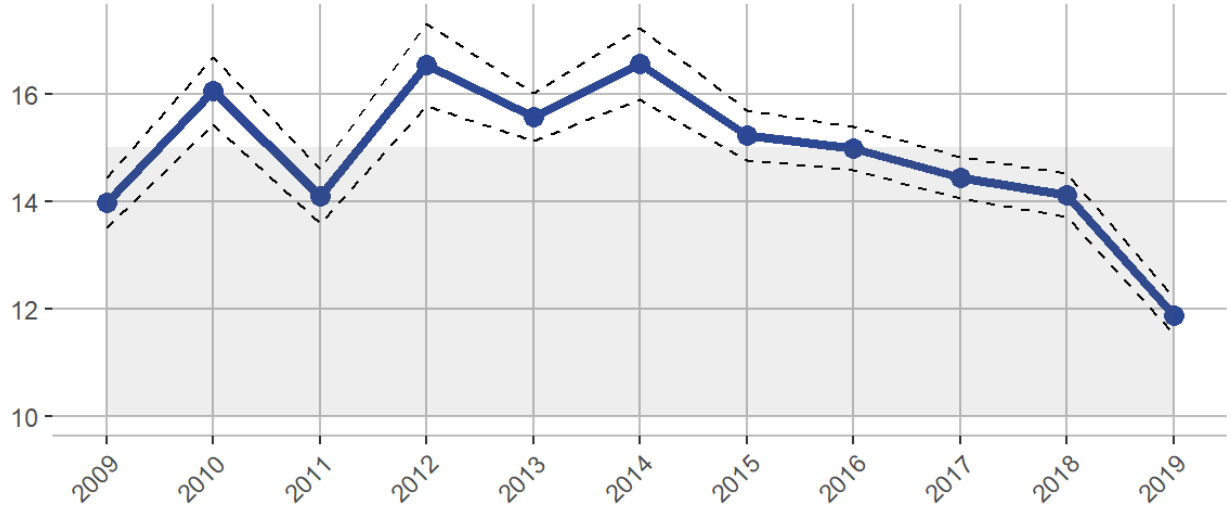
Measure	Local Rate	Acceptable Limit(s)
Coefficient of Dispersion	11.87	</= 15
Price-Related Differential	1.021	0.98 to 1.03
Price-Related Bias	0	-0.05 to 0.05

St. Louis County's COD of 11.87 is within industry thresholds, meaning that while property assessments in the area are not perfectly uniform (an unattainable goal, for practical purposes), the remaining disparities are within normal levels. Both industry measures of regressivity, the PRD and PRB, are also within industry thresholds, again indicating that while the system is still not perfect, it remains within industry-acceptable levels.

Figures 4 through Figure 6 demonstrate trends over time in industry measures of regressivity and uniformity since 2009. After experiencing apparent spikes in regressivity and inaccuracy, all measures have been trending back toward acceptable levels. Because the data used for this evaluation do not include any years prior to 2009, it is not possible to determine values for earlier years. It should be noted that in many of the other jurisdictions evaluated for this series, similar acute spikes were observed during and immediately following the 2008 recession. It is

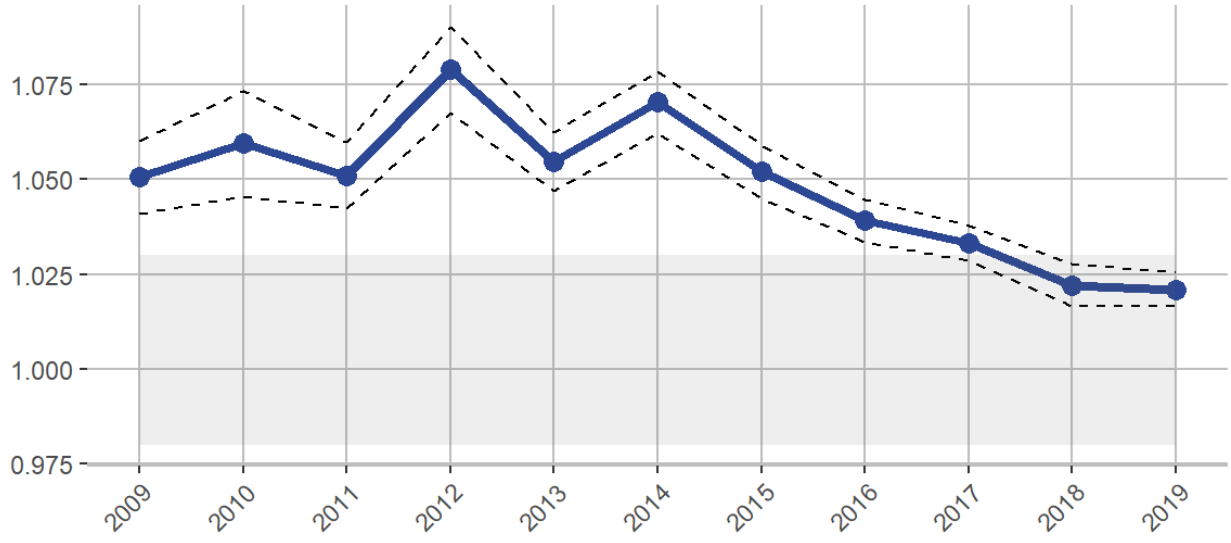
possible that similar conditions played a role in the increases seen in St. Louis and visualized below.

Figure 4: St. Louis County's Coefficient of Distribution



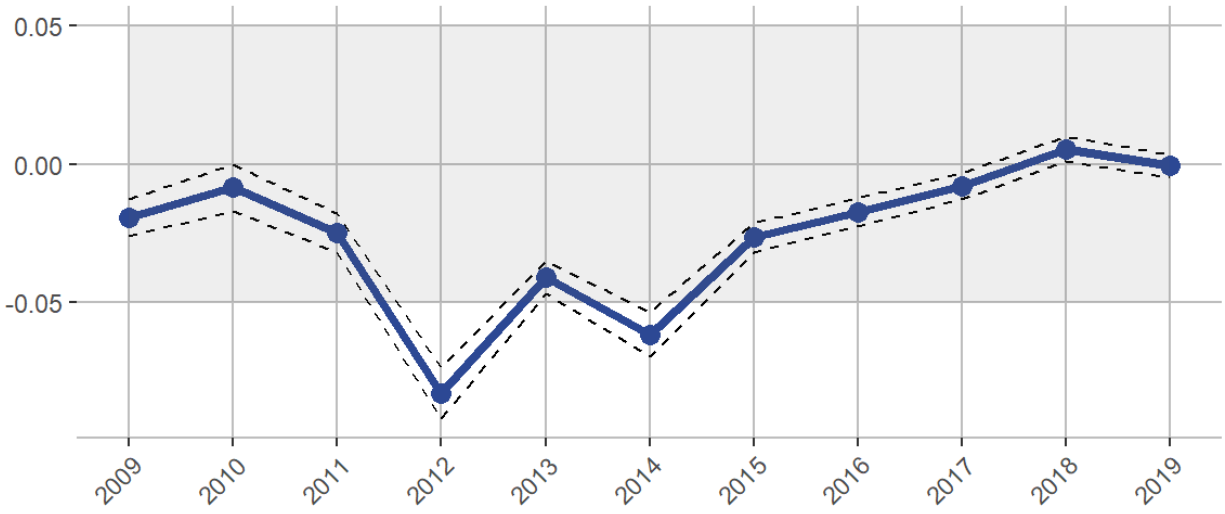
Dotted lines represent 95% Confidence Interval.
In 2019, the Coefficient of Dispersion was 11.87 which does meet the IAAO standard for uniformity.
With this value, a property worth $100,000 has a 50% chance to be assessed between $88130 and $111870.

Figure 5: St. Louis County's Price-Related Differential



Dotted lines represent 95% Confidence Interval.
In 2019, the Price-Related Differential was 1.021 which does meet the IAAO standard for uniformity.

Figure 6: St. Louis County's Price-Related Bias



Dotted lines represent 95% Confidence Interval.
In 2019, the Price-Related Bias was 0 which does meet the IAAO standard for uniformity.
This value indicates that sale ratios decrease by 0% when assessed value doubles.

Tax Implications

Community Implications

When assessments are regressive, low-value properties can expect to pay more than their fair share of property taxes, while higher-value properties will actually pay less. In other words, regressivity shifts a portion of the collective tax burden from high-value properties onto lower-value properties. Table 3 provides average 2019 sales and assessment data for each decile of sale price, including both individual property averages and aggregate impact. For example, Line 1 indicates that among the bottom 10% of homes in St. Louis County, recently sold property was under-assessed by more than $4 million in property value. By comparison, Line 10 shows that among the county's top 10% of homes, similar under-assessments amounted to nearly $120 million in property value. Table 3 supports the findings discussed earlier, namely, that inaccurate assessments in St. Louis County produce some degree of under-assessment, and thus under-taxation, among properties of all values; because of local regressivity, however, these "benefits" disproportionately favor higher-valued properties.

Table 3 only uses data from recently sold properties. Scaling the estimates up to all property in St. Louis County requires making some assumptions. Collectively, the under-assessment described in Table 3 amounted to nearly $300 million in untaxed property value among recently sold residential properties alone. In 2019, only about 4% of the county's 380,790 residential properties actually sold. Assuming recently sold properties are a representative sample of all properties in St. Louis County and extrapolating these figures to the full population, we estimate that the total value of untaxed property in St. Louis County in 2019 amounted 25 times the amount shown in Table 3, which would be more than $7 billion. While the assumptions implicit in this estimate mean that it should be taken with a grain of salt, this figure nevertheless underscores the scale of the issue at hand.

Table 3: Average & Aggregate Value of Over/ Underassessment Among Homes Sold in 2019

Sale Decile	Average Sale	Average Assessed Value	Sum of Sales	Sum of Assessed Values	Sum of Over/Under Assessments	% Over/Under Assessed
1	$80,777	$78,716	$61,162,156	$57,008,400	-$4,153,756	-7.3%
2	$128,480	$116,901	$99,860,393	$89,711,900	-$10,148,493	-11.3%
3	$160,605	$144,119	$128,465,839	$118,084,000	-$10,381,839	-8.8%
4	$190,447	$169,631	$154,200,429	$143,219,500	-$10,980,929	-7.7%
5	$224,652	$197,214	$183,850,610	$167,909,800	-$15,940,810	-9.5%
6	$265,310	$228,798	$217,973,403	$196,403,800	-$21,569,603	-11.0%
7	$315,155	$267,392	$257,373,758	$232,210,800	-$25,162,958	-10.8%
8	$387,993	$318,379	$313,370,952	$281,808,600	-$31,562,352	-11.2%
9	$506,765	$415,120	$408,602,154	$357,998,200	-$50,603,954	-14.1%
10	$951,608	$738,564	$781,186,152	$662,655,300	-$118,530,852	-17.9%

CONCLUSION

In St. Louis County, exclusive of St. Louis proper, property assessments remain modestly regressive, with the area's lowest-valued properties receiving assessments approximately ten percentage points higher than the region's highest-valued homes. This represents a more than 50% decline in the difference between the lowest- and highest-valued homes, compared with

the ten-year average for the study period. Similarly, all three industry measures of regressivity and accuracy are within acceptable levels. These findings place St. Louis County well below most of the other jurisdictions studied by the Center, with regard to assessment regressivity. While the remaining regressivity and inaccuracy in St. Louis County does appear to be relatively small, under-assessment remains heavily skewed in favor of higher-valued homes. Moreover, the collective impact of these inaccuracies is to leave potentially hundreds of millions, if not billions, of dollars in property value untaxed every year. In sum, St. Louis County has experienced substantial improvements to assessment equity in recent years; nevertheless, inequities remain.

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