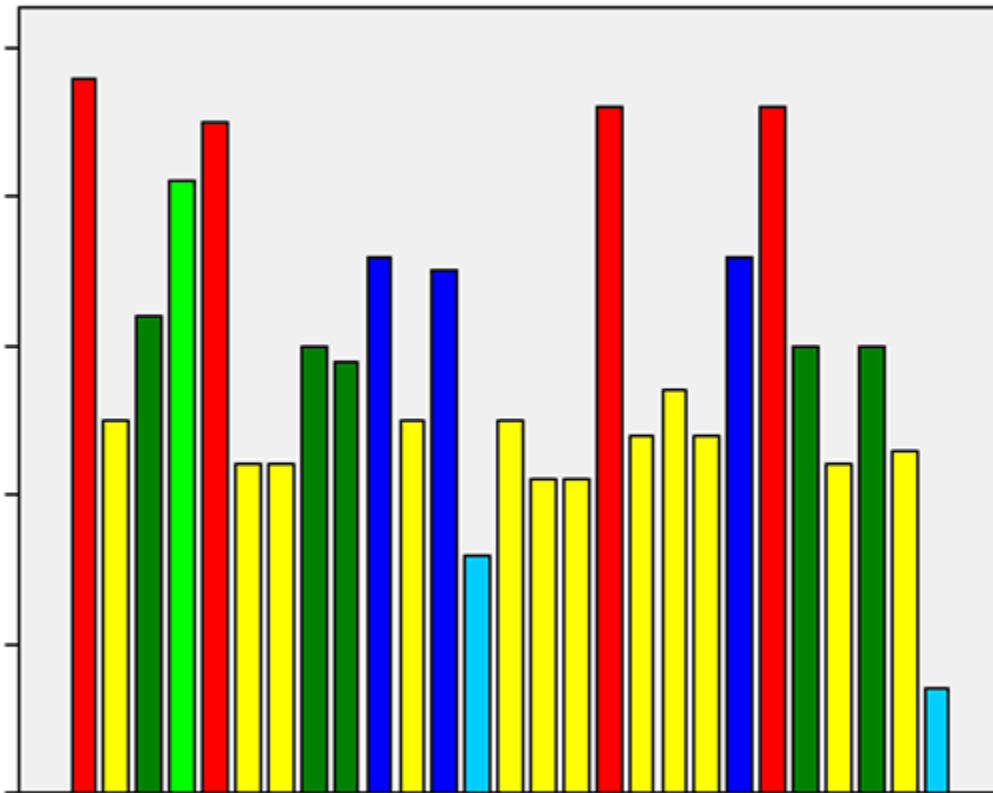




Disparity of Assessment Results: Why Missouri's School Funding Formula Doesn't Add Up



Study conducted by
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Public Finance Initiative

October, 2006
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PUBLIC POLICY RESEARCH CENTER

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EXECUTIVE SUMMARY

When the Missouri General Assembly adopted a new method for funding public schools throughout Missouri during the 2005 legislative session, it tied allocation of future funds to the property assessments and tax rates in existence in 2004. Some may have suspected that the quality of property assessment data was unequal to this task. After all, the quality of a single reassessment cycles was proposed to serve as the foundation of a formula that might distribute \$30 or \$40 billion dollars over its lifetime. On the other hand, the only evidence then available was what the State Tax Commission of Missouri (STC) provided from its biennial studies. In sum, those studies report that most everything was fine with property assessments in 2003/2004. If others were skeptical, they had little evidence beyond the anecdotal.

The results of this research provide that evidence.

The Coalition to Fund Excellent Schools first contracted with the Public Policy Research Center at the University of Missouri – St. Louis in February 2005 to perform a limited study to examine whether the property tax related information then used to determine school fund distributions was accurate. Subsequently, the contract was expanded and extended several times. Ultimately, we were tasked to produce the following deliverables, all of which are accomplished by the delivery of this report:

- To conduct sales ratio studies in 25 counties to measure the assessment levels for residential properties. The studies were to be conducted in accordance with the Standard on Ratio Studies adopted by the International Association of Assessing Officers in 1999.
- To thoroughly examine the results from the corresponding study produced by the State Tax Commission of Missouri (STC).
- To produce a procedure manual to explain our process so that outside experts could evaluate our methodology.
- To produce a final report documenting our findings.

The report is divided into three major sections. Section I is the final report that summarizes the much more detailed findings presented in the following section.

Section II begins with an introduction that is a layman's guide for reviewing the next 27 chapters, representing ratio studies for each of 27 counties. To assure that we could produce 25 studies, we found we needed to attempt more since the availability of data was often questionable until late in the study. We began the process with sufficient sales information for 33 counties. Three were rejected because the sales information did not come from the

primary board of realtors for the county. Three were eventually rejected due to problems with matching sales information with assessor information. All 27 other studies were completed.

Section III is the procedure manual that documents our methodology, written primarily for the benefit of experts – or at least those quite familiar with assessments, ratio studies and statistics.

This study found that the quality and level of assessment among Missouri counties varied widely. This finding, at least as to the general level of assessment, stood in stark contrast to the findings from the STC. A rigorous exam of STC processes, data and results provides overwhelming evidence that the studies conducted by the STC were unreliable. This study also uncovered empirical support for our findings that helps explain why so many counties produce unacceptably low assessments compared to the market values they are supposed to represent. In the end, just a few of the most relevant major consequences of disparate assessment results are examined.

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Chapter 1. Assessment Levels: Results from the PPRC Study

Accurate assessments are critical to the proper allocation of the \$5 billion (approx.) Missouri property tax burden. If assessment levels¹ are inaccurate, the ability of schools to generate local funding is compromised. Furthermore, if assessment levels are inconsistent among counties, the accurate distribution of state funds according to the design of the formula is compromised.² This chapter proffers and answers the primary questions for this study, specifically:

- What were the actual assessment levels within a sample of Missouri counties in 2003?
- Were those assessment levels consistent with the requirement that they reflect true value (approximately 100% of market value)?
- Were assessment levels consistent among counties?

To reliably answer these questions, this study adopts the standard study method used in every state, a ratio study. Ratio studies compare values used by the assessor with values from an independent source³. This study was designed and conducted according to the guidelines promulgated by the International Association of Assessing Officers (IAAO), the pre-eminent authority regarding assessment practices as set out in the IAAO's, 1999 Standard on Ratio Studies (IAAO standard).

An exhaustive study of every Missouri assessing jurisdiction⁴ for every subclass of property was impossible due to data and budget constraints. Nevertheless, the study examines a significant portion of the total state value of locally assessed real property. The following sections, describe the study counties and property types, then report study results and conclusions.

1. Study Counties and Properties

- 1.1 Selected Counties and Property Type: Ratio studies for residential properties were conducted in 27 counties. These studies use sales prices as the alternate value for measuring market value - sales ratio studies. The corresponding studies conducted by the State Tax Commission of Missouri (STC) use appraisals performed by the STC staff as the alternate value measure - appraisal ratio studies. Both sales and appraisal ratio studies are recognized approaches covered by the IAAO standard.
- 1.2 Residential: This study is limited to residential properties, the dominant subclass of property in Missouri. Residential property constitutes 68.3% of the total locally assessed valuation of real property, whereas commercial properties represent 28.9% and agricultural properties only 2.8%⁵.
- 1.3 Study Counties: The study includes individual ratio studies for 27 counties⁶. While 27 counties constitute just 23.5% of Missouri counties, these counties represented 71.7% of the total locally assessed residential value of the state.

¹ Assessment level (level of assessment) refers to the percentage that the assessors' appraised value is in comparison with market value. E.g. if the market value of a property is \$100,000, but the assessor bases the assessment on an appraised value of \$80,000, then the assessment level is 80%.

² Chapter 5 specifically addresses the consequences of inaccurate assessments.

³ A ratio study examines a relatively small portion (sample) of the properties in the county in order to make inferences about all properties (population).

⁴ 114 counties and the City of St. Louis, hereinafter counties

⁵ The sources for all statewide and county assessment data are STC Annual Reports and/or data files from the STC obtained from from of public record requests. All calculations were made by the PPRC.

1.4 County Diversity: The 27 studied counties are larger, on average, than other Missouri counties, but still represent a diverse sample:

- The three counties whose locally assessed residential values represent more than 5% of the state's total are included.
- Of the 16 counties that individually represent at least 1% of the state total, the study evaluates ten.
- Of the ten counties that individually represent between 0.5% and 1% of the state total, the study includes four.
- Of the 24 counties that individually represent 0.25% to 0.50% of the state total, the study includes six.
- An additional seven smaller counties were examined. Iron County, ranked as the 94th county, is the smallest county included. The 21 smaller counties, which individually represent from 0.01% to 0.08% of the state total, are excluded – not by design, but due to a lack of sufficient data.

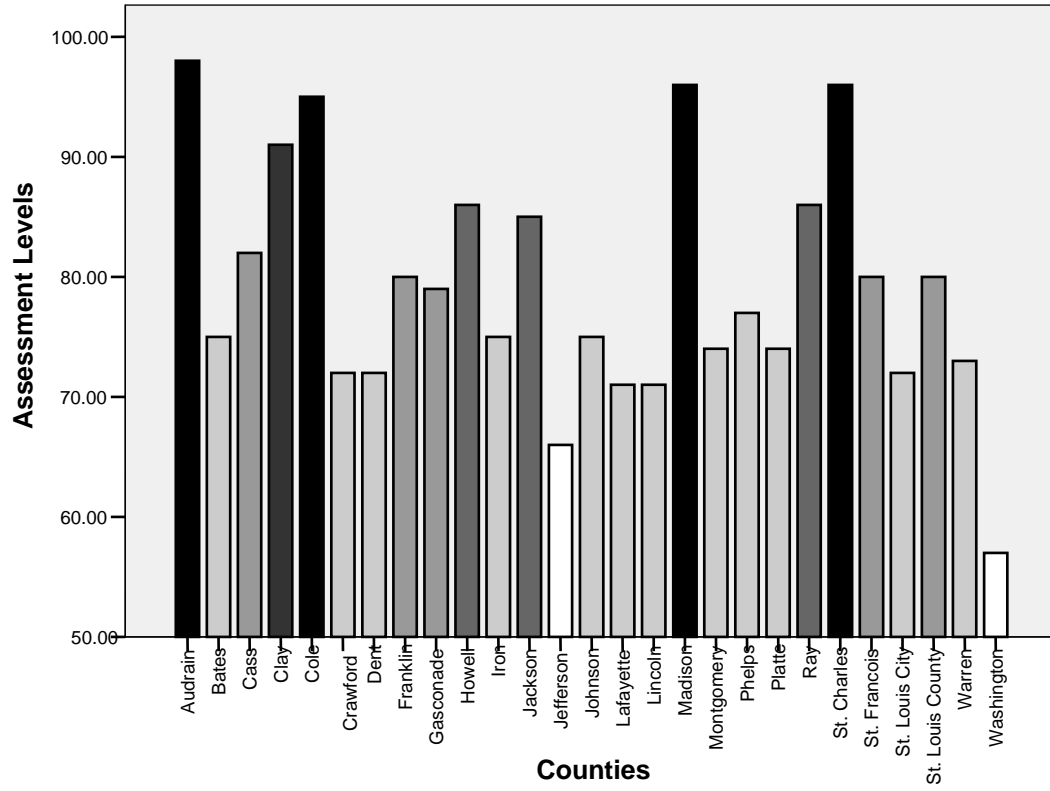
2. Results – Assessment Levels

In 2003, Missouri measured assessment level compliance based on capturing 95% (or more) of market value. The corresponding IAAO standard is that assessment levels fall between 90% and 110%. Most states adopt the IAAO standard or stricter ones (Dornfest, 2003). In this section, the results are first presented in graphical form and allowed to speak for themselves. The graphical presentation is then followed with specific results and interpretation.

⁶ Individual reports are provided in Section II.

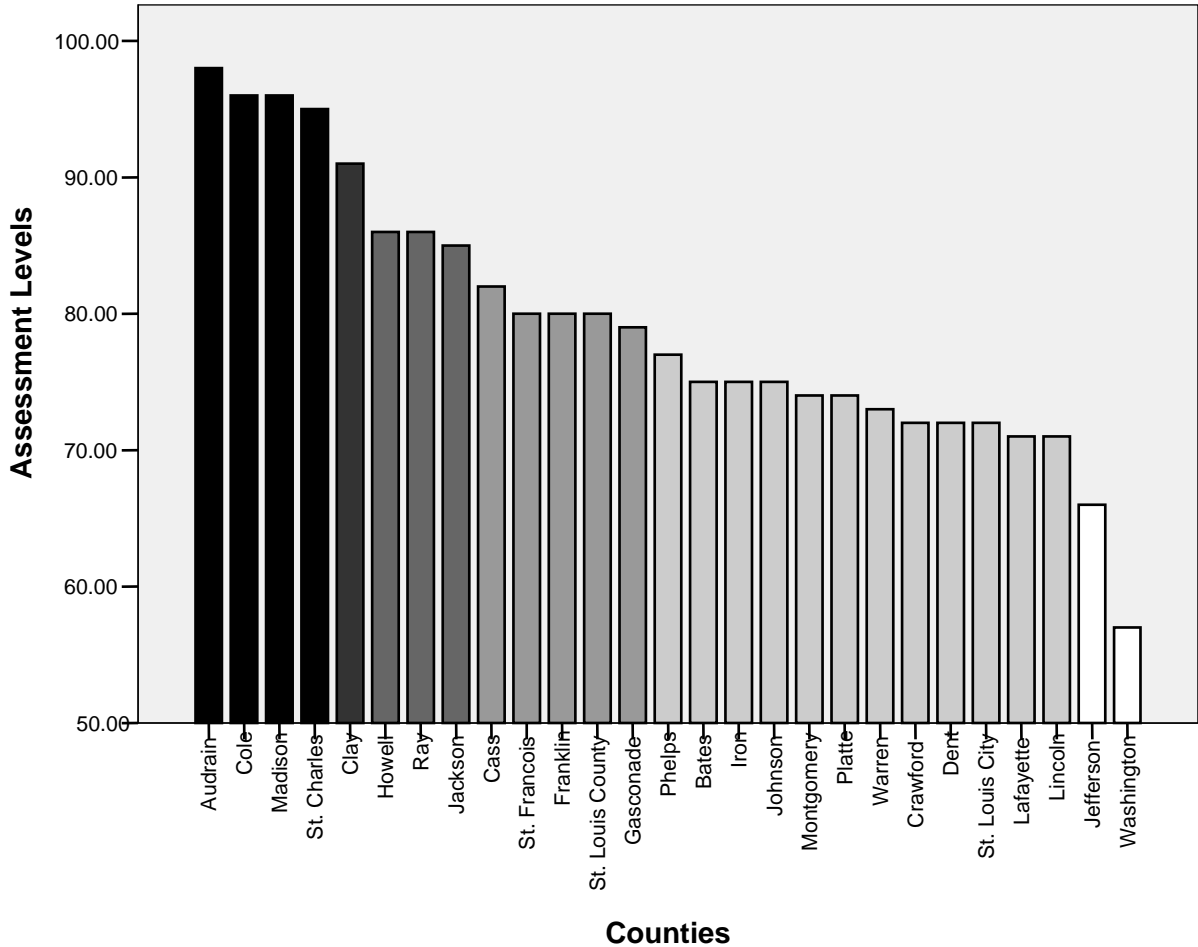
2.1 County Assessment Levels: Figure 1 is the same as the cover graph, except with labels added and colors converted to grayscale.

Figure 1: Assessment Levels. PPRC Results. Alphabetical Order.



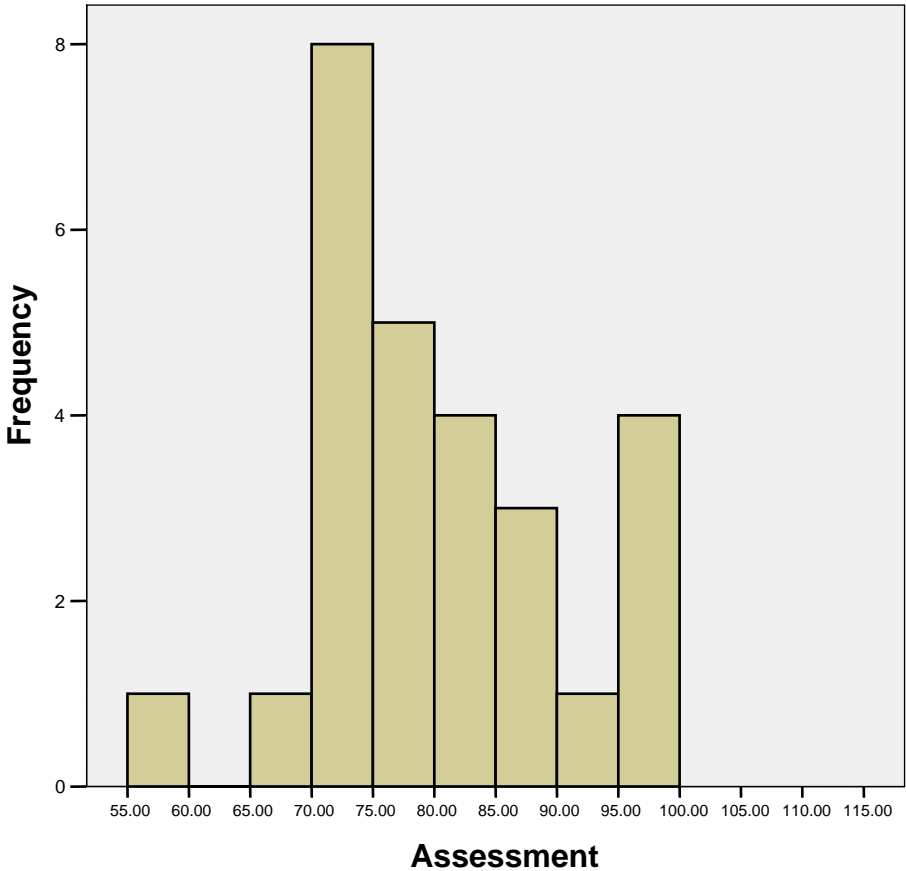
2.2 Assessment Levels Compared to 100%: Figure 2 reports the same results, but in a different order, from the highest to lowest result for assessment level. Note that none reaches 100% and that a broad range of results, from 98% to 57% was found. Four counties met the state standard of 95% and an additional county met the IAAO minimum standard of 90%.

Figure 2: Assessment Levels. PPRC Results. Level Oder.



Frequency of Assessment Levels: Figure 1 provided a clear picture of the inconsistency of assessment results. Figure 2 depicted the range of results. The next graph, Figure 3, shows what values are most and least common.

Figure 3: Assessment Levels. PPRC Study. Frequency Chart (Histogram).



The most common result was an assessment level between 70 and 75% of market value (eight counties). Only two counties had results below 70% and on the other hand, only four counties had results above 90%. Results in the 70%'s were found in 13 counties, while results in the 80%'s were found in seven. The only pattern that is consistent is that assessments do not represent over-assessment.

3. Results – A Different View

In this section, the conclusions for the assessment level are provided in tabular form and several typical measures are provided.

Figure 4: Assessment Levels: PPRC Study.

Assessment Level Conclusions. PPRC Study.			
Alphabetical Order		Assessment Level Order	
County	Level	County	Level
Audrain	98%	Audrain	98%
Bates	75%	Madison	96%
Cass	82%	St. Charles	96%
Clay	91%	Cole	95%
Cole	95%	Clay	91%
Crawford	72%	Howell	86%
Dent	72%	Ray	86%
Franklin	80%	Jackson	85%
Gasconade	79%	Cass	82%
Howell	86%	Franklin	80%
Iron	75%	St. Francois	80%
Jackson	85%	STL County	80%
Jefferson	66%	Gasconade	79%
Johnson	75%	Phelps	77%
Lafayette	71%	Bates	75%
Lincoln	71%	Iron	75%
Madison	96%	Johnson	75%
Montgomery	74%	Montgomery	74%
Phelps	77%	Platte	74%
Platte	74%	Warren	73%
Ray	86%	Crawford	72%
St. Charles	96%	Dent	72%
St. Francois	80%	St. Louis City	72%
St. Louis City	72%	Lafayette	71%
STL County	80%	Lincoln	71%
Warren	73%	Jefferson	66%
Washington	57%	Washington	57%

Source: Individual County Reports. See Section II.

The more notable results include:

- The lowest level of assessment was 57% for Washington and the highest was 98% for Audrain, a range of 41%. A 20% range is specified in the IAAO standard.
- The median (middle) result is the 77% for Phelps. 15 of 27 counties (56%) had assessment levels of less than 80%.
- The mean (average) result was 79.2%, approximately the same as for Gasconade. This means that, on average, assessments would need to be adjusted upwards by 26% to fully accomplish indirect equalization⁷.

4. Summary

The results reported in this chapter can be summarized as follows:

- Only four of 27 counties met the state required assessment level and only one more met the IAAO standard.
- The only consistent pattern of results is that most counties' capture of market value is substantially below anyone's standards. 22 of the 27 counties had assessment levels below 90%
- Assessment levels of 75% or lower were common.

In the next chapter, the corresponding results from the STC study are reported and compared to the PPRC results.

⁷ Indirect equalization is a computation of taxable value by the state oversight body used to achieve the proper distribution of intergovernmental transfer funds according to a statutory allocation formula (IAAO, 1999, 60).

Chapter 2. Assessment Levels: Results from the STC Study and Differences with the PPRC's

This chapter begins with the same questions posed in Chapter 1, except that results include all counties:

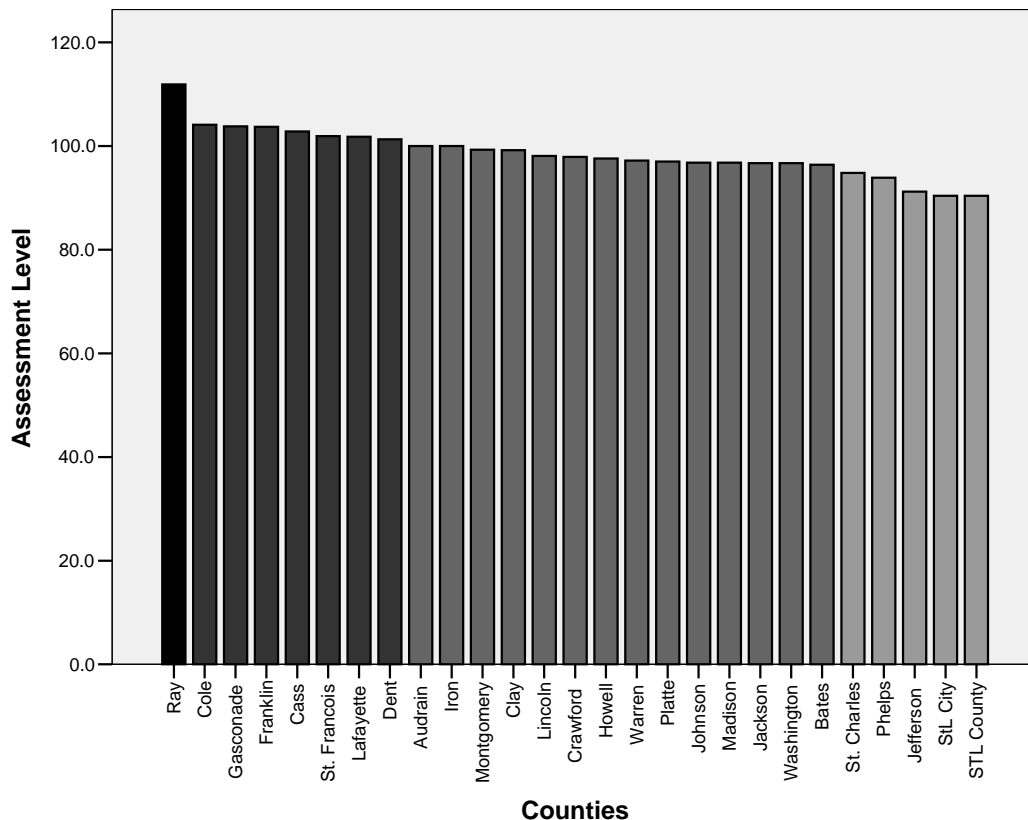
- What were the actual assessment levels within Missouri counties in 2003?
- Were those assessment levels consistent with the requirement that they reflect true value (approximately 100% of market value)?
- Were assessment levels consistent among counties?

The study performed by the STC after each biennial reassessment provides the answers for this chapter. First, the STC results for residential properties in the same studied by the PPRC, then all 115 counties, are depicted.

1. Assessment Results: Level and Consistency

1.1 Levels of Assessment (27 County Sample): The bar chart in Figure 5 shows results from the STC study sorted by result for the same counties studied by the PPRC. The range of results and the total disparity is minimal compared to the findings of the PPRC (Chapter 1, Figure 2).

Figure 5: Assessment Levels. STC Study. Sample Counties. Assessment Level Order.

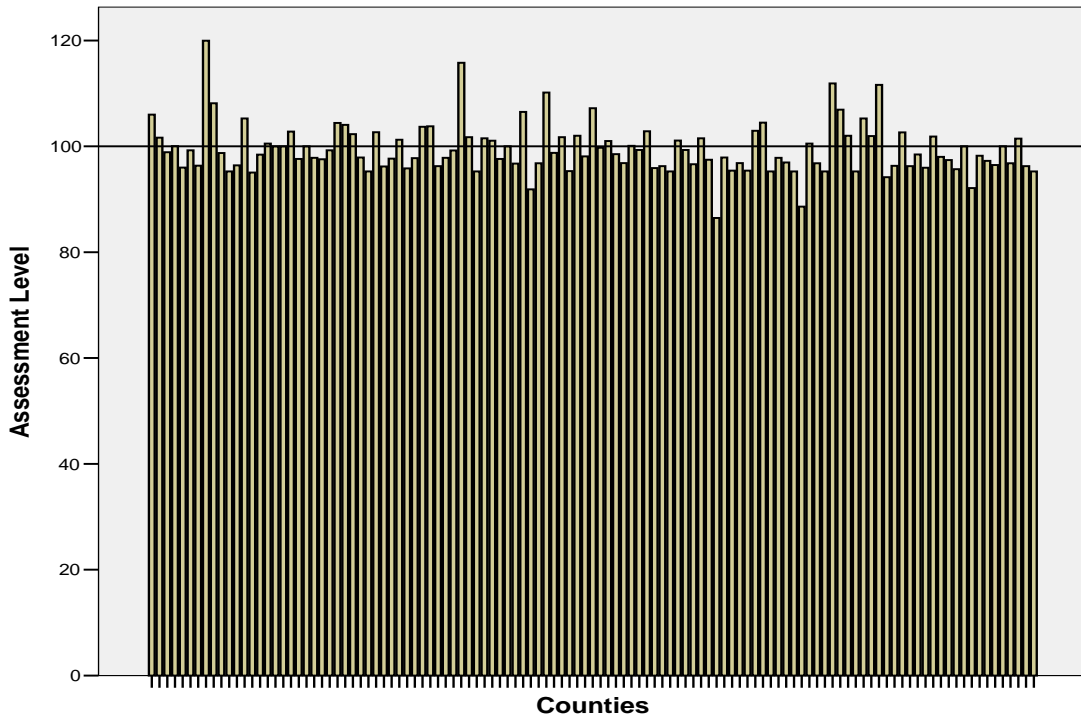


The lowest assessment level result calculated by the STC was 90.4% for St. Louis County. The highest assessment level reported, 111.9% for Ray, exceeds the maximum IAAO standard of 110%. This result means, if reliable, that the Ray County assessor is over-valuing more than half the residential properties by 12% or more. The STC found that twenty-three of the 27 counties met the state standard of 95%, whereas the PPRC found only four. The STC reports St. Charles County among the bottom five

counties, whereas the PPRC found St. Charles County’s assessment level second. In the STC study, the four largest counties in the St. Louis area are all among the lowest five and all below Washington (PRC result of 57%). In sum, the results from the two studies do not compare.

1.2 Levels of Assessment (Statewide): Figure 6 depicts STC study results for all 115 counties in alphabetical order. The pattern from the 27 counties persists. Few counties have assessment levels much below 100% and as many as have results above 100%. Overall, the level of disparity is small. Several other counties join Ray with the distinction of results above the maximum IAAO standard of 110%.

Figure 6: Assessment Levels. STC Results. All Counties. Alphabetical Order.⁸



The obvious question: Can these differences be explained? Yes, but first the rest of this chapter completes the process of putting the differences in context, before examining explanations in Chapter 3.

2. Examining the Differences between PPRC and STC Results

2.1 Differences Quantified and Summarized: Figure 7 shows how dramatically different the results from the two studies are. For some readers, these may still be just numbers, but the following subsection offers more perspective.

Figure 7: Summary Measures of Differences between PPRC and STC Studies

Measure	PPRC Result	STC Result (27 counties)	STC Result (115 counties)
Maximum	98%	111.9%	120%
Minimum	57%	90.4%	86.5%
Median	77%	97.9%	98.5%
Mean	79.2%	98.6%	99.2%
Mode	70-75%	95-97.5%	-

⁸ Results from the 2003 STC Ratio Study for all counties are included in the appendix.

2.2 Differences in Perspective: The content of Figure 8 leads to a discussion of what high assessment levels imply.

Figure 8 Comparing Assessment Level Ranges

Assessment Level	Counts						Percentages					
	PPRC	STC					PPRC	STC				
	PPRC (27)	Res (27)	Res	Agr	Com	All	PPRC (27)	Res (27)	Res	Agr	Com	All
over 105%	0	1	12	36	12	60	0	3.7	10.4	31.6	10.4	17.4
101 - 105%	0	7	25	29	22	76	0	25.9	21.7	25.4	19.1	22.1
95-100%	4	14	67	44	58	169	14.8	51.9	58.3	38.6	50.4	49.1
90 - 94%	1	5	7	4	15	26	3.7	18.5	6.1	3.5	13.0	7.6
85 - 89%	3	0	4	1	5	10	11.1	0	3.5	0.9	4.3	2.9
75 - 84%	9	0	0	0	2	2	33.3	0	0.0	0.0	1.7	0.6
65 - 74%	9	0	0	0	1	1	33.3	0	0.0	0.0	0.9	0.3
55 - 64%	1	0	0	0	0	0	3.7	0	0.0	0.0	0.0	0.0
Total	27	27	115	114	115	344	100.0	100.0	100.0	100.0	100.0	100.0

The STC measures assessment levels using medians, meaning that in each study it found half the properties assessed higher than their reported assessment level. In total, the STC reports that:

- Over 30% of counties have residential assessment levels greater than 100%.
- Over 60% of counties have agricultural assessment levels greater than 100%.
- Over 29% of counties have commercial assessment levels greater than 100%

In other words, in each of those counties for those classes at least half the properties are assessed at more than the appropriate value. Let us not fail to notice that many other property classes in other counties are reported to assess at between 95% and 100% inclusive. If accurate, a large percentage of these properties must also be over-valued for tax purposes.

So, let's examine the final column. Approximately 40% of the total STC studies report that assessors are over valuing properties for tax purposes. Another 50% of assessors show results equal to 100%, or so near, that only exceptional uniformity would keep a near majority of their taxpayers outside the over-valued category.

For those of us familiar with Missouri property tax practices, these results are credulous. Given Missouri's multi-step process for appealing property assessments, why aren't the county courthouses overwhelmed? How do these assessors ever get re-elected? Why would any property owner approve of a property tax increase for any purpose?

At the other end of the spectrum, the STC finds only four counties (3.5%) with assessment levels below 90%. The PPRC, on the other hand, found 22 of 27 (81%) below 90%.

3. Result Differences Require a New Question

Earlier, we stated that the differences could be explained. That does not mean they can be reconciled. In Chapter 3, we provide the explanation. Suspicion of results does not equate with the evidence from robust examination, which was conducted and is reported in Chapter 3. As preface, the STC appraisal ratio studies for the 27 sample counties were almost universally invalid, making the results of their studies unreliable. Yet those results, indirectly, influence the allocation of billions of dollars in local taxes and billions of dollars of state school aid (See Chapter 5).

Chapter 3. Explaining the Differences

The STC studies are conducted with several handicaps, which the PPRC study was able to avoid. Missouri has no statewide mandatory disclosure of sales prices for real property⁹. The STC has recommended statewide mandatory disclosure annually since 1979 as a way to enhance the quality of assessments and oversight. In the meantime, the STC has opted to measure county assessment levels with an appraisal ratio study.

One sure effect of using appraisals rather than sales is to limit sample¹⁰ size because appraisals are costly. As will be seen within this chapter, sample size can compromise virtually every aspect of producing a high quality study. On the other hand, the PPRC study was conducted using a larger sample (sometimes hundreds of times larger and never less than twice as large) composed of high quality sales data available in electronic form.

Second, in many counties assessors do not have ready access to important information that characterizes the population of properties in their county. In turn, that population data is unavailable to the STC. Certainly, some assessors have excellent software systems and know how to use them to full advantage. Within the 27 study counties, approximately a third had the resources and in-house knowledge to produce this information. To clarify, assessors and the STC have much information about assessments. However, a properly designed ratio study requires more than this. For example, approximately a third of the study counties could determine what percent of assessments is attributable to single-family properties (as compared to multi-family or vacant land, etc.) without outside assistance. Similarly, assessments by property age groups (e.g.) were unavailable from the assessor or STC. Without these kinds of information to characterize the population, several significant aspects of the ratio studies are compromised. Whenever the PPRC successfully obtained a copy of assessments in electronic form, its researchers developed detailed information about the population that enabled a robust study. Even when a copy of the assessment roll was unavailable, the study design called for the use of a much larger random sample than used by the STC for each of its studies to provide characterizations of the population – one large enough to permit various statistical examinations that were impossible for the STC to perform. Additional handicaps are identified in the appropriate places within this chapter. However, all the handicaps together do not fully account for the different results between the STC and PPRC studies.

Once the explanation for why the conduct of the STC ratio studies produces unreliable and/or invalid results is complete, this chapter turns to other systemic issues that result in inaccurate portrayals of assessment levels and consistency.

1. Size and Design Problem:

The STC begins its ratio study process by drawing a random sample that will produce approximately 35 appraisals. Random sampling is often used in statistical studies. However, when limited to 35 samples and drawn on a purely random basis, will it provide the necessary data for analysis? Using an example with the assumption that the STC defies odds and makes a perfect draw, the results might look like those found in Figure 9.

⁹ In 2003, three jurisdictions had locally mandated disclosure: St. Louis City, St. Louis County and St. Charles County. Subsequently, Jackson County has adopted mandatory disclosure. Only by virtue of their charters are these counties permitted to adopt these requirements locally.

¹⁰ When a complete examination of all members of any group, e.g. residential properties in a county cannot be examined, statistical analysis uses a sample that is representative of the population (group). Properly performed statistical analysis then allows the analyst to make valid inferences about the population based on the exam of the sample.

Figure 9: Example of Results from Random Sampling

Assumptions: Population: 3500 Total Properties STC Sample: 35 Properties, randomly drawn. STC Draw Result: Perfect representation by parcel.						Example County	
Total \$ Value	Percent of Total Value	\$ Value Range	Average \$ Value: Population and Sample	Number of Properties	Samples Selected	% of Total Properties for Sample and Population	% of Total Value for Sample and Population
15,000,000	20%	100,000-200,000	150,000	100	1	2.9%	35.1%
7,500,000	20%	50,000-99,999	75,000	100	1	2.9%	17.5%
7,500,000	20%	25,001-50,000	37,500	200	2	5.7%	17.5%
6,250,000	20%	5,001-25,000	12,500	500	5	14.3%	14.6%
6,500,000	20%	1-5,000	2,500	2600	26	74.3%	15.2%
42,750,000	100%			3500	35	100.0%	100.0%

In the example in Figure 9, a county with 3500 properties will be represented by a sample of 35. Exactly 1% of each value group was selected by the random draw, thus providing a perfectly proportional representation of the population (3500 properties) – by parcel count. However, when the purpose of the study is indirect equalization, as with using results to correct measures of assessments used to distribute state aid, the appropriate measure for representivity (proportionality) is as a percent of the dollars (IAAO, 1999). The last two right hand columns provide a comparison. The single property from the highest value group represents exactly 1% of the properties within the group, it represents the appropriate percentage of total properties, but it represents more than 35% of the dollars of the entire sample, compared to the group’s appropriate percentage of 20% of the total value (second column). This provides an example of problem one with the STC process. Sampling based on parcel count is unlikely to provide a sample representative of the dollar values. This could be corrected by weighting the results of each sample, but the STC does not use this method.

However, problem 2 is more important. In this sample, one property represents 20% of the value of the county while another single property represents the second 20% of value. Two properties represent another 20%. On the other hand, 26 properties are devoted to representing 20% of value. In fact, our analysis found that STC samples over-represent very low valued properties, especially for vacant land – properties that some experts consider remnants with little or no normal market (Gloude-mans, 2001). A third problem is that the STC process does not permit an examination of assessment levels for different property types, so they cannot make appropriate corrections. For example, assume that in this county lower valued properties are assessed at levels much above the assessment levels for high valued properties. The few samples for higher valued properties will have minimal effect on the median calculated by the STC, but large number of low valued properties assures a high median, one that does not properly represent county results for the purpose of indirect equalization.

The STC appreciates the value of random sampling, but fails to appreciate the subtleties required for a proper design to achieve its objective. Once it generates and uses a random sample, the STC assumes its sample is representative of the population, which is not appropriate for achieving valid results.

2. Additional Sample Size Issues

The use of small samples, a direct result of opting for an appraisal ratio study rather than a sales ratio study, presents other problems for producing reliable results.

2.1 Stratification: The IAAO strongly supports the use of stratification in ratio studies. Stratification is the process of grouping similar properties together and examining them as a group (stratum). Once all strata (pl.) have been analyzed, it is then possible to weight the results for each stratum to create an overall result that closely represents the population. A sample size of 35 is insufficient for stratification. While it is permissible to use some small strata, (we limited this use to a minimum of 5) to optimize representivity, it is preferable that most strata contain 30 samples. Examining properties within strata that are more homogenous produces results that are more precise. There is an additional important reason to use stratification. Examining properties by strata allows comparisons, i.e. which property types, location, values, ages, etc. are assessed lower and which higher. Which strata show more uniformity and which demand attention? The substantial benefits that can be produced by a ratio study with sufficient sample size are lost in Missouri.

2.2 Precision: All else being equal, the larger the sample, the more precise the result. When assessments are not uniform, as is frequently found by both the STC and PPRC – larger sample sizes become even more important in providing sufficient precision to determine whether results are reliable enough to use for important purposes, such as distributing school funds, withholding state reassessment payments, etc. However, the STC's sample size is both small and fixed. The precision generated by increased sample size is measurable. Each county report specifies the relative precision provided by the PPRC sample compared to the STC sample. A brief summary, shows that:

- The minimum relative precision for the PPRC samples was 1.26, meaning that 26% more precision was provided (Madison).
- The maximum precision gain was 1919% (St. Louis County).
- For 19 of the 27 counties the gain was at least 100 %.(all results are reported within the individual county studies in Section II).

3. Valid Results: Part 1, A Representative Sample

The ultimate aim of a ratio study is to produce valid results so that the analysis allows inference and conclusions about the population – in this case residential properties within the county. The IAAO sets out three conditions for achieving representivity and therefore valid results. One of these deals only with sales ratio studies, so the STC must demonstrate that it meets the requirements for the other two criteria to claim validity. The STC does not examine whether its studies meet either condition, but the PPRC has examined the STC studies to make this determination.

3.1 Proportionality: In simple terms, the sample would ideally mirror the population on a variety of property characteristics that affect property value. These include location, size, value level, property age, property use, condition, etc. However, achieving an ideal sample is not practical. Demonstrating approximate proportionality on one or two important characteristics is generally considered sufficient, though more is always desirable. In fact, a sample that fails to achieve proportionality can still produce valid results as long as the under or over-represented properties have results that are similar to the overall sample. The IAAO states that even random samples should be examined to determine whether they meet this criterion. Since the STC does not conduct that examination, we did. Our results showed that the STC sample did not represent the population sufficiently in 15 counties. Even when a sample does not meet this criterion initially, valid results can be produced

using weighting to compensate for over or under-representation. The PPRC used weighting in all 27 counties, even when not essential, to optimize its representivity.

Still, the final judgment regarding this first criterion for validity is often somewhat subjective; therefore, we never concluded that a STC study was invalid on this basis alone. The final criterion is far more important in an appraisal ratio study and proved the undoing of the STC studies.

4. Valid Results: Part 2, Representing Market Value

The final requirement for producing a valid ratio study, especially for appraisal ratio studies is to demonstrate that the appraisals represent market values.

4.1 Background: Missouri is the only state whose assessments are tied to market values, which relies exclusively on appraisals for its ratio study. The other 48 either use sales exclusively, or supplement sales data with appraisals when sales data is sparse (Dornfest, 2003 and Gardner, 2006). Especially for residential properties, it is uncommon to use appraisals in lieu of sales data, since sufficient sales information can usually be gathered, even in states without mandatory disclosure (Ibid.). Some of the reasons for this propensity are obvious from what has already been covered in this chapter (e.g. sample size, cost, ability to stratify and weight), but the over-arching reason for the preference for sales ratio studies, as identified by the IAAO, is that appraisals introduce subjectivity into the process. Still, appraisal ratio studies are professionally acceptable and have some advantages. However, it is essential that the appraisals be proven as representative of market values. The STC performs no analysis to demonstrate that their appraisals represent market values. Again, we provide the missing analysis.

4.2 Methodology: The IAAO standard recommends a method for testing appraisals against sales to determine whether the appraisals meet the essential requirement that they represent market values. The PPRC conducted a more rigorous process than required. Rather than conduct one statistical test, it used two. While each is designed to make the same determination, they use different approaches and sometimes reach slightly different conclusions. In addition, the PPRC repeated each test using only single-family properties. This added caution provides several advantages. First, single-family properties dominate the total assessed value for the residential sub-class. Secondly, appraising single-family properties is easier than appraising vacant land or multi-family properties. Finally, it assured that any differences in the distribution of property types between the STC and PPRC sample were eliminated.

4.3 Findings: In statistical analysis, results are reported in terms of the degree of statistical confidence. The required minimum level of confidence depends on how the result will be used. For research in the social sciences, a result with 95% statistical confidence is common. However, lower levels of confidence, especially 90% are sometimes used. The detailed results from the four tests are reported in each county study. The conclusions are summarized here:

- In 25 counties, we concluded that the STC appraisals did not represent market values.
 - In 20 counties, the conclusion for all four tests was with 99% statistical confidence.
 - In three counties, the conclusion for all four tests was with 95% statistical confidence.
 - In two counties, the results were mixed, but only slightly. In both counties, three tests rejected the possibility that STC appraisals represented market values

with at least 95% statistical confidence, while the confidence level for the fourth test was between 90% and 95%.

- In only two counties, Madison and St. Charles, were we unable to reject the conclusion that STC appraisals did not represent market values.

5. Systemic Bias – some statute, some STC action, some “natural” outgrowth?

The problems discussed thus far render the data used in the school funding formula for assessed values per student unreliable. There are additional systemic issues that further compromise the data.

5.1 Evolving Results: From the time a field appraiser concludes a value for a property to the time a final value is used in the final set of results, the conclusion is reviewed at many stages, some formal and others informal. An brief example of a possible flow is:

- i. Field appraiser reaches conclusion
- ii. Review appraiser disagrees
- iii. New value is used
- iv. Value reported to assessor, who disagrees and a conference results
- v. New value is used
- vi. Value reported to school district. Disagreements persist and additional conferences take place.
- vii. New value is used.
- viii. If county does not meet the needed level, a second sample can be requested
- ix. Second sample repeats the process above
- x. If second sample helps the result, it is used in combination with first sample. If it does not help, it is dismissed.

Of course, few properties, or few counties in a given year actually experience all the possible changes within the review chain. Furthermore, in many cases the first overall result (referred to by the STC as the preliminary result) is identical to the final result. Nevertheless, this process (largely dictated by state law) introduces tremendous potential for subjectivity. To determine how significant this process affects results, we examined the how much change occurred between the first result and the final calculated result during the 2003/2004 examination cycle. In Figure 10, we noted that 56 of the 230 ratios changed. Of these 50 increased, almost 90% up and 10% down. This is not to say that review is inappropriate. An opportunity to correct mistakes for so important a matter, makes sense. That 90% of the changes have the same result raises more than medians, it raises the specter of a system with built in bias.

Outside the assessment community, it is unlikely that many are aware that even after the review process the STC offers two “bonus” opportunities, so that in the end the STC may never use its calculated results.

Figure 10: Changes after the First Review of Field Results

	RES	COM	TOTAL
Ratio Increased	25	25	50
Ratio Decreased	2	4	6
COD Bonus	10	2	12
Midpoint Bonus	2	8	10

- 5.2 Bonus Opportunities: Once the process of calculating results and reviewing them is complete, the results are reviewed to see if the counties deserve a COD bonus and/or whether using a different measure than the median would be helpful
- i. COD Bonus: The definition and other matters related to a measure called the COD are covered elsewhere. Suffice it to say this is a measure of uniformity with lower values indicating better uniformity. The STC has adopted a practice whereby if the county COD is less than 25%, then the calculated median is tossed and replaced by 18.1 (i.e. 95.36%). Given that a COD measure of 25% is a poor result, this is hardly an achievement deserving of reward. Is it instead just a reward to achieve a desired result? In any case, it is doubtful that an unbiased expert would support its use. In addition, we wonder why County A with a measure of 94% gets a 1% bump to 95%, while County B with a measure of 85% gets a bump of 10%. Can there be an explanation beyond the end justifying the means?
 - ii. Mid point Bonus: When a county does not qualify for a COD bonus, they might qualify for the mid-point bonus. The calculated median is compared to a number (one with no special statistical significance). The higher of the two is used.
 - iii. Results: As seen in figure 10, 22 bonuses were awarded in this cycle.
- 5.3 The Equivalent Sales Ratio: The state is not done here. There is another opportunity to make sure that effective indirect equalization does not occur. By statute, the Missouri Department of Elementary and Secondary Education used calculations from the current year, or the best three of the past four years. The result of these processes is that of the last 920 results used, all but 18 were “perfect”.

6. Summary

The state process does not provide reliable results, yet the state relies heavily on those results. Largely, it appears this is the design.

Chapter 4. Explaining Assessment Levels

This report has provided evidence using valid ratio studies of the actual level of assessment for residential properties in 27 counties for 2003 (Chapter 1). We have documented the corresponding results from the STC study and quantified the differences (Chapter 2). Furthermore, in the last chapter (Chapter 3) we have analyzed the STC studies finding them generally invalid and unreliable and identified other elements of the existing process that allow low assessments to “hide” from exposure and correction.

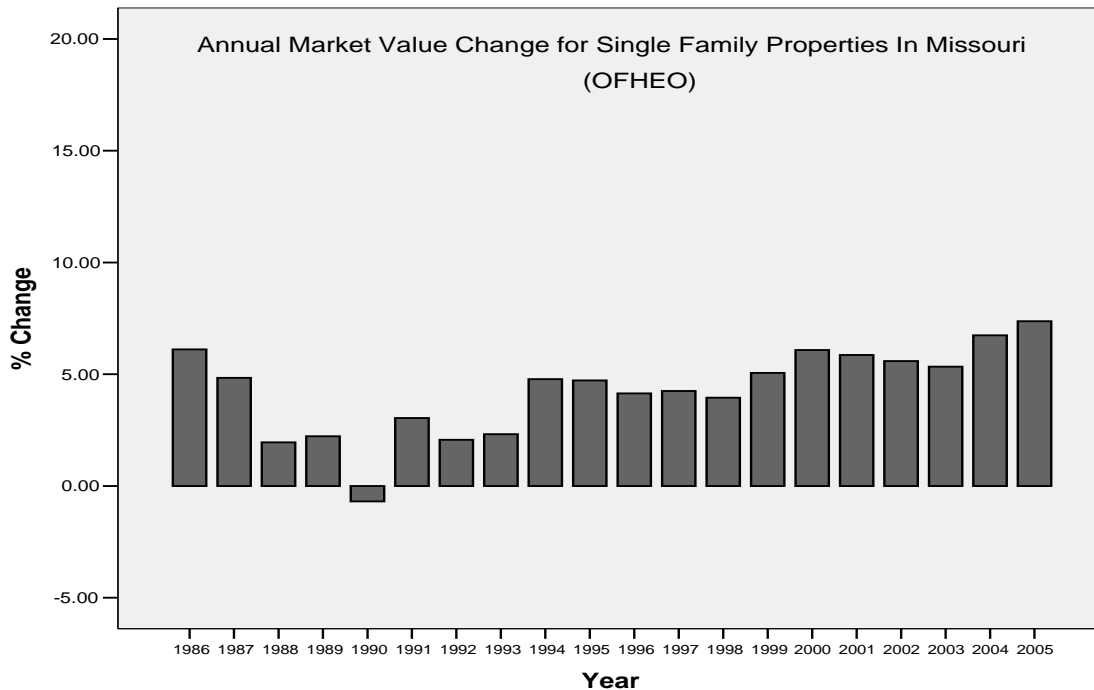
In this chapter, we leave ratio studies behind to explore the existence of empirical evidence that helps explain assessment levels and confirm the results of the PPRC study.

1. Reassessment Frequency

Biennial Reassessment: Missouri law calls for a biennial reassessment in odd numbered years. One of the primary reasons for the reassessment is to enable assessors to adjust assessments to changes in market value during the previous two-year period. If this process is completed effectively, assessment levels should maintain pace with their previous level. What happens, however, if meaningful reassessment is a pretense, especially in a period of rapidly rising market values? Assessment levels decline.

1.1 The Market: Since 1991 property values for single-family properties, the dominant contributor to residential values, has been on the constant rise in Missouri according to the most comprehensive index available. The market has been particularly strong since 1999, showing annual increases in value of more than 5%. This is a statewide index, so some counties have experienced more value inflation and others less. Nevertheless, it provides a first litmus test to see how counties are progressing in their efforts to assure that assessments reflect market values.

Figure 10: Market Values



Source: Office of Federal Housing and Enterprise Oversight

1.2 Measuring Biennial Reassessment: One pattern we noted in the conduct of our study was that the increase in valuation during each two-year reassessment cycle was often low. In each county report we noted whether this tendency existed and its impact (again, with the caution that the index may not be as relevant in some counties as it is in others). Here, we re-examine this pattern as it applies to all 115 Missouri counties. We adopted a very soft test: Did the reassessment produce a total 2-year rise of at least 3%. If not, we draw the tentative conclusion that a serious reassessment of values is unlikely to have occurred.

Figure 11: Inferring Meaningful Reassessments

Frequency of 3% Increases (for 2-yr cycle)	Number of Counties
0 of 4	14
1 of 4	24
2 of 4	44
3 of 4	19
4 of 4	14

A third of Missouri’s counties (38/115) appear to have reassessed only once, or never, in the last eight years. Only 12% (14/115) appear to have actually reassessed during each cycle. When market values are rising and assessments are not, only one result can occur, lower assessment levels.

2. A Special Pattern for the Lack of Reassessment

Another noted pattern in some counties was a tendency to produce little or no increase in assessments when the re-assessment preceded an election year. These were followed by increases that are more normal when an election was not forthcoming. We classified counties that produced assessment increases of less than 2% in pre-election year efforts, followed by increases in the off years of greater than 4%.

- 15 counties fit this pattern of 4-year reassessment cycles. They are identified in the Appendix.

3. Capturing Partial Increases in Market Value Changes

In some counties, and/or in some years, the pattern fits neither of the above. Rather, the noted pattern was that each reassessment proved “meaningful,” but not in line with expectations of value increase based on the OFHEO index. To provide definition for this characterization, we looked at the series of three reassessments that were intended to capture market value changes from 1997 through 2003. For this category, we identified those counties that produced less than half of the total expected change.

4. Failing to Capture Value for Some Property Types

Readers of each ratio study will find that many counties have one or more groups of properties that are assessed particularly low. Most often, these included older properties, lower valued properties and vacant parcels. Even when assessment levels are generally good, the failure to keep some groups up to market value will lower the overall result and reduce the equitable distribution of local tax burdens.

Chapter 5. Consequences of Disparate Assessment Levels

In this chapter, no effort is made to exhaust the list of consequences from low assessment levels or levels that are inconsistent among Missouri counties. Instead, the focus is on four major issues. Two issues directly affect school funding. The other two issues directly affect a substantial number of Missouri property owners. Indirectly the final two also affect schools because taxpayers with little confidence in the property tax process are unlikely to support its expanded use.

1. Distribution of State Funds

Under the new state funding formula for school, the state's allocation depends in part on the relative wealth of each school district. This is measured by the ability of the local school to raise revenues based on a set tax rate of \$3.75 per \$100 of assessed valuation. The assessments used are also fixed as of 2004 (essentially the same as 2003 other than one year of new construction). However, if assessment data is faulty, all calculations regarding what is "due" a school district is erroneous. Furthermore, if the assessment data is inconsistent, then it is reasonable to presume that districts lying within highly assessed counties are harmed, while those within lowly assessed counties are benefited through inaccuracy.

To make this point clearer refer to the sample in Figure 12.A. For simplicity, the assumption is made that both districts are equal in all regards to the formula, other than as specified.

Figure 12.A: Example: Beginning Data

	County A.	County B.
Formula Fixed Tax Rate:	3.43	3.43
Assessment/Student	116,618	116,618
Local (per student)	4,000	4,000
Other includable revenue	800	800
State Target (per student):	6,117	6,117
Total Local Target (per student):	4,800	4,800
State Aid:	1,317	1,317

Thus far, all is equal, or at least it appears so.

However, what if the reality is that in County B assessments represent 75% of market value while in County A assessments represented 100% of market value. In other words, the true value of property wealth in County B is understated and its ability to raise local revenue is similarly understated. Now, we can re-examine using Figure X.B. assuming that County B's reported assessments are adjusted using indirect equalization.

Figure 12.B: Example: Adjusted Data

Assessment Level:	100%	75%
Assessment/Student	116,618	155,491
Formula Fixed rate	3.43	3.43
Local target	4000	5333
Other includable revenues	800	800
total target	6,117	6,117
less local	4,800	6,133
State Aid Due	1,317	0

In essence, scarce state resources that could have been allocated to needier districts went instead to the district in County B, albeit through no fault of their own. The actual affect, of course, is much more complex. Some districts now funded as “hold harmless” districts might no longer be if accurate and effective indirect equalization occurred. The reverse is equally true. It might be possible to dramatically speed the phase in of the current formula, etc. Those matters are outside the scope of this study, but this study brings them back into the decision arena.

2. Special Case of the 2.75 Districts

Missouri school districts are permitted to levy and operating rate up to \$2.75 by action of the elected school board. Roughly, 100 districts use a \$2.75 levy, i.e. approximately 20% of all districts. However, this constitutional provision is frustrated by low assessments. Use

Nominal Tax Rate	2.75
Actual Assessment Level	75%
Effective Tax Rate	2.0625

The meaning is simple; the school board is denied the effect of the constitutional provision to raise the revenues consistent with an effective tax rate of \$2.75. This affects far more than those districts with tax rates of \$2.75. Any district with an operating levy of less than \$3.66 in a county where the assessment level is 75% has an effective tax rate of less than \$2.75.

3. Boundaries

Hundreds of Missouri taxing authorities lie within two or more counties, including many school districts. Unless all the counties that share a school district assess at similar levels, disparities are certain. This may help or hinder a school depending on how much revenue comes from which county; and which county represents the school districts home county. It quickly gets dizzying. When a system, such as Missouri’s current property tax system, operates inaccurately and inconsistently, the permutations of possible effects become too large to consider. For the local property taxpayer though, the ramification is straightforward. Consider the situation of two taxpayers living in different counties, but the same school district.

Figure 13. Cross Boundary Example

	County A	County B
Home Value:	100,000	100,000
Assessment Level:	100%	75%
Assessed at 19%:	19,000	14,250
Tax Rate 4.00 per		
One Hundred:	760.00	570.00

The property owner in County A is paying 33% more. So, is he paying 33% too much or is the owner in county B paying 16.7% too little and the owner in County A 16.7% too much, or does it depend?

4. Taxpayer Rights

One certain consequence of low assessments is that it effectively takes away the appeal rights for typical taxpayers. Say you know your property is worth around \$250,000. You receive a notice from the assessor that your assessment is increasing 33% based upon his new appraised value of \$200,000. Do you scream about the

33% increase, or your head low - know that your assessment is still 20% undervalued? What you do not know is that the normal assessment level is 70%. At that assessment level, your appraisal should be reduced to \$175,000, other properties should increase from 70% to 80%, or you and the rest of the county should all have assessments based on approximately 100%, as the law provides. When true market value is the effective standard, you know that when the assessor appraiser your \$250,000 property for \$300,000 that it is time to appeal. When the assessment level is unknown, what are your practical rights?

5. Changing Circumstances

While not directly a part of our study, we would feel derelict in our duty to Missouri if we did not make the point that fixing funding based on property wealth as of 2004, even if that property wealth had been properly measured, is certain to cause a problem we have not yet discussed. If the current formula lasts for ten to 15 years its predecessors did, some counties will experience substantially changed circumstances – either a significant decline or increase in local property wealth. Consider a small county where a major employer leaves, or a new one arrives.

6. Summary

Inaccurate and inconsistent assessments create problems that in turn create new ones. Effective indirect equalization could compensate for some of the problems, but only accurate assessments can address them all.

Missouri's current funding formula locks in the effect of poor assessments that were not equalized. That statute provides no means of correction short of new legislation.

Chapter 6. Conclusions

- ❖ While some Missouri county's assessment levels in 2003 approximately represented market values, these were a distinct minority, only five of the 27 studied counties.
- ❖ The STC ratio studies, which showed dramatically different results, are generally invalid (in 25 of 27 counties). The indirect equalization process in effect when 2004 assessments were evaluated did not work.
- ❖ The low assessments in most study counties are accompanied by empirical data that suggests that re-assessment was not always serious and/or only a portion of increases in market value were captured.
- ❖ The inconsistent assessments among Missouri counties lead to a wide variety of real and potential consequences for schools, taxpayers and the state. Moreover, using the seriously flawed assessment data from 2004 for many years to distribute state funds guarantees inaccurate allocation.

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