

Ratio Study Practices in the United States, Canada, and the World: Results of 2022 Survey

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This paper explores current practices and issues in ratio studies by comparing states, provinces, four nations outside North America, and a few local jurisdictions not subject to review by a state/provincial oversight agency in terms of frequency of studies, standards used to evaluate results, and final use of results. The report includes an introduction and a narrative discussion of responses and some trends since 1989, but focuses on the most recent changes. The report also offers tables and appendices showing key findings, tabulated responses, and the individual responses from each jurisdiction. In comparing responses to IAAO standards, the 2013 version of the Standard on Ratio Studies is the basis.

Introduction

The intent of this analysis is to continue to search for clarification of technical issues by exploring and reviewing state and provincial-level ratio study practices throughout the United States and Canada. When possible, responses are compared to those from previous surveys. The current survey represents an update of the 2013 survey and adds some new content areas, as well as, for the first time, including responses from nations outside of North America.

This section explores the history of ratio study surveys, provides historical perspective on the availability of standardized ratio study guidance, and describes the development of the 2022 survey and its comparison with survey responses over time.

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History of Ratio Study Surveys

Although the direct involvement of the IAAO in ratio study surveys dates only from 2008, attempts to systematically survey national or international ratio study practices can be traced to at least 1975, when Dennis Deegear, then with the Texas Legislative Property Tax Committee, conducted the first known comprehensive survey with wide participation from U.S. states. A comprehensive survey was conducted in 1984 by Robert Gloude-mans, then with the Arizona Department of Revenue, with responses from 44 states. Beginning in 1983, Alan Dornfest, with the Idaho State Tax Commission, periodically conducted comprehensive U.S. surveys, adding Canadian provinces and territories in 1989. Although IAAO staff helped with the 1997 and 2003 surveys, the product was not adopted as a formal IAAO-sponsored task until 2008 when the survey was assigned to the Technical Standards Committee. That assignment has now been transferred to the Research and Standards Committee.

Availability of Standardized Ratio Study Guidance

Historically, little written material was available to provide a basis for standardization of ratio studies. The early literature includes a 1924 bulletin of the Kansas State Agricultural College titled, “Assessment and Equalization of Farm and City Real Estate in Kansas” (Agricultural Experiment Station 1924); a more systematic 1954 Federation of Tax Administrators publication titled, “Guide for Assessment-Sales Ratio Studies” (Committee on Sales Ratio Data 1954); and a U.S. Census Bureau series of publications begun in 1957 and continued every five years through 1982 titled, “Taxable Property Values and Assessment/ Sales Price Ratios” (U.S. Department of Commerce 1985). By the late 1970s, IAAO was providing guidance through materials including the *Improving Real Property Assessment* textbook (Almy 1978). This soon was followed by the first IAAO Standard on Ratio Studies, published in 1980 (IAAO 1980). By 1990, “the IAAO Property Appraisal and Assessment Administration” textbook (Eckert, Gloude-mans, and Almy 1990) and an updated Standard on Ratio Studies (IAAO 1990) were available and were soon in wide circulation. There is now a 2013 version of the Standard on Ratio Studies (IAAO 2013) that reflects minor updates to the 2010 revised standard (IAAO 2010), and a 2011 publication, *Fundamentals of Mass Appraisal* (Gloude-mans and Almy 2011), that replaced the 1999 *Mass Appraisal of Real Property* (Gloude-mans 1999).

The survey is the first following the adoption of the 2013 Standard on Ratio Studies, and one of the key goals is to assist the Committee in evaluating the usefulness of guidance found in that Standard. Although these materials present many unified themes for ratio study practices, disparities in use and terminology still exist and make interpretation of survey responses somewhat subjective. The authors of this report attempted to address this problem by personal follow-up contacts with many of the participants in the survey. Many of these follow-up interviews were conducted by Kathlynn Ireland, on the staff of the Idaho State Tax Commission.

Survey Development

The 2022 Ratio Study Survey is the first conducted by the Research and Standards Committee following on the heels of three that were conducted by the IAAO Technical Standards Committee. Many of the prior questions were retained to permit longitudinal comparisons. New questions were developed in response to emerging issues, such as whether the provision in the Standard requiring no more than 5% difference in level between individual strata and the overall level in the jurisdiction is being adopted by jurisdictions. Some questions were eliminated because they weren’t applicable at present.

In addition, the current survey was conducted as an online survey over the Web using the Survey Monkey® survey tool. Requests to respond to the survey were sent via e-mail with an embedded link to the IAAO Web page.

Responses were received from most Canadian provinces and U.S. states, the District of Columbia, two Hawaiian counties and one county in Delaware. Participation from these areas was similar to that in 2013. In addition, four nations outside of North America participated for the first time in 2022. A text version of the online survey, showing the original questions in their entirety, is provided in appendix A.

Comparison with Previous Surveys

Because of the continuing nature of this survey in North America, it is possible to report not only on U.S. state and Canadian provincial practices but also on progress toward the incorporation of professionally accepted best practices. This latest 2022 survey shows, with a few exceptions, a continuation of trends noted in the 2008, 2011, and 2013 surveys especially regarding the increasing use of vertical uniformity standards by states and provinces. There was also a notable trend in both Canada and the United States for greater use of confidence intervals in determining compliance with standards for assessment level. There was also an increase in the number of states and provinces using the IAAO vertical equity standards based on the PRD and calculating the PRB.

Table 1 shows previously asked questions that were deleted in 2013 as well as new questions. Appendix B presents a comparison of the number of states and provinces responding to each question beginning with the 1994 survey. Results shown previously for a question relating to statistical measures used for both direct and indirect equalization are not included in this table. The question was substantially reworded in 2008, when it was split into separate questions about direct and indirect equalization. There is therefore no long-term comparability. Results of the separate questions are shown beginning in 2008.

Table 1.

Questions on 2013 survey deleted in 2022
9. What was the assessment date tested with the state or province's most recent ratio study?
21. Are blanket or global adjustments made to sales prices prior to computing ratios? (For example, some jurisdictions adjust all prices down by one percent in an attempt to adjust for personal property that is difficult to isolate sale by sale; others might adjust all sales by ten percent for financing considerations.)
40. Do you have a statutorily defined level(s) of assessment?
61. What software does your agency use for ratio studies? (check all that apply)
62. Do you currently use any foreclosure-related sales in your ratio studies?
Questions new to 2022 survey
7. Please indicate any concepts from the IAAO Standard on Ratio Studies that have been incorporated into your guidelines.
40. Do you have a limit in the difference in appraisal level permitted between classes of property and the overall level in the jurisdiction? For example, where the overall level of appraisal is 98%, if residential property were at 104%, it would be more than 5% difference and would not comply with IAAO Standard on Ratio Studies. (Ratio Study Standard Section 11.1.2)
60. Some jurisdictions are seeing rapidly changing market conditions. With this in view, are you:

Survey Limitations

In reports on results of previous ratio study surveys (Dornfest 1993, 1995, 1997; Dornfest and Thompson 2004; Technical Standards Committee 2009, 2012), a great deal of confusion regarding ratio study terminology, techniques, standards, and use was noted. A certain amount of confusion is probably unavoidable, resulting from long-standing practices and local statutory guidelines, both of which are difficult to change.

After reviewing responses and clarifying feedback, the committee notes the following limitations because they may affect interpretation of trends among surveys:

- Forty-eight states, the District of Columbia, two Hawaii counties, one Delaware county, eight Canadian provinces and four nations (or states) outside of North America (The Netherlands, Estonia, Western Australia, and New Zealand) responded in 2022. The 2013 data was used to fill in gaps for some states. Significant changes were considered unlikely in these jurisdictions.
- Hawaii and Delaware are unique in that they do not provide state oversight for local assessments. Responses for these states were from local jurisdictions and reflect local, rather than state, practices.
- Western Australia responses should be taken as indicative of practices in that Australian state. It is not known how closely these practices reflect the practices in other Australian states.
- Value-related fees (i.e., transfer taxes) are shown in Appendix C and D.
- In addition to questions that were deleted or added (table 1), some questions, over time, have been reworded substantially so that comparisons with prior years' results are not meaningful. This issue affects areas such as reliability and equalization.
- Despite an attempt by the committee to reword questions to eliminate confusion, some questions remained difficult for respondents to correctly interpret the committee's intent. This situation led to inadvertent mistakes in tallies of responses. In particular, the following concerns should be noted:
 - Reliability means use of confidence intervals and similar statistics for testing appraisal level or uniformity and compliance with standards. States and provinces that indicated they judge reliability other than by recognized statistical measures were not included as using reliability statistics.
 - Beginning in 2022, the question designed to establish the frequency of ratio studies (question 3) was reworded deleting the word *required*. Consistency with prior survey responses cannot be assured.
- States with multiple oversight agencies sometimes answered equalization and similar response type questions for one, but not the alternate agency (such as a state board of equalization). The intent of the survey was to establish and confirm state practices, regardless of specific implementing agency, so we tried to correct these inconsistencies when they were discovered.
- Some states may conduct ratio studies with different standards, depending on the timing and intended use of the study. It is not always clear in the responses whether the standards indicated apply universally.
- Responses have been categorized to distinguish between state-mandated and statewide-implemented procedures to the extent possible. In some cases, it is possible to make a distinction between these two possibilities from the answers,

for example, if a state’s laws permit the ordering of adjustments to locally determined assessments but the state has not used this provision.

- There appears to have been a significant decline in the number of states incorporating parts of the IAAO Standard on Ratio Studies in their statutes, rules, or regulations. This may be a misinterpretation resulting from adding a new, subsidiary question in 2022. That question asked whether states incorporated parts of the Standard into guidelines. As this second question was not available in previous surveys, states may have answered yes to the more legalistic question that was available even though they may only have had less legalistic procedures and guidelines. This should be explored more thoroughly in future editions of this survey.
- As in 2008, 2011, and 2013, questions about reliability and confidence intervals were not divided into direct and indirect equalization uses. This diminishes the accuracy of responses to this set of questions when states or provinces use point estimates for one type of equalization but not for another.
- Questions about methods used to detect sales chasing were reworded in 2011 and the same format was used in 2013 and 2022. The 2008 survey asked respondents to rank the different methods according to “first choice, second choice, and so on.” This was not very meaningful, and the subsequent surveys asked only which methods were used.

Responses from U.S. States and Canadian Provinces

Table 2 shows the response rate of ratio study surveys since 1989. Key findings from U.S. and Canadian responses to major survey issues are summarized in table 3. Major ratio study practices and trends are presented beginning in 1989. Because there are fewer Canadian provinces than U.S. states and the number of Canadian respondents has fluctuated considerably, numerical comparisons with previous provincial surveys may be misleading.

Appendix B presents a detailed tabulation of U.S. and Canadian responses from the 1994, 1997, 2003, 2008, 2011, 2013, and 2022 surveys. This material enables comparisons among responses from various years (keeping in mind the provisos regarding the rewording of questions). The other International responses are included, however comparisons to prior surveys do not apply.

Table 2. Response Comparison from U.S. and Canadian Provinces

Survey Year	U.S. States		Canadian Provinces/Territories		International	
	Number	Percentage	Number	Percentage	Number	Percentage
1989	48/51	94%	10/12	83%		NA
1992	47/51	92%	10/12	83%		NA
1994	46/51	90%	7/12	58%		NA
1997	51/51	100%	11/12	92%		NA
2003	51/51	100%	12/13	92%		NA
2008	51/51	100%	11/13	85%		NA
2011	51/51	100%	9/13	69%		NA
2013	43/51	84%	8/13	61%		NA
2022	51/51a	100%	8/13	61%	4	NA

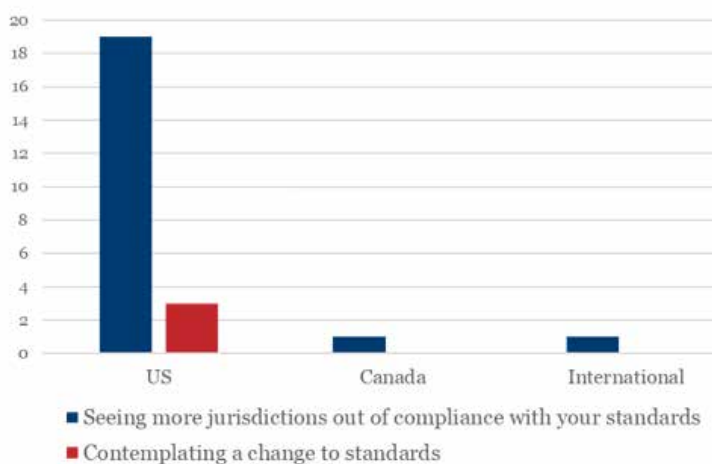
a - Includes D.C. and HI counted once, two responses

Based on this data, the typical ratio study program is likely to include the following features:

- An annual ratio study of real property is conducted at the state or provincial level.
- Sales or a mix of sales and appraisals of real property are used to develop the ratio study.
- There is statutory authority to require disclosure of sale prices to administrative jurisdictions by means of mandatory disclosure and/or transfer fees, especially in Canada where each province has mandatory disclosure. Note that 3 of the 4 non-North American respondents also have mandatory disclosure of sale prices.
- Adjustments to sale prices are made primarily for personal property included in the sale price and time.
- U.S. results are used primarily to equalize funding, advise local officials of assessment conditions, and determine the need for reappraisal.
- Secondary uses of significant frequency are adjusting locally determined values, equalizing assessments of centrally assessed properties, and approving tax rolls.
- In comparing states with authority to order adjustments with those ordering adjustments, the former has been relatively consistent over time, while the number of states actually ordering adjustments reached an all time high as reported in 2022. This is likely more related to the current market circumstances, demonstrated in the chart below, than to structural changes.

Question 60

In view of the current rapidly changing market conditions in your jurisdiction, are you:



- While the number of states reporting the use of ratio studies to equalize centrally assessed properties dropped sharply from 17 in 2008 to 8, both in 2011 and 2013, this number increased to 18 in 2022 – a number more consistent with 2008 and prior survey results.
- A growing number of U.S. states use IAAO level standards for their local jurisdictions.

- IAAO uniformity standards are usually used to gauge local jurisdiction performance.
- A growing number of U.S. and Canadian respondents indicate using confidence intervals for compliance determination.
- Canadian results are used primarily to monitor valuation accuracy. Note that a number of Canadian provinces are the assessing authority.

Table 3.

						UNITED STATES									
						Number of Responses									
2003	2008	2011	2013	2022	Survey Year>	1989	1992	1994	1997	2003	2008	2011	2013	2022	
Q No.	Q No.	Q No.	Q No.	Q No.	Topic Total Responses>	48	47	46	51	51	51	51	43a	51	
2	3	3	3	3	Annual ratio study	35	37	35	41	41	43	43	44	44	
3	4	4	4	4	Conducted by state/province/ territory	29	24	26	29	38	44	44	42	44	
4	5	8	7	8	Only sales used in ratio study	19	15	20	23	25	31	30	28	26	
5a	94	69	54	53	Personal property ratio study	6	10	9	8	7	6	6	6	7	
6a	100	NA	NA	NA	Intangible personal property exemption	NA	32	25	32	38	40	NA	NA	NA	
7	12	74	58	57	Procedural audits in lieu of ratio study	NA	11	19	17	22	2	2	2	3	
NA	11	72	56	55	Procedural audits used	NA	NA	NA	NA	NA	32	25	26	28	
8a	16	20	14	14	Full disclosure of sales prices	24	33	30	35	37	36	37	37	42	
Sale Price Adjustments (used)															
9	26	29	19	19	Time	11	13	14	15	18	21	23	23	26	
9	26	29	19	19	Financing	13	10	16	16	15	11	12	10	NA	
9	26	29	19	19	Personal property	28	26	31	32	26	30	27	25	27	
Equalization Adjustments (Authority)															
11c	30	51	38	37	Order reappraisal	12	20	22	31	31	28	30	33	29	
12	34	49	36	35	Trend by category	18	16	11	14	13	16	15	15	10	
12c	34	49	36	35	Give local officials a grace period	NA	NA	2	12	3	12	25	10	10	
12d	34	49	36	35	Other	NA	NA	11	4	10	12	16	16	14	
13a	48	57	44	43	Uniformity Standards for COD/COV	24	26	32	34	38	40	31	33	30	
13a	48	57	44	43	More stringent than IAAO	3	1	6	1	5	6	3	0	2	
13a	48	57	44	43	Less stringent than IAAO	18	9	21	23	21	11	5	4	4	
13a	48	57	44	43	No standard	23	20	18	17	13	12	20	18	20	
13a	48	57	44	43	IAAO standard for one or more types	NA	NA	NA	NA	23	23	26	29	29	
13b	55	58	45	44	Vertical Equity Standards for PRD	NA	11	11	18	22	27	28	30	31	
13b	57	58	45	44	IAAO standard: PRD = 0.98–1.03	NA	2	8	12	17	23	25	25	29	
13b	57	58	45	44	Standard range differs from IAAO	NA	9	3	4	5	4	3	5	2	
13b	57	58	45	44	No standard	NA	34	35	34	28	25	23	21	21	
NA	NA	NA	46	45	Computes the PRB	NA	NA	NA	NA	NA	NA	NA	5	6	
Testing Assessment Level															
14a	35	53	41	39	Statutory +10%	17	10	11	15	16	16	19	21	25	
14a	35	53	41	39	Statutory +5%	6	5	5	6	6	4	5	5	7	
Assessment Level															
16	70	NA	NA		100% market value for residential	14	27	17	22	23	26	NA	NA	NA	
NA	NA	53	40	NA	Statutorily set assessment level	NA	NA	NA	NA	NA	NA	43	43	NA	

Table 3., continued

						CANADA										Int'l
						Number of Responses										
2003	2008	2011	2013	2022	Survey Year>	1989	1992	1994	1997	2003	2008	2011	2013	2022	2022	
Q No.	Q No.	Q No.	Q No.	Q No.	Topic Total Responses>											
2	3	3	3	3	Annual ratio study	6	4	1	6	8	8	7	7	5	3	
3	4	4	4	4	Conducted by state/province/territory	3	2	6	3	7	10	9	9	6	3	
4	5	8	7	8	Only sales used in ratio study	5	6	5	8	8	10	8	10	8	1	
5a	94	69	54	53	Personal property ratio study	0	0	0	0	0	0	0	0	0	0	
6a	100	NA	NA	NA	Intangible personal property exemption	NA	7	3	4	6	3	NA	NA	NA	NA	
7	12	74	58	57	Procedural audits in lieu of ratio study	NA	5	2	3	3	1	0	0	1	0	
NA	11	72	56	55	Procedural audits used	NA	NA	NA	NA	NA	6	8	7	4	3	
8a	16	20	14	14	Full disclosure of sales prices	5	7	6	9	11	11	9	9	8	3	
Sale Price Adjustments (used)																
9	26	29	19	19	Time	2	8	4	9	4	6	7	6	7	2	
9	26	29	19	19	Financing	2	6	3	8	5	4	4	4	NA	NA	
9	26	29	19	19	Personal property	3	7	6	9	4	7	5	6	5	2	
Equalization Adjustments (Authority)																
11c	30	51	38	37	Order reappraisal	1	2	2	1	1	0	2	4	2	1	
12	34	49	36	35	Trend by category	3	6	1	2	1	0	1	1	1	2	
12c	34	49	36	35	Give local officials a grace period	NA	NA	0	2	1	1	1	0	0	2	
12d	34	49	36	35	Other	NA	NA	6	3	0	0	0	2	0	0	
13a	48	57	44	43	Uniformity Standards for COD/COV	4	5	2	8	9	8	7	5	7	3	
13a	48	57	44	43	More stringent than IAAO	2	0	1	1	4	2	0	0	0	1	
13a	48	57	44	43	Less stringent than IAAO	NA	NA	3	6	3	0	0	0	2	0	
13a	48	57	44	43	No standard	6	3	2	3	3	3	0	5	1	1	
13a	48	57	44	43	IAAO standard for one or more types	NA	NA	NA	NA	5	6	7	5	5	2	
13b	55	58	45	44	Vertical Equity Standards for PRD	NA	2	2	4	6	5	6	6	5	3	
13b	57	58	45	44	IAAO standard: PRD = 0.98-1.03	NA	1	2	2	5	5	6	6	5	3	
13b	57	58	45	44	Standard range differs from IAAO	NA	1	1	1	1	1	0	0	0	0	
13b	57	58	45	44	No standard	NA	8	4	7	6	5	3	4	3	1	
NA	NA	NA	46	45	Standard for PRB	NA	NA	NA	NA	NA	NA	NA	0	2	6	
Testing Assessment Level																
14a	35	53	41	39	Statutory +10%	3	2	1	4	1	3	3	6	4	1	
14a	35	53	41	39	Statutory + 5%	0	2	2	2	2	2	3	2	4	1	
Assessment Level																
16	70	NA	NA		100% market value for residential	5	5	6	6	8	9	NA	NA	NA	NA	
NA	NA	53	40	NA	Statutorily set assessment level range	NA	NA	NA	NA	NA	NA	5	3	NA	NA	

- Results are calculated on the basis of samples for which there is generally no predetermined minimum size.

Detailed Responses

Appendix C presents the detailed responses from each U.S. state, and appendix D lists the responses for each Canadian province. Appendix E lists the responses for each respondent outside North America. These tabulations provide a complete rendition of responses, except in a few instances in which it became evident from the responses that the wording of the question may have caused confusion. In these instances, the responses are judged as not meaningful and are not reported in the tables.

Table 4.

Question Number	Description of Topic
5	How ratio study is used
8,9	Comments on use of sales and appraisals in ratio study
10	Comments on time period for ratio study sales
13	Description of sales validation audit policy
16	Description of transfer tax
20	Methods used for time adjustments
22	Comments on sample size goals
26,27	Comments on use of confidence intervals to test appraisal level
28	Alternate vertical equity methods
29	Describe vertical equity corrective actions
33	Comments on outlier trimming procedures
34	Maximum percentage of sales that can be trimmed
35	Methods used to order adjustments to locally determined values
39	Specific standards for appraisal level
40	Describe limit on appraisal level between classes
41	Methods or authority for setting appraisal level standards
42	Alternate horizontal; equity methods
43	Specific standards for uniformity based on the COD
44	Specific standards for vertical equity based on the PRD
45	Specific standards for vertical equity based on the PRB
46	Description of actions resulting from failure to meet uniformity standards
51	Comments on techniques used to test sales chasing
52	Comments on lower limit for COD as indicator of sales chasing
54	Uses of personal property ratio studies
56	Types of property subject to procedural audits
57	Comments on use of procedural audits instead of ratio studies
58	Uses of procedural audits
60	Describe actions to respond to rapidly changing market conditions
61	Comments on new issues, recent changes and court cases related to ratio study
62	Comments on survey

Several of the questions presented respondents an opportunity to elaborate on procedures or circumstances (see table 4). Many of these more elaborate answers have been included in appendices C, D, or E of this report. Often, these questions were discretionary or did not apply to certain jurisdictions. As a result, responses are included only for certain states and provinces.

Raw data from the survey is available on the IAAO website at IAAO.org in the Resources drop down menu under IAAO Surveys. See: https://www.iaao.org/wcm/Resources/Surveys/wcm/Resources_Content/Library/IAAO_Surveys.aspx?hkey=3bb5dda9-3e4b-4f92-b475-6c17404d83de, last accessed January 16, 2023.

Recent Trends in the United States

Within the limitations noted, the questions in the current survey and the number of responding jurisdictions were similar to those in previous ratio study surveys. While respecting the constraints and other concerns noted, the authors were often able to compare changes in U.S. ratio study practices over time.

General Trends

The number of states performing annual ratio studies remained at 44 as reported in 2013. Many states combine sales and appraisals although most use sales only. There is little change in this area. As was reported in 2011 and 2013, only California still bases its ratio study exclusively on appraisals. In this state, assessed value only equates to market value upon a property's sale or when current market value is less than or equal to the adjusted sale price, so assessments in general do not reflect market value as indicated by sale prices.

The number of states performing personal property ratio studies increased from six to seven. This is the first increase in this area since 2003 and reflects new “yes” answers by Michigan and Wisconsin, while California did not provide an answer (it had been yes in 2013).

The number of states conducting procedural audits decreased from 32 in 2008 to 25 in 2011, increasing slightly to 26 in 2013 and again to 28 in 2022. Only two states, Mississippi and Washington, now indicate that they conduct such audits instead of ratio studies (likely for selected classes of property). Procedural audits typically are conducted to provide information about selected property categories for which there is little market activity or when use value and other constraints not directly related to the market are in place. The results of procedural audits may be used to determine compliance. The number of states ordering equalization or reappraisal from procedural audits decreased from eight in 2011 to four in 2013, but bounced back to nine in 2022.

Disclosure of Sale Price to Government Jurisdictions

There are three elements of disclosure: full mandatory sales price disclosure, transfer fees, and mandatory recordation of any transfer instrument. There are 4 states that do not require any of these elements as statewide policy: Idaho, Missouri, Texas, and Utah. However, the limitation is not as severe in Missouri because several major local jurisdictions have full disclosure; thus, only parts of the state are without sale price disclosure requirements.

Many states have transfer taxes based on sale price. Some of these states also have full disclosure. In the case of Louisiana, and Mississippi, a value-based transfer tax is reported although there is no formal disclosure law.

Although mandatory recordation does not provide complete information, the number of states reporting this element of disclosure increased from 28 in the 2011 survey to an all-time high of 42 in 2022.

Sampling Issues

In terms of the sales period used for ratio study sales, two more states indicate using periods overlapping the assessment date than in 2013. However, only five states now use a period mostly after the assessment date as opposed to 11 which did so in 2011 and six in 2013; 7 states use an overlapping period now as opposed to nine in 2011 and 5 in 2013.

The number of states reporting use of adjustments to sale prices is similar to that reported in the last several surveys. However, questions about financing, closing costs, and brokerage fee adjustments were not asked in 2022.

With regard to methods used for determining time adjustments, the number reporting tracking ratio study trends remained at 21 as in 2013.

Florida allows a significant overall adjustment to assessed values and sales prices.

Use of Ratio Studies

The ratio study has traditionally been used in an advise-and-assist role. There is little change in the number of states reporting this use from 2008 to 2022.

There was an increase in the number of states reporting using ratio studies to order adjustments to locally determined assessed values or ordering local jurisdictions to reappraise.

Among the most significant changes was a large increase (eight to 18) in the number of states using ratio studies to adjust or equalize centrally assessed properties. Along these lines, the number of states indicating use of orders to adjust locally set values grew from seven in 2013 to 23 in 2022. This higher number was more similar to numbers reported in 2008 and 2011 and may reflect sales price related economic activity during these periods. Interestingly, the number of states indicating use of direct equalization or trending orders applied by class or category of property decreased from 15 in both 2011 and 2013 to 10 in 2022. Conversely, the number trending jurisdiction wide increased from two in 2013 to four in 2022. Previous surveys have shown that the number of states that would apply trends to individual categories of property has varied considerably over time. Regarding reappraisal orders, 24 states now indicate that as a purpose of their ratio studies, but only 11 indicate issuing such orders.

States using ratio studies to adjust locally determined assessed values often have reported giving local officials a grace period to reach compliance. Eleven states reported use of grace periods in 2022.

The number of states reporting using ratio studies to approve the tax roll increased from nine to 14 between 2013 and 2022.

Uniformity Standards

The number of states reporting standards for horizontal uniformity decreased from a high point of 40 in 2008 to 33 in 2013 and 30 in 2022.

Generally, standards in use are similar to those recommended in the Standard on Ratio Studies (IAAO 2013). General uniformity standards are based predominantly on the coefficient of dispersion (COD). Although 10 states calculate the coefficient of variation

(COV), only 2 states, Florida and Utah, indicate that compliance is based on this statistic. By contrast, 47 states calculate the COD, and 25 use it as a basis for compliance with uniformity standards.

The number of states that have developed price-related differential (PRD) standards continues to increase, from 28 in 2011 to an all-time high of 31 in 2022. Also on the increase is the number of states using the IAAO recommended range of 0.98 – 1.03. This count reached an all-time high of 29 states in 2022. This represents the most widely used guidance found in the IAAO standard.

Six states indicate they have standards based on the price-related bias (PRB) statistic. Three of these indicate specific compliance thresholds related to the IAAO Ratio Study Standard.

Thirty-six states report that they can initiate action on the basis of poor uniformity. The most typical action is ordering reappraisal, which can be done in 23 of these states.

Twenty-three states indicate that they test the reliability of the COD. This grew slightly from 21 in 2013. In addition, 14 now test the reliability of the PRD and this was a marked increase from seven in 2013. There was significant growth in the number of states indicating that uniformity related compliance decisions would be based on confidence intervals. This year, 19 states indicated taking reliability into account when making decisions or determining compliance with uniformity standards. In 2013, only 10 states reported using confidence intervals in this regard.

Level Standards

A level standard is defined as the specified range of acceptability around a required assessment ratio. Such ranges may be provided by statute but, more frequently, are established by an administrative or oversight agency. Many states have established ranges of this type. The IAAO Standard on Ratio Studies (2013) recommends a range of –10 to +10% for direct equalization of locally determined values and a range of –5 to +5% for indirect equalization of funding distributions. The number of states using the $\pm 10\%$ parameter grew from 16 in 2008 to an all-time high of 25 in 2022, while the number using the $\pm 5\%$ parameter increased from five in 2013 to 7 in 2022. Overall, the number of states with some allowable variance dropped slightly 43 in 2013 to 40 in 2022.

Reliability of Level Statistics

When the principles of statistical sampling error are applied, ratio studies tend to be more reliable for large, uniform samples and less reliable when these conditions are not met. The number of states indicating they test reliability and use this information for compliance purposes appears to have increased in 2013 and again in 2022 following a low point in 2011. Since that time, this number has risen from 14 to 23 states. Only point estimates are used in 29 states.

Since 2008, the survey has examined a special situation in which lower levels of confidence or point estimates might be appropriate, as described in the IAAO Standard on Ratio Studies (2010, 2013). To do this, the survey asked whether a decision based on reliability statistics could be based on point estimates or lower levels of confidence given long-standing noncomplying point estimates. This practice has been the recommendation in the IAAO Standard on Ratio Studies since 1999. Few states have adopted this provision with only two states (Idaho and New York) using lower using lower degrees of confidence and four states (Iowa, Illinois, North Dakota, and Nebraska) switching from confidence intervals to point estimates in these cases in 2022.

Measures of Assessment Level

States typically compute three measures of level: the mean, the median, and the weighted mean. Although similar numbers of states compute these statistics, either the median or the weighted mean predominates for equalization purposes. Beginning in 2008, the survey further distinguished between statistics used for direct and indirect equalization.

There is an emerging trend toward fewer states reporting using the median for direct equalization. Numbers have fallen from 25 in 2008 to 17 in 2013 to 14 in 2022. However, this should be explored further as there were only small increases in the reported use of any of the measures and it is not clear whether the movement was away from the median or, simply, away from the need to do direct equalization. Similarly, for indirect equalization, all measures of level had lower use reported.

Additionally, there was a notable increase in the number of states reporting that they calculate the weighted mean. This number increased from 29 in 2013 to 39 in 2022 — a number more reminiscent of numbers reported in 1997 and 2003 surveys.

The IAAO Standard on Ratio Studies (2010, 2013) differentiates between direct (change property values) equalization and indirect (alter funding) equalization, suggesting that the median is more appropriate for the former and the weighted mean, conceptually, is more appropriate for the latter.

Outliers

The 38 states indicating in 2022 that they identify outliers is slightly larger than those reporting such identification in previous surveys. Since 2008, the survey has been expanded to explore methods of outlier identification and trimming. This year, for the first time in these surveys, use of the interquartile range (IQR) method presented in the Standard on Ratio Studies (IAAO, 2013), has tended to be predominant, growing from 9 states using the 1.5XIQR formula and 6 states using the 3.0XIQR formula to 14 and 11 states, respectively.

Sales Chasing

The number of states with statutory requirements for testing for sales chasing increased to 8 in 2022 after only 3 reported such statutes in 2013. In addition, 13 states have non statutory requirements to test for sales chasing, up from 11 in 2013.

The number of states testing samples for sales chasing decreased slightly from 30 in 2013 to 28 in 2022. This question was revised in 2011 to enable states to list methods employed for detecting sales chasing. In 2022, the most commonly used technique remains comparison of average percentage appraised value changes on sold and unsold parcels; 24 states report use of this method. The number of states establishing a lower limit on the COD as a possible indicator of sales chasing has continued to increase from six in 2011 to eight in 2013 to 11 in 2022. In 2013, four states indicated following IAAO guidance and use a lower limit of five on the COD; this detail was not captured in the 2022 survey.

Sample Size

Uncertainty continues regarding any minimum sample size standard that should be used for evaluating assessment performance based on a ratio study.

There is considerable variance among jurisdictions which has not changed significantly in the past several surveys of this subject. The most common answer currently is for the minimum to be between five and nine sales (or observations).

Legal Action

The number of states indicating that legal action could result from ratio studies grew from 21 in 2013 to 26 in 2022, This remains considerably fewer than the 37 states citing this possibility in 2003. In 22 states, taxing jurisdictions can initiate legal actions using ratio study results, while in nine states, taxpayers can initiate such actions.

Recent Trends in Canada

Responses to this year’s survey were received from eight of the 10 Canadian provinces but no territories. Quebec and Prince Edward Island did not participate in the 2022 survey. In the few instances in which significant trends were apparent, they have been noted. In other cases, the general nature of Canadian ratio studies is discussed with comparison in some instances with U.S. practices.

General Trends

The number of provinces performing annual ratio studies appears to have decreased from 7 in 2013 to 5 in 2022. This may be misleading however, since the two provinces that did not participate this year, both indicated annual studies in 2013. Similarly, the number reporting that the ratio study is performed at the provincial level decreased from nine to six while the number reporting local or contracted studies was unchanged at one each. Some decreases in Canadian responses are due to elimination of provinces that did not respond in 2013, but were included in results reported for that year based on 2011 responses.

In the 2022 survey, all Canadian respondents indicate that ratio studies are based solely on sales samples.

Personal property is known to be exempt in most provinces. None of the provinces conduct personal property ratio studies.

Four provinces report using procedural audits. This response reflects a decrease from the seven provinces reporting this use in 2013.

Disclosure of Sale Price

All Canadian provinces report having full disclosure and transfer fees. All but Newfoundland report mandatory recordation.

Sampling Issues

In terms of sample selection, provinces were split evenly with four reporting provincial and four reporting local selection. Validation was also split along these lines. The number of provinces using multiple years of sales grew from two in 2013 to five in 2022. In terms of sales period, five provinces indicate using sales occurring mostly before the assessment date, while none reported use of overlapping periods or sales occurring after the assessment date.

Adjustments for time and personal property are the most common (seven and five provinces, respectively) and occur at about the same relative frequency as in the United States. Time adjustments are usually made by tracking trends in ratios over time. This is the main method reported in six provinces.

Use of Ratio Studies

Ratio studies are predominantly used as a tool to advise local jurisdictions or to assist mass appraisal programs, with these uses reported in seven and four provinces, respectively. Alberta and New Brunswick report use to adjust locally determined values — note that Prince Edward Island had reported this use in 2013 but is missing from the current survey responses. In addition, Alberta remains the only province to indicate use of ratio studies to equalize provincial funding of local jurisdictions. Previously, Quebec had reported such use. Only Alberta reports using the results to order local jurisdictions to reappraise. Saskatchewan had indicated such use in 2013. Alberta also indicates using ratio studies to adjust utility (centrally assessed or linear property) values. Alberta and New Brunswick indicate ordering adjustments to locally determined values in the past three years.

Level and Uniformity Standards

Use of uniformity standards in 2022 grew slightly from five in 2013 to six in 2022. Seven of the reporting provinces use standards similar to those in the IAAO Standard on Ratio Studies (2010, 2013), although two also have some standards that are more stringent.

Five provinces indicate vertical equity standards based on the PRD and all of these continue to report use the 0.98–1.03 range in the IAAO Standard on Ratio Studies (2010, 2013). The number of provinces using the PRB grew from one in 2013 to five in 2022, with four of these indicating use of the suggested ranges found in the IAAO Standard. This represents one of the most significant changes that can be tied directly to advice given in the IAAO Standard, especially as this advice was only incorporated into the Standard in 2013.

In 2013, three provinces indicated that they could initiate reappraisal action based on uniformity. In 2022, only Alberta indicated that reappraisal action could be initiated on this basis.

The number of provinces reporting use of specified allowable variance ranges for assessment level was eight in 2022 and had been 10 in 2013. Of these, four use a range of –10 to +10% for this purpose (a decrease from six provinces in 2013). Four provinces use a tighter range of –5 to +5%.

Reliability

In 2022, 4 provinces indicate using confidence intervals to determine compliance with assessment level standards. None of these provinces, however, use ratio studies in other than an advise-and assist function. No province indicates that it lowers the level of confidence needed to find noncompliance after the calculated (point estimate) measure of level has been out of the desired range for several years.

The number of provinces testing the reliability of the COD and PRD decreased in 2022 from five to three for the COD and from three to two for the PRD. No province reports that a reappraisal decision would be based on confidence intervals or other reliability measures.

Measures of Assessment Level

Canadian use of the various measures of assessment level is similar to that in the United States; however the median stands out in being used in every reporting province, while the mean is reported in just 2 provinces and the weighted mean in just three provinces.

In Canada, assessment functions tend to be more concentrated at the provincial level or are carried out by quasi-governmental corporations that operate within the province. This practice has led to less use of ratio studies for equalization than in the United States. Therefore, compilations of statistics regarding measures of level used for various types of equalization are not very meaningful. Regardless, in the one province reporting indirect equalization (Alberta), the weighted mean is used for this purpose.

Normality

Only 2 provinces indicated testing ratios for normality. This represents a decrease from five reporting this use in 2013 and as far back as 2008 .

Outliers

Five provinces indicated testing for outliers. Of those, three indicated using the IQRX1.5 range while one uses the IQRX3 range. Whereas only one province indicated placing a limit on trimmed outlier sales in 2013, this number grew to 4 in 2022.

Sales Chasing

While no province indicates statutory requirements for testing for sales chasing, 3 provinces, Alberta, Saskatchewan, and Nova Scotia, now have informal requirements. In addition, 5 provinces indicate using low CODs as an indicator of probable sales chasing. All reporting provinces indicate comparing average assessed value changes on sold v. unsold properties as a way of detecting sales chasing, regardless of any such testing requirement.

Sample Size

Minimum sample size requirements generally are similar to those in the United States, with four provinces reporting use of no fewer than five to nine sales in a sample.

Legal Action

No province reported ability to initiate legal action as a result of ratio studies in 2022. In 2013, such ability was reported in both Alberta and Nova Scotia.

International responses outside North America

For the first time in 2022, there was outreach to and responses received from oversight agencies outside North America. New Zealand, Western Australia, the Netherlands, and Estonia all responded to the survey and their responses have been compiled and included in the various tables and appendices included with this report.

Of course these results are based on the surveys of just four jurisdictions outside North America and thus cannot be seen as representative for non-North American countries; it is also not possible to distinguish trends in the use of the Standard on Ratio Studies. Therefore, these four international respondents must be considered as a good starting point to get feedback about the use of the standard in non-North American jurisdictions. The ultimate goal is to make the Standard on Ratio Studies more accepted and applied internationally.

Some notable uses and approaches to ratio studies in these international jurisdictions are listed below:

- In 75% of the international jurisdictions ratio studies are used by oversight agencies to approve the tax roll. This percentage is significantly higher than in the

U.S. and in Canada.

- The results of the survey indicate that outside north America the ratio studies are frequently used to issue adjustment or reappraisal orders by oversight agencies.
- Direct or indirect equalization is common in some parts of the US but not applied in The Netherlands, Estonia, New Zealand, or Western Australia.
- Procedural audits seem more common outside North America. They are mostly used to advise or assist assessment jurisdictions and in one case (in The Netherlands) also to approve the tax roll.

Many countries know a form of ad valorem property tax, which usually is part of the tax system of local governments. At the same time there are big differences between property tax systems. In some countries the (recurrent) valuation is done by a centralized organization, while in other countries, the situation is comparable to the situation in the US, where local jurisdictions are responsible for the valuation and there is a form of centralized oversight at a state or national level. This means that the use of the Standard on Ratio Studies is not just a function of oversight agencies, but can also be done by a quality assurance department within an organization.

Although there are major differences between the valuation systems, ratio studies are broadly applicable and differences between systems should not hinder the use of the IAAO Ratio Study Standard. Therefore, IAAO should consider the standard as one of its most important products and, at the same time, be aware that the standard does not have to be taken as an all-or-nothing document. Perhaps IAAO and our survey can assist nations or jurisdictions in understanding this aspect of the standard.

The authors conclude that future surveys should be valuation system independent as much as possible. International places that have centralized valuation should be asked open ended questions about how they oversee valuation model quality using ratio studies and who or what organization (or department within an organization) does these studies and who implements corrective actions, as opposed to the organization doing the valuations.

Conclusions

Ratio studies remain critical for measuring, evaluating, and working toward the improvement of assessment practices in most places. The IAAO Standard on Ratio Studies provides detailed guidance on ratio studies. However, aside from isolated instances, such as the growing use of vertical equity standards based on the PRB in Canada, in the period between 2013 and 2022 no clear continuing trend has emerged of states and provinces adopting the more technical features of the IAAO standard. The report on the 2003 ratio study survey (Dornfest and Thompson 2004) indicated that a growing number of states and province-based assessment level compliance on confidence intervals and suggested that a major change in practice related to this issue might be developing. However, the number of states that base compliance decisions on confidence intervals rather than point estimates actually dropped slightly in 2022 and now matches the 2003 number.

It is also notable that few jurisdictions have adopted what may be more obscure provisions of the Standard, such as restrictions on differences in assessment level between property types (the Standard suggests no more than 5% difference should be allowed) and use of lower degrees of confidence intervals after several years of compliance based solely on higher degrees of confidence.

Along these lines, inconsistencies among the answers to multiple questions on this subject led the authors to conclude that the degree of understanding of statistical reliability measures remains deficient. As reported in 2008, we continue to believe that previous conclusions about trends in the use of such statistics may have been based on incorrect interpretation of survey questions or responses. As a corollary in support of this conclusion, few states and provinces appear to have responded to the recommendation first found in the 1999 Standard on Ratio Studies (IAAO 1999) to lower the level of confidence when long-term inequities are apparent. The lack of response in this area suggests lack of understanding of the underlying statistical measures.

On a more positive note, many states and some provinces are using the methods outlined in the IAAO standard for identifying outliers and for detecting sales chasing. In future surveys, follow-up questions could explore issues of resolution once sales chasing is identified. In addition, the recently adopted price related bias (PRB) statistic has come into wider (but not widespread) use. It will be important to watch for additional use and adoption of this statistic.

General IAAO-recommended standards for level and horizontal and vertical equity have been widely adopted. The 2013 version of the IAAO Standard on Ratio Studies has now been available for nearly 10 years and is in widespread use. Nevertheless, although this IAAO Standard on Ratio Studies continues the tradition of providing valuable guidance and assistance and is widely cited and used, states (more so than provinces) appear slow to adapt or change procedures. It is hoped that this survey will provide focus for U.S. states and Canadian provinces and territories that are attempting to evaluate their ratio study systems as well as work toward internationally recognized guidelines. It also is hoped that these authorities will use survey results as an impetus to become more knowledgeable about the technical aspects of ratio studies that have not yet been incorporated into their practices.

Finally, the 2022 version of this survey marks our first expansion outside North America. Although only four nations outside this continent participated, it is gratifying to see the widespread use of IAAO standards and guidelines on ratio studies, at least in these participating nations. It is an avowed goal to continue to expand the inclusiveness of this survey and take back messages and input from around the world leading toward the development of more comprehensive and applicable standards and guidance. This will only occur with broad participation so that our committees developing and redeveloping our Ratio Study Standard will better understand the needs of all nations in the myriad of areas, concepts and techniques covered.

Acknowledgments

The International Association of Assessing Officers (IAAO) Research and Standards Committee develops and maintains technical standards of professional practice in assessment administration, tax policy, and mass appraisal. The authors of this report also want to acknowledge the support and contributions of this committee which has the responsibility to conduct such surveys. At the time this survey was completed the committee consisted of: Melissa Baer, Larry Clark, Margaret Cusack, Alan Dornfest, Travis Horne, Marco Kuijper, Carol Neihardt, Carmela Quintos, Jennifer Rearich, Michael Safarty, James Russell Thimgan and Douglas Warr.

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Appendix A. 2022 questionnaire for survey of ratio study practices

Q1: Enter your full contact information. (contact information will not be distributed or used except in relation to this survey)

Name (first last):

Title:

Jurisdiction:

E-mail address:

Phone:

Q2: What is your jurisdiction type?

- State agency
- Provincial agency
- National agency
- Territory
- Local
- Other, describe (50 char limit)

Q3. How often does your jurisdiction conduct ratio studies? Indicate if annual or explain other variations.

- Annual
- Not required
- Other, describe

Q4. Who produces the result of the ratio study? (check all that apply)

- State officials
- Provincial officials
- National officials
- Territory officials
- Local officials
- Contracted service provider (university or private company)
- Other, specify (50 char limit)

Q5. How is the oversight ratio study used? (check all that apply)

- To order adjustments to locally determined assessed values if necessary
- To equalize higher-level, government-shared funding of local jurisdictions
- To order local jurisdictions to reappraise
- To advise assessment officials of assessment conditions
- To assist mass appraisal programs
- To approve tax assessment roll
- To adjust or equalize centrally determined assessed values (such as public utilities or railroads)
- Other (please specify)

Q6. Please indicate any concepts from the IAAO Standard on Ratio Studies that have been incorporated into your statutes (legislation) or rules and regulations.

- Not applicable
- Level
- Horizontal uniformity
- Vertical uniformity
- Other, specify (240 char limit)

Q7. Please indicate any concepts from the IAAO Standard on Ratio Studies that have been incorporated into your guidelines.

- Not applicable
- Level
- Horizontal uniformity
- Vertical uniformity
- Other, specify (240 char limit)

Ratio Study Design

Q8. Which of the following does the oversight agency real property ratio study include?

- Sales only
- Appraisals conducted by or contracted by the agency only
- Both sales and appraisals conducted by or contracted by the agency

Q9. If both sales and appraisals are used in the question above, can they be combined in order to study one type or category of property?

- Yes
- No
- If yes, provide any related comments (240 char limit)

Q10. What is the time period from which sales are used in the oversight agency ratio study? (check all that apply)

- One year
- Multiple years
- Flexible time period (varies by jurisdiction or category)
- Sales period mostly before assessment date
- Sales period mostly after assessment date
- Sales period equally before and after the assessment date

Date Acquisition and Screening

Q11. Which agency primarily performs the sales sample selection? (check all that apply)

- Not applicable
- State agency
- Provincial agency
- National agency
- Local agency
- Contracted service provider
- Combination of government levels
- Other, specify (240 char limit)

Q12. Which agency primarily conducts the sales validation (screening)? (check all that apply)

- Not applicable
- State agency
- Provincial agency
- National agency
- Local agency
- Contracted service provider
- Combination of government levels
- Other, please describe (240 char limit)

Q13. If the oversight agency does NOT conduct the sales validation, does the agency perform an audit of the sales validation process?

- Yes
- No
- Not applicable
- If yes - briefly summarize your audit policy (240 char limit)

Q14. Does your jurisdiction have a law requiring disclosure of real estate sales prices to assessment officials?

- Yes, disclosure made to state/provincial/national/territory officials
- Yes, disclosure made to local assessors
- Yes, disclosure made to both
- No

Q15. Are disclosed sale prices public records?

- Yes
- No
- Not applicable
- Other, describe (240 char limit)

Q16. Is a value-related fee charged (e.g., transfer tax, deed stamp) for real property transfers?

- Yes
- No
- If yes - state the rate(s) and describe the structure (400 char limit)

Q17. Does your jurisdiction have a law making recordation/registration mandatory for real property transfers?

- Yes
- No

Sale Price Adjustments

Q18. Is there authority to adjust sale prices in your ratio studies? (check all that apply)

- No authority to implement adjustments
- Time
- Personal property (chattels)
- Intangible personal property
- Other, describe (240 char limit)

Q19. Which of the following adjustments to sale price are used in your ratio studies? (check all that apply)

- Time
- Personal property (chattels)
- Intangible personal property
- Not applicable
- Other, describe (240 char limit)

Q20. Which time adjustment methods are used in ratio studies? (check all that apply)

- Tracking trends in sales ratios over time
- Tracking changes in value per unit over time Analysis of repeat sales
- Not applicable
- Other, describe (240 char limit)

Ratio Study Statistics & Procedures

Q21. Regarding sample size, what is the smallest sample you will use to evaluate any category of property?

- Less than 5 observations
- 5 to 9 observations
- 10 to 19 observations
- 20 to 30 observations
- More than 30 observations
- Other, describe (50 char limit)

Q22. Do you establish sample size quotas or goals (e.g., 3% of parcels in category or a number based on a statistical sample size formula)?

- Yes
- No
- If yes - explain (240 char or less)

23. Check each measure of level that you calculate and indicate if it is used for direct and/or indirect (funding) equalization.

- ARITHMETIC MEAN - calculate
- ARITHMETIC MEAN - use for direct equalization
- ARITHMETIC MEAN - use for indirect equalization
- MEDIAN - calculate
- MEDIAN - use for direct equalization
- MEDIAN - use for indirect equalization
- WEIGHTED MEAN - calculate
- WEIGHTED MEAN - use for direct equalization
- WEIGHTED MEAN - use for indirect equalization
- GEOMETRIC MEAN - calculate
- GEOMETRIC MEAN - use for direct equalization
- Use GEOMETRIC MEAN - use for indirect equalization
- OTHER - calculate
- OTHER - use for direct equalization
- OTHER - use for indirect equalization
- If other measure of level, specify (50 char limit):

Q24. Do you use confidence intervals (CIs) to determine statistical compliance with standards for appraisal level?

- Yes
- No (if no is checked, skip to question No. 28)

Q26. If the calculated level of assessment is 86% with a CI ranging from 76% to 95% for a particular group of properties, would you consider the level to be in compliance?

- Yes (the upper CI overlaps the required minimum level)
- No (the CI does not overlap 100%)
- Additional comments (240 char limit)

Q27. If the calculated level of assessment (point estimate) is out of compliance except for the CI for a particular group of properties, and the calculated level of assessment remains below the required minimum level for several years, which action would your agency take?

- Lower the level of confidence and reevaluate
- Base the compliance decision on point estimates
- Continue to find the jurisdiction in compliance
- Other
- Not applicable (CI not used to determine compliance)

Q28. Which measures or tests of vertical equity do you use? (check all that apply)

- Price-related differential (PRD) calculated
 - PRD used to test for compliance
 - Price-related bias (PRB) calculated
 - PRB used to test for compliance
 - Spearman-Rank calculated
 - Spearman-Rank used to test for compliance
 - Mann-Whitney Test calculated
 - Mann-Whitney Test used to test for compliance
 - t-test calculated
 - t-test used to test for compliance
- Describe any alternate methods used by your agency (240 char limit)

Q29. Are actions taken to correct vertical inequity?

- Yes
- No
- If yes - describe (240 char limit)

Q30. Do you calculate confidence intervals or related tests of statistical significance around any of the following?(check all that apply)

- Coefficient of dispersion (COD)
- Price-related differential (PRD)
- Price-related bias (PRB)
- Not applicable
- Other measurement of inequity, describe (240 char limit)

Q31. If you compute jurisdiction wide ratio study statistical results, how are they made available? (check all that apply)

- Website (Please share URL of site in “Other” choice below)
- Publication
- Not made available
- Not applicable (We do not compute statewide ratio study statistical results)
- Other, explain (240 char limit)

Outlier Trimming

Q32. Do you trim outlier ratios?

- Yes
- No (if no is checked, skip to question No. 35)

Q33. If outliers are trimmed, what procedure do you use? (check all that apply)

- 1.5 X interquartile range
- 3.0 X interquartile range
- Beyond 2 standard deviations
- Fixed symmetric points (e.g., remove ratios $<.50$ or > 1.50)
- Fixed asymmetric points (e.g., remove ratios $<.30$ or > 2.00)
- Good judgment
- Look for logical break points
- Other, describe (240 char limit)

Q34. Is there a limit on the maximum percentage of sales that can be trimmed out of a sample? (e.g., 20%)

- Yes
- No
- If yes, indicate percentage (50 char limit)

Ratio Study Standards & Enforcement

Q35. If you order adjustments to locally determined assessed or appraised values, which of the following procedures are used? (check all that apply)

- Order local officials to apply trending factors to individual classes or categories of property
- Oversight agency modifies assessed or appraised values
- Trend all types of property equally, based on a jurisdiction-wide adjustment factor
- Give local officials a compliance grace period to apply indicated factors
- No authority
- Other, describe (240 char limit)

Q36. In the past three (3) years, what is the average number of jurisdictions found to be out of compliance with appraisal level standards and ordered to adjust locally determined values?

Q37. Do you or another oversight agency have authority to order reappraisal of locally determined values on the basis of ratio study results?

- Yes
- No

Q38. In the past three years, what is the average number of local jurisdictions that have been found out of compliance and ordered to REAPPRAISE locally determined values?

Q39. What are your ratio study standards for a range around the legally required level of appraisal?

- .95 to 1.05
- 0.90 to 1.10
- Other, indicate range (50 char limit)

Q40. Do you have a limit in the difference in appraisal level permitted between classes of property and the overall level in the jurisdiction? For example, where the overall level of appraisal is 98%, if residential property were at 104%, it would be more than 5% difference and would not comply with IAAO Standard on Ratio Studies. (Ratio Study Standard Section 11.1.2)

- Yes
- No
- Other, describe (240 char limit)

Q41. If you have appraisal level standards, how are they set?

- Statute
- Administrative rule or regulation
- Other, describe (50 char limit)

Q42. Which of the following horizontal uniformity measures are calculated or used to make compliance determinations? (check all that apply)

- Coefficient of dispersion (COD) calculated
- COD used to test for compliance
- Coefficient of variation (COV) calculated
- COV used to test for compliance

Q43: If you have specific standards or requirements based on the COD, what is the highest acceptable COD for each of the following categories? (50 char limit per field, enter “NA” for categories that do not apply)

- Residential
- Commercial/Industrial
- Farmland
- Timberland
- Vacant Land
- Other, specify

Q44. If you have a standard for vertical inequity based on the PRD, what is the standard?

- PRD 0.98 to 1.03
- Other, describe (50 char limit)

Q45. Do you have a standard for vertical inequity based on the PRB?

- Yes
 - No
- If yes - describe the standard (50 char limit)

Q46. What actions can your agency initiate as a result of assessment uniformity?

- None
- Order a reappraisal
- Withhold funding
- Other
- Additional comments (240 char limit)

Q47. Is the action dependent upon confidence intervals or related tests of statistical significance?

- Yes, for PRD
- Yes, for PRB
- Yes, for COD
- Yes, for COV
- No (action based on point estimate)
- Not applicable (no action taken)

Q48. In the past three years, what is the average number of times your agency has ordered a jurisdiction to reappraise or withheld funding as a result of assessment uniformity?

Sales Chasing

Q49. Do you have legal requirements to check for sales chasing?

- Yes
- No
- Informal requirement

Q50. Do you test for sales chasing?

- Yes
- No

Q51. If you test for sales chasing, what techniques do you use? (check all that apply)

- Comparison of average percentage changes in appraised values of sold and unsold properties
- Comparison of average unit values of sold and unsold properties
- Split sample technique (using sales before and after the appraisal date)
- Comparison of observed vs. expected distribution of ratios
- Mass appraisal techniques

Q52. Has a lower limit on the COD been established as an indicator of possible sales chasing?

Personal Property Ratio Studies

Q53. Is a ratio study conducted for personal property?

- Yes
- No (If no is checked, skip to question #55)
- Not applicable (If not applicable is checked, skip to question #55)

Q54. How are the results of your personal property ratio study used?

- To order adjustments to locally determined assessed values
- To equalize higher-level government shared funding of local jurisdictions
- To order local jurisdictions to reappraise
- To advise assessment officials of assessment conditions
- To assist mass appraisal programs
- To approve tax assessment roll
- To adjust or equalize centrally determined assessed values (such as public utilities or railroads)
- Other, describe (240 char limit)

Procedural Audits

Q55. Does your agency perform procedural audits of local assessment procedures/practices?

- Yes
- No (if no is checked, skip to question No. 59)

Q56. Which categories of real property are audited? (check all that apply)

- Residential
- Commercial
- Industrial
- Agricultural
- Timberland
- Other, explain (240 char limit)

Q57. Is the audit used INSTEAD OF a ratio study?

- Yes
- No

Q58. How is the procedural audit how used?

- To order adjustments to locally determined assessed values
- To equalize higher-level government shared funding of local jurisdictions
- To order local jurisdictions to reappraise
- To advise assessment officials of deficiencies or to recommend improvements in assessment procedures To assist mass appraisal programs
- To approve tax assessment roll
- Other, describe (240 char limit)

Miscellaneous/New & Emerging Issues

Q59. Can any of the following initiate legal action as a result of your ratio study?

- Taxing jurisdiction (e.g., school district)
- Centrally assessed property (for example, railroads or public utilities)
- Taxpayers
- Not applicable

Q60. In view of the current rapidly changing market conditions in your jurisdiction, are you:

- Not applicable
- Seeing more jurisdictions out of compliance with your standards
- Contemplating a change to standards

Q61. Please provide relevant information and comments about new issues, recent changes and court cases related to your ratio study practices. (600 char limit)

Q62. Please share any comments you may have about this survey (400 char limit)

Appendix B. Tabulation of comparable responses from the surveys of ratio study practices in the United States and Canada, 1994–2022

1994 Q No.	1997 Q No.	2003 Q No.	2008 Q No.	2011 Q No.	2013 Q No.	2022 Q No.	Topic	Response	UNITED STATES						CANADA						INTN'L		
									Nos. of Responses						Nos. of Responses						No. of Responses		
									1994	1997	2003	2008	2011	2013	2022	1994	1997	2003	2008	2011	2013	2022	2022
General																							
2	2	2	3	3	3	3	Frequency of ratio studies	Annual	35	41	41	44	43	44	45	1	6	8	8	7	7	5	3
								1 per 2 years	5	4	2	2	3	3	NA	0	0	0	0	0	1	NA	NA
								1 per 3 years	1	0	0	1	2	1	NA	1	1	1	1	1	1	NA	NA
								1 per 4 years	5	7	1	1	1	0	NA	5	4	2	2	1	0	NA	NA
								Other	5	7	7	3	2	3	6	0	1	1	0	0	1	2	1
								Not required	NA	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA	1	0
3	3	3	4	4	4	4	Who does study?	State or province/territory	26	29	38	44	43	42	44	6	3	7	10	9	9	6	4
								Local only	4	7	7	7	6	7	4	0	3	1	0	0	1	1	0
								Contracted to others	14	14	4	2	1	2	2	1	4	2	1	0	1	1	2
								Both state and local	NA	NA	NA	11	6	5	9	NA	NA	NA	0	0	2	1	0
								Other	2	2	2	0	1	0	1	0	1	3	0	0	3	0	0
4	4	4	5	8	7	8	What does study include?	Sales only	20	23	25	31	30	28	26	5	8	8	10	8	10	8	1
								Appraisals only	5	4	2	1	1	1	0	0	0	1	0	0	0	0	1
								Both sales and appraisals	21	25	24	19	19	21	25	2	3	1	1	1	0	0	1
4a	4a	4a	6	9	8	9	If both, combined?	Yes	NA	NA	24	17	18	17	20	NA	NA	0	1	1	0	0	2
NA	NA	NA	NA	79	62	NA	Foreclosure sales included?	Yes	NA	NA	NA	NA	17	18	NA	NA	NA	NA	1	0	NA	NA	
4b	4b	4b	7	15	11	11	Who selects samples?	State or province/territory	NA	NA	35	23	28	29	27	NA	NA	6	7	6	7	4	3
								Local	NA	NA	14	12	11	10	10	NA	NA	5	2	3	2	4	0
								Both	NA	NA	NA	16	10	9	5	NA	NA	NA	0	0	0	0	1
								Private contractor	NA	NA	NA	1	0	1	1	NA	NA	NA	1	0	1	0	0
4c	4c	4c	8	16	12	12	Who validates sales?	State or province/territory	NA	NA	23	26	13	12	12	NA	NA	7	6	5	5	3	2
								Local	NA	NA	24	26	18	18	23	NA	NA	3	4	4	3	3	0
								Both	NA	NA	NA	8	17	18	11	NA	NA	0	1	0	0	1	1
								Contracted and other	NA	NA	NA	1	1	1	1	NA	NA	0	2	0	2	0	1
NA	NA	NA	9	18	13	13	Audit of sales validation?	Yes	NA	NA	NA	23	18	15	24	NA	NA	NA	3	2	3	4	2
NA	NA	NA	NA	11a	10	10	Time period sales are used?	One year	NA	NA	NA	NA	29	30	31	NA	NA	NA	NA	3	2	2	0
								Multiple years	NA	NA	NA	NA	17	17	20	NA	NA	NA	NA	5	2	5	1
								Varies by jurisdiction or class	NA	NA	NA	NA	10	5	8	NA	NA	NA	NA	0	1	4	1
NA	NA	NA	NA	11b	10	10	Time period described in relation to assessment date?	Before	NA	NA	NA	NA	23	20	18	NA	NA	NA	NA	7	6	5	2
								After	NA	NA	NA	NA	11	6	5	NA	NA	NA	NA	0	0	0	0
								Overlapping	NA	NA	NA	NA	9	5	7	NA	NA	NA	NA	4	3	0	1

Appendix B. (continued)

1994 Q.No.	1997 Q.No.	2003 Q.No.	2008 Q.No.	2011 Q.No.	2013 Q.No.	2022 Q.No.	Topic	Response	UNITED STATES						CANADA						INT'L		
									Numbers of Responses						Numbers of Responses						Responses		
									1994	1997	2003	2008	2011	2013	2022	1994	1997	2003	2008	2011	2013	2022	2022
Personal Property																							
5	5	5	93	NA	NA	NA	Personal property (PP) taxable?	Yes	37	40	40	39	NA	NA	NA	3	6	3	2	NA	NA	NA	NA
5a	5a	5a	94	69	54	53	PP ratio study conducted?	Yes	8	8	7	6	6	6	7	0	0	0	0	0	0	0	0
5b	5b	5b	95	NA	NA	NA	For PP ratio study, do you use sales, appraisals, or both?	Sales only	0	0	0	0	NA	NA	NA	0	0	0	0	NA	NA	NA	NA
								Appraisals only	7	8	7	6	NA	NA	NA	0	0	0	0	NA	NA	NA	NA
								Both sales and appraisals	1	0	0	0	NA	NA	NA	0	0	0	0	NA	NA	NA	NA
5c	5c	5d	99	71	55	54	How is PP ratio study used?	Order adjustments	NA	NA	3	2	2	3	2	NA	NA	NA	NA	NA	NA	NA	NA
								Equalize funding	NA	NA	0	3	3	3	2	NA	NA	NA	NA	NA	NA	NA	NA
								Order reappraisal	NA	NA	0	1	2	2	4	NA	NA	NA	NA	NA	NA	NA	NA
								Advise local jurisdictions	NA	NA	0	3	3	3	5	NA	NA	NA	NA	NA	NA	NA	NA
								Assist mass appraisal	NA	NA	0	1	1	2	1	NA	NA	NA	NA	NA	NA	NA	NA
								Adjust or equalize centrally assessed property	NA	NA	2	1	1	1	2	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	5e	97	NA	NA	NA	pp appraisal techniques?	Depreciation or economic life tables	NA	NA	7	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
								Iowa curves	NA	NA	2	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
								Other	NA	NA	1	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
8	6	6a	100	NA	NA	NA	Statutory exemption for intangible personal property?	Yes	25	32	37	40	NA	NA	NA	3	4	6	3	NA	NA	NA	NA
								No	17	15	9	12	NA	NA	NA	4	4	6	8	NA	NA	NA	NA
NA	NA	6b	101	NA	NA	NA	Exemptions for types of intangible personal property?	Capital stock	NA	NA	32	33	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA
								Bonds	NA	NA	33	31	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA
								Deposits	NA	NA	33	30	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA
								Contracts and contract rights	NA	NA	34	30	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA
								Copyrights	NA	NA	35	31	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA
								Custom computer programs	NA	NA	29	30	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA
								Customer lists	NA	NA	34	29	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA
								Goodwill	NA	NA	30	28	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA
								Licenses	NA	NA	34	30	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA
								Patents	NA	NA	35	31	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA
								Rights-of-way	NA	NA	22	20	NA	NA	NA	NA	NA	2	1	NA	NA	NA	NA
								Trademarks	NA	NA	35	31	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA
Trade secrets	NA	NA	35	29	NA	NA	NA	NA	NA	3	1	NA	NA	NA	NA								
Other	NA	NA	6	2	NA	NA	NA	NA	NA	1	0	NA	NA	NA	NA								

Appendix B. (continued)

1994 Q No.	1997 Q No.	2003 Q No.	2008 Q No.	2011 Q No.	2013 Q No.	2022 Q No.	Topic	Response	UNITED STATES					CANADA					INT'L					
									Numbers of Responses					Numbers of Responses					Responses					
									1994	1997	2003	2008	2011	2013	2022	1994	1997	2003	2008	2011	2013	2022	2022	
Procedural Audits																								
6	7	7	12	74	58	57	Procedural audit in lieu of ratio study?	Yes	19	17	22	2	2	2	3	2	3	3	1	0	0	1	0	
								No	NA	NA	NA	30	25	35	31	NA	NA	NA	5	9	7	3	4	
NA	7a	NA	11	72	56	55	Procedural audit on any category?	Yes	NA	NA	NA	32	25	26	28	NA	NA	NA	6	8	7	4	3	
								No	NA	NA	NA	19	26	23	24	NA	NA	NA	5	1	3	4	1	
NA	NA	NA	NA	73	57	56	Residential?	Yes	NA	NA	NA	NA	26	22	25	NA	NA	NA	NA	7	7	4	3	
								Commercial/Industrial	Yes	NA	NA	NA	NA	25	22	25/23	NA	NA	NA	NA	8	7	4/3	3/3
								Agricultural	Yes	NA	NA	NA	NA	21	20	23	NA	NA	NA	NA	5	6	3	2
								Timber	Yes	NA	NA	NA	NA	9	8	10	NA	NA	NA	NA	2	2	2	1
NA	NA	NA	14	75	59	58	Is procedural audit advisory?	Yes	NA	NA	NA	14	26	22	27	NA	NA	NA	4	5	6	4	3	
								No	NA	NA	NA	17	25	NA	NA	NA	NA	NA	1	4	NA	NA	NA	
NA	7c	7b	13	NA	NA	NA	Is procedural audit in addition to ratio studies?	Yes	NA	25	26	26	NA	NA	NA	NA	4	5	4	NA	NA	NA	NA	
								No	NA	NA	NA	5	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	
NA	7b	7c	15	75	59	58	Can equalization or reappraisal be ordered from audits?	Yes	11	14	15	12	8	4	9	2	5	4	4	1	2	0	0	
								No	NA	NA	NA	16	17	NA	NA	NA	NA	NA	2	8	NA	NA	NA	
Disclosure																								
7	8a	8a	16	20	14	14	Legal requirement?	Yes	30	35	37	36	37	37	43	6	9	11	11	10	9	8	3	
7a	8a	8a	16	20	14	14	Disclosure made to:	State or province/territory only	NA	NA	2	6	6	6	10	NA	NA	11	7	8	7	5	2	
								Local assessors only	NA	NA	8	8	8	7	13	NA	NA	2	2	0	0	1	0	
								Both	NA	NA	20	22	23	24	20	NA	NA	5	2	1	2	2	1	
0	0	8b	17	NA	NA	NA	Disclosure occurs when?	At deed recording	NA	NA	35	33	NA	NA	NA	NA	NA	11	11	NA	NA	NA	NA	
								Within statutory time period	NA	NA	4	1	NA	NA	NA	NA	NA	0	0	NA	NA	NA	NA	
								Other	NA	NA	3	2	NA	NA	NA	NA	NA	0	0	NA	NA	NA	NA	
NA	NA	8c	18	23	NA	NA	Are documents tracked?	Yes	NA	NA	31	29	24	NA	NA	NA	NA	8	11	9	NA	NA	NA	
NA	NA	8d	20	21	NA	NA	Type of disclosure document?	Sale price statement	NA	NA	17	10	9	NA	NA	NA	NA	10	5	3	NA	NA	NA	
								Comprehensive questionnaire	NA	NA	7	10	7	NA	NA	NA	NA	0	0	0	NA	NA	NA	
								Both	NA	NA	7	9	7	NA	NA	NA	NA	1	3	1	NA	NA	NA	
								Other	NA	NA	8	7	15	NA	NA	NA	NA	0	3	5	NA	NA	NA	
7a	8a	8e	22	24	15	NA	Is disclosure confidential?	Yes	9	6	5	9	7	9	NA	3	4	4	2	1	0	NA	NA	
								No	NA	NA	39	29	35	37	NA	4	7	8	9	8	10	NA	NA	
7b	8b	8f	23	26	16	16	Value-related fee?	Yes	NA	NA	34	35	36	36	37	5	10	10	11	9	9	8	3	
7c	8c	8g	24	27	17	17	Mandatory recording?	Yes	28	25	26	27	28	32	40	5	8	10	10	9	10	7	4	
NA	NA	8g	24	22	NA	NA	If yes, recodation occurs at what jurisdictional level?	State or province/territory	NA	NA	10	NA	1	NA	NA	NA	NA	6	NA	0	NA	NA	NA	
								Local	NA	NA	14	NA	35	NA	NA	NA	NA	1	NA	9	NA	NA	NA	
								Both	NA	NA	3	NA	1	NA	NA	NA	NA	0	NA	0	NA	NA	NA	
NA	NA	8h	NA	NA	NA	NA	Legal penalties for falsifying?	Yes	NA	NA	35	NA	NA	NA	NA	NA	NA	9	NA	NA	NA	NA	NA	
								No	NA	NA	8	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	
							No element of disclosure?		3	4	2	7	5	5	4	0	0	0	0	0	0	0	0	

Appendix B. (continued)

1994 Q No.	1997 Q No.	2003 Q No.	2008 Q No.	2011 Q No.	2013 Q No.	2022 Q No.	Topic	Response	UNITED STATES								CANADA					INT'L		
									Numbers of Responses								Numbers of Responses							
									1994	1997	2003	2008	2011	2013	2022	1994	1997	2003	2008	2011	2013	2022	2022	
Sales Price Adjustments																								
9	9	9	26	30	19	19	Verified sales prices adjusted?	Yes	33	34	32	40	39	35	39	6	9	9	8	7	7	8	4	
								Adjust for:	Time	14	15	18	21	23	23	26	4	9	4	6	5	6	7	2
									Financing	16	16	15	11	12	10	NA	3	8	5	4	2	4	NA	NA
									Personal property (chattel)	31	32	26	30	27	25	27	6	9	4	7	5	6	5	2
									Closing costs	0	5	2	6	8	8	NA	0	1	1	1	1	2	NA	NA
									Brokerage fees	1	4	0	2	4	6	NA	0	0	1	1	0	1	NA	NA
									Intangibles	5	11	11	16	14	13	14	3	1	3	3	3	4	3	1
Other	7	4	4	4	3	4	5	0	2	3	0	1	2	2	1									
10	10	10	27	31	21	NA	Blanket or global adjustments?	Yes	8	3	3	3	3	2	NA	1	0	0	0	0	0	NA	NA	
								Tracking trends in ratios over time	NA	NA	NA	NA	15	21	21	NA	NA	NA	NA	5	5	6	1	
NA	NA	NA	NA	30	20	20	Method of calculating time adjustments?	Tracking changes in value per unit	NA	NA	NA	NA	8	11	8	NA	NA	NA	NA	1	1	2	1	
								Analysis of repeat sales	NA	NA	NA	NA	15	12	14	NA	NA	NA	NA	2	3	4	1	
								MRA	NA	NA	NA	NA	2	1	2	NA	NA	NA	NA	1	0	0	0	
10b	10b	10b	29	NA	NA	NA	Court cases re: adjustments?	Yes	NA	NA	1	1	NA	NA	NA	NA	NA	0	0	NA	NA	NA	NA	
Purposes of Ratio Study																								
11	11	11	30	5, 6	5	5	Purposes of ratio study?	Order adjustments	22	27	26	20	20	20	24	3	4	2	1	1	3	1	2	
								Equalize funding	30	31	31	28	29	26	25	1	3	2	2	2	1	1	0	
								Order reappraisal	22	31	30	28	20	21	24	2	1	1	0	2	2	1	1	
								Advise local jurisdictions	35	35	43	39	40	35	35	7	9	5	7	6	6	7	1	
								Assist mass appraisal	NA	NA	31	22	20	19	19	NA	NA	9	4	6	7	4	2	
								Adjust or equalize centrally assessed property	13	18	19	17	8	8	18	0	0	0	0	0	0	1	0	
NA	NA	NA	32	50	37	36	How many states issued orders to adjust?	Approve tax roll	0	0	5	13	13	9	14	0	0	3	3	2	2	3	3	
								Orders to adjust	NA	NA	NA	16	14	7	23	NA	NA	NA	0	0	0	2	2	
NA	NA	NA	33	52	39	38	How many states issued orders to reappraise?	Orders to reappraise	NA	NA	NA	20	10	7	11	NA	NA	NA	0	0	0	0	1	
NA	NA	NA	NA	63	NA	NA	Fewer ratio study related actions taken in the past 3 years?	Yes	NA	NA	NA	NA	12	NA	NA	NA	NA	NA	0	NA	NA	NA		
12	12	12	34	49	36	35	Adjustment procedures?	Order trend by class/category	11	14	13	16	15	15	10	1	2	1	0	1	1	1	2	
								Trend jurisdiction-wide	5	3	3	7	3	2	4	1	1	0	0	0	0	0		
								Grace period	2	12	3	12	25	10	11	0	2	1	0	0	0	0	2	
								Other	11	4	10	12	16	14	2	6	3	0	0	0	2	0	0	

Appendix B. (continued)

1994 Q.No.	1997 Q.No.	2003 Q.No.	2008 Q.No.	2011 Q.No.	2013 Q.No.	2022 Q.No.	Topic	Response	UNITED STATES										CANADA					INT'L
									Numbers of Responses										Numbers of Responses					
									1994	1997	2003	2008	2011	2013	2022	1994	1997	2003	2008	2011	2013	2022		
Testing Uniformity																								
13a	13a	13a	48	57	44	43	Statute/ standard for COD/ COV?	Yes	32	34	38	40	31	33	30	2	8	9	8	6	5	6	3	
								No	18	17	13	12	20	18	21	2	3	3	3	3	5	2	1	
NA	NA	13a	48	57	44	43	Comparison to IAAO standard	IAAO standard	NA	NA	23	23	26	29	30	NA	NA	5	6	6	5	7	3	
								More stringent	6	1	5	6	5	0	2	1	1	4	2	0	0	2	1	
								Less stringent	21	23	21	11	3	4	4	3	6	3	0	0	0	0	0	
								Unknown	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
13b	13b	13b	55, 57	58	44	43	Price-related bias—PRD standard?	Yes	11	18	22	27	28	30	31	2	4	6	6	6	6	5	3	
								No	35	34	28	25	23	21	21	4	7	6	5	3	4	3	1	
								IAAO standard 0.98–1.03	8	12	17	23	25	25	29	2	2	5	5	6	6	5	3	
NA	NA	NA	NA	NA	46	45	Price-related bias—PRB standard?	Yes	NA	NA	NA	NA	NA	2	6	NA	NA	NA	NA	NA	1	5	0	
								No	NA	NA	NA	NA	NA	36	38	NA	NA	NA	NA	NA	6	3	4	
								IAAO Standard	NA	NA	NA	NA	NA	2	0	NA	NA	NA	NA	1	4	0		
13c	13c	13c	58, 59, 60	56, 59	47	46	Initiate action re: uniformity?	Yes	30	34	34	30	32	31	36	4	7	7	5	5	4	3	3	
								Order reappraisal	NA	NA	23	23	21	22	23	NA	NA	4	3	4	3	2	2	
							If so, which actions?	Withhold funding	NA	NA	9	5	7	9	10	NA	NA	0	0	0	0	0	0	
								Other action	NA	NA	10	11	13	14	13	NA	NA	3	1	1	4	1	1	
NA	NA	13d	61	56, 41	43, 29	42, 28	If yes, uniformity measures?	COD	NA	NA	24	21	22	22	24	NA	NA	4	5	6	4	3	3	
								PRD	NA	NA	12	14	14	9	12	NA	NA	2	4	4	4	2	3	
								PRB	NA	NA	NA	NA	NA	NA	5	NA	NA	NA	NA	NA	NA	2	1	
NA	NA	13e	62	43, 61	48	47	Action dependent upon:	Point estimates	NA	NA	17	12	11	12	12	NA	NA	4	2	1	2	2	0	
								Confidence intervals	NA	NA	8	11	6	10	19	NA	NA	0	1	4	0	0	3	
Testing Assessment Level																								
14a	14a	14a	35	54	41	39	Allowable variance?	Yes	33	34	34	37	41	43	40	5	7	5	8	8	10	8	2	
								No or unknown	13	18	17	15	10	8	12	2	4	7	3	1	0	0	2	
							Variance permitted?	± 10%	11	15	16	16	19	21	25	1	4	1	3	3	6	4	1	
								± 5%	5	6	6	4	5	5	7	2	2	2	2	3	2	4	1	
								Other	17	17	9	17	17	13	10	2	1	1	2	2	2	0	0	
14b	14b	14b	36	55	42	41	If yes, variance set by statute?	Yes	15	18	19	18	22	21	18	0	1	3	2	4	2	0	0	
								No	17	15	18	18	21	22	31	3	3	2	6	5	6	8	4	
							If no, legal authority?	Administrative rule	NA	NA	8	7	19	22	23	NA	NA	1	0	3	6	3	2	
								Other	NA	NA	7	11	0	6	3	NA	NA	0	5	2	2	5	1	
NA	NA	NA	NA	NA	NA	40	Between classes?	Yes	NA	NA	NA	NA	NA	NA	11	NA	NA	NA	NA	NA	NA	2	1	

Appendix B. (continued)

1994 Q No.	1997 Q No.	2003 Q No.	2008 Q No.	2011 Q No.	2013 Q No.	2022 Q No.	Topic	Response	UNITED STATES								CANADA								INT'L
									Numbers of Responses								Numbers of Responses								
									1994	1997	2003	2008	2011	2013	2022	1994	1997	2003	2008	2011	2013	2022	2022		
Testing Reliability																									
NA	NA	15a	37	36	26	25	Use confidence interval (CI) to determine statistical compliance?	Yes	NA	NA	19	15	14	17	23	NA	NA	4	5	3	3	4	2		
								No	NA	NA	27	32	33	31	27	NA	NA	6	3	6	6	4	2		
15d	15a	15a	43	36	26	NA	Is compliance based upon?	Point estimates only	NA	26	19	27	30	27	NA	NA	5	3	2	2	7	NA	NA		
								Confidence intervals only	13	18	20	6	14	17	NA	NA	1	6	3	3	2	NA	NA		
								Both	NA	NA	NA	11	NA	NA	NA	NA	NA	2	NA	NA					
NA	NA	15b	NA	NA	NA	NA	If yes, which test?	95% confidence level	NA	NA	17	NA	NA	NA	NA	NA	NA	4	NA	NA	NA	NA	NA		
								90% confidence level	NA	NA	5	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA		
								Other confidence level	NA	NA	0	NA	NA	NA	NA	NA	NA	0	NA	NA	NA	NA	NA		
14d	15b	15c	44	37	27	26	Is a sample mean ratio of 86%, with a CI between 76% and 95%, in compliance?	Yes, confidence interval overlaps	NA	11	13	11	12	11	16	NA	NA	2	4	3	1	4	0		
								No, only point estimates used	NA	NA	28	30	29	29	29	NA	1	5	2	0	8	4	3		
								No, CI fails to overlap 100%	NA	NA	NA	5	2	5	7	NA	NA	NA	1	0	2	0	1		
NA	NA	NA	45	39	28	27	If CI overlaps, but the median continues to be out of compliance for several years, what actions?	Lower confidence level and reevaluate	NA	NA	NA	3	2	2	2	NA	NA	NA	2	1	1	0	0		
								Base compliance decision on point estimates	NA	NA	NA	0	2	2	4	NA	NA	NA	0	0	0	1	0		
								Continue to find in compliance	NA	NA	NA	6	6	6	6	NA	NA	NA	2	1	0	1	0		
								Other	NA	NA	NA	6	4	3	5	NA	NA	NA	2	0	0	1	0		
NA	15c	15d	47	NA	NA	NA	Revise if COD showed poor uniformity?	No change	NA	33	16	7	NA	NA	NA	NA	1	0	2	NA	NA	NA	NA		
NA	NA	NA	NA	43	31	30	Compute confidence intervals for?	COD	NA	NA	NA	NA	20	21	23	NA	NA	NA	NA	6	5	3	2		
NA	NA	NA	62	61	48	47	Uniformity compliance actions dependent on?	Confidence intervals	NA	NA	NA	9	6	10	19	NA	NA	NA	3	4	0	0	3		

Appendix B. (continued)

1994 Q No.	1997 Q No.	2003 Q No.	2008 Q No.	2011 Q No.	2013 Q No.	2022 Q No.	Topic	Response	UNITED STATES						CANADA						INT'L		
									Numbers of Responses						Numbers of Responses								
									1994	1997	2003	2008	2011	2013	2022	1994	1997	2003	2008	2011		2013	2022
Sales Chasing																							
NA	NA	18	88	64	50	49	Statutes for sales chasing?	No, but nonstatutory requirement	NA	NA	NA	12	9	11	13	NA	NA	NA	0	1	3	3	1
							Yes	Yes	NA	NA	10	3	5	3	8	NA	NA	1	0	0	0	0	1
NA	NA	NA	54	68	53	52	Lower limit on COD established	Yes	NA	NA	NA	1	6	8	11	NA	NA	NA	0	2	3	5	1
NA	NA	NA	89	65	51	50	Test for sales chasing?	Yes	NA	NA	NA	27	31	30	28	NA	NA	NA	5	5	6	4	3
NA	NA	NA	90	66	52	51	Procedure for sales chasing?	Compare average changes—sold vs. unsold	NA	NA	NA	20	24	20	24	NA	NA	NA	3	5	5	8	2
								Compare average unit values	NA	NA	NA	6	3	4	9	NA	NA	NA	3	5	2	4	2
								Split sample technique	NA	NA	NA	5	8	11	10	NA	NA	NA	3	1	0	0	2
								Compare observed vs. expected distributions	NA	NA	NA	14	7	8	5	NA	NA	NA	4	1	2	0	0
								Mass appraisal techniques	NA	NA	NA	17	7	6	10	NA	NA	NA	3	1	1	1	2
Miscellaneous																							
NA	NA	NA	NA	44	32	31	Compute statewide ratio study statistics?	Yes	NA	NA	NA	NA	29	30	43	NA	NA	NA	NA	6	6	6	2
NA	NA	NA	NA	NA	32b	31	How is statewide ratio study made available?	Website	NA	NA	NA	NA	NA	23	31	NA	NA	NA	NA	NA	4	2	0
								Publication	NA	NA	NA	NA	NA	16	19	NA	NA	NA	NA	NA	3	2	0
								None	NA	NA	NA	NA	NA	2	6	NA	NA	NA	NA	NA	2	2	2
								Hard copy	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	0	NA	NA
NA	NA	NA	NA	77	61	NA	Software used for ratio studies?	Custom, written in-house	NA	NA	NA	NA	23	22	NA	NA	NA	NA	NA	4	5	NA	NA
								CAMA vendor application	NA	NA	NA	NA	6	8	NA	NA	NA	NA	NA	1	1	NA	NA
								Spreadsheet (e.g., Excel)	NA	NA	NA	NA	25	23	NA	NA	NA	NA	6	5	NA	NA	
								Statistical (e.g., SPSS)	NA	NA	NA	NA	19	18	NA	NA	NA	NA	7	7	NA	NA	
							Database (e.g., Access)	NA	NA	NA	NA	14	12	NA	NA	NA	NA	4	3	NA	NA		
NA	NA	NA	42	7	6	6	Incorporate IAAO standards in statutes or rules?	Yes	NA	NA	NA	33	36	38	27	NA	NA	NA	5	5	5	3	2
								No	NA	NA	NA	16	15	13	21	NA	NA	NA	6	4	5	4	1
NA	NA	NA	NA	NA	NA	7	Incorporate IAAO standards in guidelines	Yes	NA	NA	NA	NA	NA	NA	31	NA	NA	NA	NA	0	1	6	3
								No	NA	NA	NA	NA	NA	11	NA	NA	NA	NA	NA	2	0		
17	19	19	92	76	60	59	Legal action re: ratio study?	Yes	30	32	37	27	20	21	26	1	4	3	1	1	2	0	0
NA	NA	NA	NA	76	60	59	Legal action by taxpayer?	Yes	NA	NA	NA	NA	12	11	9	NA	NA	NA	NA	0	1	0	0
NA	NA	NA	NA	76	60	59	Legal action by taxing jurisdiction?	Yes	NA	NA	NA	NA	18	19	22	NA	NA	NA	NA	1	2	0	0
NA	NA	NA	NA	NA	NA	60	Actions in rapidly changing market	More jurisdictions out of compliance	NA	NA	NA	NA	NA	NA	22	NA	NA	NA	NA	NA	NA	1	1
								Contemplating change to standard	NA	NA	NA	NA	NA	3	NA	NA	NA	NA	NA	0	0		
NA = not asked or compiled																							
= These questions are new to the 2022 survey.																							
= These questions were not asked beginning with the 2022 survey.																							

Appendix C. Results of 2022 Survey of Ratio Study Practices in the United States

Question No. >		Q2	Q3	Q4	
	State	What is your jurisdiction type?	How often does your jurisdiction conduct ratio studies? Indicate if annual or explain other variations.	Who produces the result of the ratio study? (check all that apply)	
	Abbr.		Other:	Comment:	
	Alaska	AK State agency	Other	We monitor the results of ratio studies conducted by local assessors.	Local officials
	Alabama	AL State agency	Annual		State officials Local officials
	Arkansas	AR State agency	Annual		State officials
	Arizona	AZ State agency	Annual		State officials
	California	CA State agency	Annual		State officials
	Colorado	CO State agency	Annual		State officials Independent audit by contract for the state.
	Connecticut	CT State agency	Annual		State officials
	District of Columbia	DC Other	Annual		Local officials CAMA Manager
	Delaware-Sussex County	DE Local	Not required		
	Florida	FL State agency	Annual		State officials
	Georgia	GA State agency	Other	We appraise non-operating public utility properties and perform ratio analysis to defend the values.	State officials Georgia Department of Audits and Accounts (DOAA), Georgia Department of Revenue (DOR) uses the results of their study for our purposes.
	Hawaii-Maui County	HM Local	Annual		Local officials
	Hawaii-Honolulu County	HN Local	Annual		Local officials Analyst
	Iowa	IA State agency	Annual		State officials
	Idaho	ID State agency	Annual		State officials
	Illinois	IL State agency	Annual		State officials
	Indiana	IN State agency	Annual		Local officials
	Kansas	KS State agency	Annual		State officials
	Kentucky	KY State agency	Annual		State officials
	Louisiana	LA State agency	Annual		State officials
	Massachusetts	MA State agency	Annual		State officials
	Maryland	MD State agency	Annual		State officials
	Maine	ME State agency	Annual		State officials Local officials Most local officials complete the annual sales ratio study, and State of Maine personnel verify the validity of the work.
	Michigan	MI State agency	Annual	Not required	State officials Local officials
	Minnesota	MN State agency	Annual		State officials
	Missouri	MO State agency	Other	Residential Sales Studies are conducted once every 2 years and Commercial Appraisal Studies are conducted once every 6 years	State officials The study is conducted by the Local Assistance Section of the Missouri State Tax Commission
	Mississippi	MS State agency	Other	Ratio studies are not required for the state as a whole. Ratio studies are done on update year in each county.	
	Montana	MT State agency	Other	Biannual - State is on 2 year reappraisal cycles	State officials
	North Carolina	NC State agency	Annual		State officials
	North Dakota	ND State agency	Annual		State officials Local officials
	Nebraska	NE State agency	Annual		State officials
	New Hampshire	NH State agency	Annual		State officials
	New Jersey	NJ State agency	Annual		State officials
	New Mexico	NM State agency	Annual		State officials Local officials
	Nevada	NV State agency	Annual		State officials
	New York	NY State agency	Annual		State officials
	Ohio	OH State agency	Other	at 3 year intervals for each of the 88 county jurisdictions	State officials
	Oklahoma	OK State agency	Annual		State officials
	Oregon	OR State agency	Annual		State officials Local officials
	Pennsylvania	PA State agency	Annual		State officials
	Rhode Island	RI Local	Annual		State officials
	South Carolina	SC State agency	Annual		State officials Local officials
	South Dakota	SD State agency	Annual		State officials
	Tennessee	TN State agency	Annual		State officials
	Texas	TX State agency	Annual		State officials
	Utah	UT State agency	Annual		State officials
	Virginia	VA State agency	Annual		State officials Local officials Contracted service provider (university or private company)
	Vermont	VT State agency	Annual		State officials
	Washington	WA State agency	Annual		State officials
	Wisconsin	WI State agency	Annual		State officials
	West Virginia	WV State agency	Annual		State officials
	Wyoming	WY State agency	Annual		State officials Local officials

Appendix C. (continued)

Question No. >	Q5							
	How is the oversight ratio study used? (check all that apply)							
State	To order adjustments to locally determined assessed values if necessary	To equalize higher-level, government-shared funding of local jurisdictions	To order local jurisdictions to reappraise	To advise assessment officials of assessment conditions	To assist mass appraisal programs	To approve tax assessment roll	To adjust or equalize centrally determined assessed values (such as public utilities or railroads)	Other (please specify)
Alaska		X		X			X	CO: Also to test jurisdictions level of appraisal and uniformity.
Alabama	X		X	X	X	X	X	
Arkansas	X			X	X			
Arizona	X					X		
California							X	
Colorado			X					
Connecticut		X		X				
District of Columbia				X	X			
Delaware-Sussex County								
Florida		X		X		X	X	
Georgia	X	X	X	X	X	X	X	
Hawaii-Maui County				X	X			
Hawaii-Honolulu County				X	X			
Iowa	X	X	X					
Idaho	X			X			X	
Illinois	X		X	X	X			
Indiana	X	X	X	X				
Kansas			X	X	X			
Kentucky	X			X				
Louisiana			X	X				
Massachusetts						X		
Maryland				X				
Maine	X	X	X	X	X			
Michigan	X	X				X		
Minnesota	X	X	X	X			X	
Missouri	X		X	X	X			
Mississippi						X		
Montana				X				
North Carolina			X				X	
North Dakota	X		X	X	X	X		
Nebraska	X	X	X	X			X	
New Hampshire		X					X	
New Jersey	X	X	X	X	X		X	
New Mexico				X	X			
Nevada	X		X	X	X	X		
New York		X		X	X	X	X	
Ohio	X							
Oklahoma	X	X	X	X	X			
Oregon	X	X	X	X	X	X	X	
Pennsylvania		X		X	X			
Rhode Island		X						
South Carolina						X		
South Dakota	X	X	X	X				
Tennessee	X	X					X	
Texas		X						
Utah	X		X	X		X	X	
Virginia				X	X		X	
Vermont		X	X					
Washington		X		X			X	
Wisconsin		X	X	X			X	
West Virginia			X	X	X			
Wyoming	X	X	X	X		X		

Appendix C. (continued)

Question No. >	Q6				Q7				Q8
	Please indicate any concepts from the IAAO Standard on Ratio Studies that have been incorporated into your statutes (legislation) or rules and regulations.				Please indicate any concepts from the IAAO Standard on Ratio Studies that have been incorporated into your guidelines.				
State	None	Level	Horizontal uniformity	Vertical uniformity	None	Level	Horizontal uniformity	Vertical uniformity	
AK	X								Sales only
AL	X						X	X	Both sales and appraisals conducted by or contracted by the agency
AR		X	X	X		X	X	X	Both sales and appraisals conducted by or contracted by the agency
AZ		X	X			X	X	X	Sales only
CA	X				X				
CO		X	X	X					Both sales and appraisals conducted by or contracted by the agency
CT	X				X				Sales only
DC			X	X			X	X	Sales only
DE	X				X				Both sales and appraisals conducted by or contracted by the agency
FL		X	X	X		X	X	X	Both sales and appraisals conducted by or contracted by the agency
GA		X				X			Both sales and appraisals conducted by or contracted by the agency
HM		X	X	X		X	X	X	Sales only
HN						X	X	X	Both sales and appraisals conducted by or contracted by the agency
IA		X			X				Both sales and appraisals conducted by or contracted by the agency
ID		X				X	X	X	Sales only
IL		X	X	X		X	X	X	Sales only
IN			X	X			X	X	Sales only
KS						X	X	X	Sales only
KY						X			Both sales and appraisals conducted by or contracted by the agency
LA	X					X	X	X	Both sales and appraisals conducted by or contracted by the agency
MA	X				X				Sales only
MD	X						X	X	Sales only
ME	X				X				Both sales and appraisals conducted by or contracted by the agency
MI	X								Both sales and appraisals conducted by or contracted by the agency
MN		X		X		X		X	Sales only
MO		X	X	X		X	X	X	Both sales and appraisals conducted by or contracted by the agency
MS	X								Sales only
MT	X								Sales only
NC	X				X				Sales only
ND	X				X				Both sales and appraisals conducted by or contracted by the agency
NE		X	X	X		X	X	X	Sales only
NH		X	X	X		X	X	X	Sales only
NJ	X				X				Sales only
NM	X					X	X	X	Sales only
NV			X	X			X	X	Both sales and appraisals conducted by or contracted by the agency
NY	X					X	X	X	Both sales and appraisals conducted by or contracted by the agency
OH		X	X	X					Sales only
OK		X	X			X	X		Both sales and appraisals conducted by or contracted by the agency
OR		X	X	X		X	X	X	Both sales and appraisals conducted by or contracted by the agency
PA		X	X	X		X	X	X	Sales only
RI	X				X				Sales only
SC	X				X				Sales only
SD		X		X		X		X	Sales only
TN	X						X	X	Sales only
TX			X	X			X	X	Both sales and appraisals conducted by or contracted by the agency
UT		X				X			Sales only
VA		X	X	X		X	X	X	Both sales and appraisals conducted by or contracted by the agency
VT		X	X	X		X	X	X	Both sales and appraisals conducted by or contracted by the agency
WA		X				X	X	X	Both sales and appraisals conducted by or contracted by the agency
WI	X					X	X	X	Both sales and appraisals conducted by or contracted by the agency
WV									Both sales and appraisals conducted by or contracted by the agency
WY		X	X	X		X	X	X	Both sales and appraisals conducted by or contracted by the agency

Appendix C. (continued)

Question No. >	Q9	Q10					
	If both sales and appraisals are used in the question above, can they be combined in order to study one type or category of property?	What is the time period from which sales are used in the oversight agency ratio study? (check all that apply)					
State		One year	Multiple years	Flexible time period (varies by jurisdiction or category)	Sales period mostly before assessment date	Sales period mostly after assessment date	Sales period equally before and after the assessment date
AK				X	X		
AL	Yes	X					
AR			X				
AZ			X		X		
CA							
CO	Yes		X	X	X		
CT		X					
DC			X		X		
DE							
FL	Yes	X	X	X	X		
GA	Yes	X	X				X
HM		X					
HN	Yes	X					
IA	Yes	X					
ID		X	X	X		X	
IL	No	X					
IN		X	X		X		
KS		X				X	
KY	Yes				X		
LA	No			X			X
MA		X	X		X		
MD							X
ME	Yes	X	X	X	X		
MI	Yes	X	X				
MN		X			X		
MO	Yes						X
MS							
MT						X	X
NC		X			X		
ND	Yes	X		X			
NE			X				
NH		X					X
NU		X	X				
NM		X			X		
NV	No	X	X			X	
NY	Yes		X				
OH							
OK	No		X				
OR	Yes	X	X		X		
PA		X					
RI		X					
SC		X					
SD	Yes	X			X		
TN		X					
TX	Yes						X
UT		X	X				
VA	Yes	X			X		
VT	Yes		X		X		
WA	Yes	X					
WI		X	X		X		
WV	Yes	X					
WY	Yes		X	X			

Appendix C. (continued)

Question No. >	Q11	Q12	Q13
State	Which agency primarily performs the sales sample selection? (check all that apply)	Which agency primarily conducts the sales validation (screening)? (check all that apply)	If the oversight agency does NOT conduct the sales validation, does the agency perform an audit of the sales validation process?
AK	State agency	Local agency	No
AL		State agency	
AR	Combination of government levels	Local agency	Yes
AZ	State agency		
CA	Combination of government levels		
CO	Local agency	Contracted service provider	Yes
CT	State agency	Local agency	Yes
DC	Local	Local agency	
DE	State agency	State agency	
FL	Local agency	Local agency	Yes
GA	State agency	Combination of government levels	Yes
HM	Local agency	Local agency	Yes
HN	State agency	Local agency	
IA	Local agency	Combination of government levels	
ID	State agency	Local agency	No
IL	State agency	Combination of government levels	Yes
IN	State agency	Combination of government levels	No
KS	State agency	State agency	
KY	Local agency	State agency	
LA	State agency	State agency	
MA	Local agency	Local agency	No
MD	State agency	State agency	
ME	State agency	Combination of government levels	Yes
MI	Combination of government levels	Combination of government levels	Yes
MN	State agency	Local agency	
MO	Local agency	Local agency	Yes
MS	State agency	Local agency	Yes
MT	State agency	State agency	No
NC	State agency	Local agency	Yes
ND	State agency	Local agency	Yes
NE		Local agency	Yes
NH	Contracted service provider	State agency	
NJ	State agency	Combination of government levels	Yes
NM	State agency	Local agency	
NV	State agency	Local agency	Yes
NY	State agency	State agency	
OH	Not applicable	State agency	
OK	State agency	State agency	
OR	State agency	Local agency	Yes
PA	Combination of government levels	Combination of government levels	Yes
RI	Combination of government levels		
SC		Local agency	No
SD	State agency	Local agency	Yes
TN		Local agency	Yes
TX	Other, specify (240 char limit)	Not applicable	
UT	Other, specify (240 char limit)	Combination of government levels	Yes
VA	State agency	Combination of government levels	Yes
VT	Provincial agency	Combination of government levels	
WA	State agency	Local agency	Yes
WI	Local agency	Local agency	Yes
WV	Local agency	Local agency	Yes
WY	Provincial agency	Local agency	No

Appendix C. (continued)

No. >	Q14	Q15	
State	Does your jurisdiction have a law requiring disclosure of real estate sales prices to assessment officials?	Are disclosed sale prices public records?	Comment:
AK	No	Yes	
AL	Yes, disclosure made to local assessors	Yes	
AR	Yes, disclosure made to local assessors	Yes	
AZ	Yes, disclosure made to both	Other	In most counties yes but not all counties
CA	Yes, disclosure made to state/provincial/national/territory officials		
CO	Yes, disclosure made to local assessors	Yes	
CT	Yes, disclosure made to local assessors	Yes	
DC	Yes, disclosure made to local assessors	No	
DE	Yes, disclosure made to both	Yes	
FL	Yes, disclosure made to both	Yes	
GA	Yes, disclosure made to both	Yes	
HM	Yes, disclosure made to local assessors	Yes	
HN	Yes, disclosure made to state/provincial/national/territory officials	Yes	
IA	Yes, disclosure made to both	Yes	
ID	No	Other	Some parts may be disclosable, but lists with parcel identifiers generally are considered confidential.
IL	Yes, disclosure made to both	Yes	
IN	Yes, disclosure made to local assessors	Yes	
KS	Yes, disclosure made to both	No	Sales price information available to various qualified parties and individuals (certified appraisers, taxpayers under appeal, real estate agents & brokers, etc.)
KY	Yes, disclosure made to both	Yes	
LA	No	Yes	
MA	Yes, disclosure made to local assessors	Yes	
MD	Yes, disclosure made to state/provincial/national/territory officials	Yes	
ME	Yes, disclosure made to both	Yes	
MI	Yes, disclosure made to both	Yes	
MN	Yes, disclosure made to state/provincial/national/territory officials	Yes	
MO	No	Yes	
MS	No	No	Sales are disclosed when the property signs for homestead exemption only. Sales letters are sent to the grantor and grantee of each valid warranty deed.
MT	Yes, disclosure made to state/provincial/national/territory officials	No	
NC	No	Yes	
ND	Yes, disclosure made to both	Yes	
NE	Yes, disclosure made to both	Yes	
NH	Yes, disclosure made to state/provincial/national/territory officials	Yes	
NJ	Yes, disclosure made to both	Yes	
NM	Yes, disclosure made to local assessors	No	
NV	Yes, disclosure made to local assessors	Yes	Yes, the disclosed sales price is to the county recorder through the Real Property Transfer Tax. It is then public record.
NY	Yes	Yes	
OH	Yes, disclosure made to local assessors	Yes	
OK	Yes, disclosure made to state/provincial/national/territory officials	Yes	
OR	Yes, disclosure made to both	Yes	
PA	Yes, disclosure made to state/provincial/national/territory officials	Yes	
RI	No	Not applicable	
SC	Yes, disclosure made to both	Yes	
SD	Yes	Yes	
TN	Yes, disclosure made to both	Yes	
TX	No	No	
UT	No	Not applicable	
VA	Yes, disclosure made to both	Yes	
VT	Yes, disclosure made to state/provincial/national/territory officials	Yes	
WA	Yes, disclosure made to both	Yes	
WI	Yes, disclosure made to both	Yes	
WV	Yes, disclosure made to both	Yes	
WY	Yes, disclosure made to local assessors	No	

Appendix C. (continued)

Question No. >	Q16	
State	Is a value-related fee charged (e.g., transfer tax, deed stamp) for real property transfers?	Fee amount:
AK	No	
AL	Yes	Record Deed - \$1.00 fee / \$1,000 value Record Mortgage - \$1.50 fee / \$1,000 value
AR	Yes	Deed stamps at the rate of \$3.30 per \$1000 of value
AZ	Yes	No transfer tax but a two dollar recording fee is charged for recording the Affidavit of Property Value
CA	Yes	
CO	Yes	
CT	Yes	State Tax: the state tax rates by property type. The rate is 0.75% of (1) the first \$800,000 of the sales price of a residential dwelling (i.e., single family home or condominiums); (2) the full sales price of residential property other than residential.
DC	Yes	
DE	Yes	Transfer Tax- 2.1/2% to State, 1.1/2% to County = 4% total
FL	Yes	In all Florida counties except Miami-Dade, the tax rate imposed on documents subject to tax is 70 cents on each \$100 or portion thereof of the total consideration. Miami-Dade County is 60 cents on each \$100 or portion thereof, of the total consideration
GA	Yes	\$1.00 transfer tax per \$1,000 transaction amount.
HM	Yes	tiered rates based upon price and occupancy .001% to .0125%
HN	Yes	Ten cents (\$.10) per \$100 of the actual and full consideration for properties with a value of less than \$600,000 (condo - \$.15 per \$100 with value <\$600,000) \$.20 for \$600,000-\$1,000,000 (\$.0.25) \$.30 for \$1,000,000-\$2,000,000 (\$.0.40) \$.50 for \$2,000,0
IA	Yes	
ID	No	
IL	Yes	All transfers are subject to a State and County Transfer Tax, and the City of Chicago charges a separate City Transfer Tax.
IN	No	
KS	No	
KY	Yes	Determined by local officials
LA	No	
MA	Yes	\$.456 per thousand dollars of sale price. There may be some additional county tax.
MD	Yes	The rates vary for each of the 24 county jurisdictions in the state.
ME	Yes	
MI	Yes	\$0.55 per \$500 of selling price
MN	No	The Deed Tax rate is 0.0033 of the net consideration.
MO	No	This would be a county duty to deal with transfers.
MS	No	
MT	No	
NC	Yes	Deed Stamps are equal to the selling price divided by 500
ND	Yes	
NE	Yes	
NH	Yes	
NU	Yes	
NM	Yes	Varies by county typically \$.25
NV	Yes	The tax is administered through the Real Property Transfer Tax and the rate varies based on the local jurisdiction.
NY	Yes	
OH	Yes	
OK	Yes	\$1.50 per \$1,000 of sale price
OR	No	
PA	Yes	State imposes 1% and Local imposes 1% for a total of 2% value-related fee charged and it is generally split between buyer (1%) and seller (1%) at closing.
RI	Yes	as of Jan 1, 2022 - \$2.30 per \$500 of sale price for all property. For residential property, an additional \$2.30 per \$500 of portion of sale price that is over \$700,000. see RIGL 44-25-1
SC	Yes	
SD	Yes	A fee of .50 cents for each five hundred dollars of value.
TN	Yes	\$12 dollars per instrument recording fee and \$3.70 per \$1,000 of sworn transfer value.
TX	No	
UT	No	
VA	Yes	\$.0.25/\$100 of value
VT	Yes	
WA	Yes	Effective Jan. 1, 2020, sales of real property located in Washington are subject to a graduated real estate excise tax (REET) rate. The graduated state REET rates replace the previous flat state REET rate. The following state REET rates apply: Sale pr
WI	Yes	
WV	No	
WY	No	

Appendix C. (continued)

Question No. >	Q17	Q18				
		Is there authority to adjust sale prices in your ratio studies? (check all that apply)				
State	Does your jurisdiction have a law making recordation/ registration mandatory for real property transfers?	No authority	Time	Personal property (chattels)	Intangible personal property	Other:
AK	Yes		X	X	X	
AL	No			X		
AR	Yes		X	X		
AZ	Yes		X	X		
CA	No					
CO	Yes		X	X	X	
CT	Yes	X				
DC	Yes		X			
DE	Yes	X				
FL	Yes		X	X	X	
GA	Yes		X	X	X	Merchantable and Pre-merchantable Timber extraction
HI	Yes					
HN	No	X				
IA	Yes		X	X	X	
ID	No		X	X		
IL	Yes		X	X	X	
IN	Yes		X			
KS	No		X	X	X	Special assessments, financing
KY	Yes	X				
LA	Yes		X			
MA	Yes		X			
MD	Yes			X		
ME	Yes	X				
MI	Yes		X	X	X	
MN	Yes		X	X		Financing
MO	Yes					For the residential sales studies the sales are weighted for time and location
MS	No					
MT	Yes		X	X		
NC	Yes					
ND	Yes			X		
NE	Yes		X		X	
NH	Yes		X	X		
NJ	Yes	X				
NM	Yes					
NV	Yes		X	X		
NY	Yes		X			
OH	No	X				
OK	Yes			X	X	
OR	Yes		X	X	X	Machinery & equipment
PA	Yes	X				
RI	Yes		X			
SC	No	X				
SD	Yes			X		
TN	No			X		
TX	No		X	X	X	
UT	No		X	X	X	
VA	Yes	X				
VT	Yes		X	X		concessions
WA	Yes					Sales price is adjusted 1% for personal property values transferred that are not assessable as Real Property (WAC 458-53-080)
WI	Yes			X	X	
WV	Yes			X		
WY	No		X	X		

Appendix C. (continued)

Question No. >	Q19					Q20			
	Which of the following adjustments to sale price are used in your ratio studies? (check all that apply)					Which time adjustment methods are used in ratio studies? (check all that apply)			
State	Not applicable	Time	Personal property (chattels)	Intangible personal property	Other:	Tracking trends in sales ratios over time	Tracking changes in value per unit over time	Analysis of repeat sales	Other:
AK		X	X	X					
AL			X			X			
AR		X				X			
AZ		X	X			X			
CA									
CO		X	X	X		X			
CT	X								
DC		X					X	X	
DE	X								
FL		X			Local officials submit documentation to the Department asserting what percentage their assessments have been adjusted for cost and/or conditions of sale. The Department may choose to adjust sales prices according to this and other information.	X			
GA		X	X	X				X	
HM			X					X	
HN		X				X			
IA		X	X	X					MRA
ID		X				X			
IL		X	X	X		X		X	
IN		X				X	X	X	
KS		X	X	X		X	X	X	date-of-sale variable from MRA models
KY	X								
LA		X					X		
MA		X				X		X	
MD			X						
ME	X					X		X	
MI		X	X	X		X	X	X	
MN		X			Financing	X			
MO		X			location and time weighted				Sales closer to the effective date are given more weight.
MS	X								
MT			X						
NC	X								
ND			X						
NE				X					
NH		X	X			X			
NU	X								
NM	X								
NV		X	X			X	X	X	
NY		X				X		X	
OH	X								
OK			X						We use values either set within the year before the sale for the Performance Audit or values set within the year after the sale for the Equalization Study
OR		X	X	X	machinery and equipment	X	X	X	
PA	X								
RI		X							computer algorithm based on the quarter of the year and trended by formula
SC	X								
SD		X	X						
TN			X						
TX		X	X	X		X	X		
UT		X	X	X	Financing	X		X	
VA			X	X					
VT			X		concessions				
WA			X	X	Personal and intangible personal property are excluded from the real property sales price. Sales price is adjusted 1% for other non-identified personal property values transferred that are not assessable as Real Property (WAC 458-53-080)				
WI			X	X		X			
WV			X						
WY		X	X			X		X	

Appendix C. (continued)

No. >	Q21		Q22	
State	Level	Regarding sample size, what is the smallest sample you will use to evaluate any category of property?	Do you establish sample size quotas or goals (e.g., 3% of parcels in category or a number based on a statistical sample size formula)?	Comment:
AK		10 to 19 observations	No	
AL		5 to 9 observations	Yes	
AR	X	Less than 5 observations	No	
AZ	X	10 to 19 observations	No	
CA				
CO	X	More than 30 observations	No	Use all data available from counties
CT		Less than 5 observations	Yes	must have at least 3 valid sales for each category of property. If any category of property does not have at least 3 valid then the ratio used for that category is the overall median ratio for all properties.
DC		10 to 19 observations	No	
DE				Not applicable
FL	X	More than 30 observations	Yes	Sample size is calculated using the formula based on COV
GA	X	Depends on the formula for minimum sample size.	No	
HM	X	5 to 9 observations	No	
HN		5 to 9 observations	No	
IA	X	10 to 19 observations	No	
ID	X	5 to 9 observations	No	
IL	X	20 to 30 observations	Yes	Illinois Department of Revenue requires a minimum of 25 qualified (valid) sales to produce an individual jurisdiction sales ratio study.
IN		5 to 9 observations	Yes	
KS		5 to 9 observations	No	
KY		20 to 30 observations	No	
LA		20 to 30 observations	Yes	
MA			Yes	
MD		10 to 19 observations	No	
ME		5 to 9 observations	No	
MI		A sample size that can be supported as representative of the class being studied.	No	
MN	X	5 to 9 observations	Yes	Sample size must be 30 or more for statistics or trends.
MO	X	More than 30 observations	Yes	50 sales for the residential sales studies or 1% of the population.
MS		10 to 19 observations	No	
MT		More than 30 observations	No	
NC		More than 30 observations	No	
ND		More than 30 observations	Yes	In Statute
NE	X	No specific sample size due to the diversity of Nebraska counties	No	
NH	X	5 to 9 observations	Yes	
NJ		Less than 5 observations	No	
NM		20 to 30 observations	No	
NV		5 to 9 observations	Yes	Yes, it varies based on the parcel count of the local jurisdiction as well as the prior ratio study coefficient of variation from standard. We then have an acceptable risk level and desired accuracy to help determine the sample size.
NY		20 to 30 observations	No	
OH	X	Less than 5 observations	No	
OK	X	5 to 9 observations	Yes	1% up to 1,000 samples
OR	X	Less than 5 observations	Yes	For small samples trim no more than 10%
PA	X	Less than 5 observations	No	
RI		Less than 5 observations	No	
SC		Counties required to send all true sales no limit as to # of observations	No	
SD	X	10 to 19 observations	No	
TN		5 to 9 observations	No	
TX		Less than 5 observations	Yes	
UT	X	10 to 19 observations	No	
VA	X	10 to 19 observations	Yes	Depends on the parcel count of the locality.
VT	X	5 to 9 observations	Yes	90% confidence interval required
WA	X	5 to 9 observations	Yes	A minimum 1/2 of 1% of all personal property in the state is selected for ratio study
WI		Percentage of base selling	Yes	Varies by quality of COD and COC, and number of parcels
WV		Less than 5 observations	No	
WY	X	5 to 9 observations	No	

Appendix C. (continued)

Question No. >	Q23				
	Check each measure of level that you calculate and indicate if it is used for direct and/or indirect (funding) equalization.				
State	Comment:	Arithmetic Mean	Median	Weighted Mean	Other
AK		Calculate	Calculate	Both direct and indirect	
AL		Calculate	Direct Equalization	Calculate	
AR			Indirect Equalization		
AZ			Calculate		
CA					
CO	Use all data available from counties	Calculate	Both direct and indirect	Calculate	
CT	must have at least 3 valid sales for each category of property. If any category of property does not have at least 3 valid then the ratio used for that category is the overall median ratio for all properties.	Calculate	Indirect Equalization	Calculate	
DC		Calculate	Calculate	Calculate	
DE	Not applicable				
FL	Sample size is calculated using the formula based on COV	Calculate	Calculate	Both direct and indirect	
GA		Indirect Equalization	Both direct and indirect	Both direct and indirect	
HI			Calculate	Calculate	
HN		Calculate	Calculate	Calculate	most of the general stats used to calc ratio studies.
IA		Calculate	Indirect Equalization	Calculate	
ID		Calculate	Direct Equalization	Indirect Equalization	Geometric mean
IL	Illinois Department of Revenue requires a minimum of 25 qualified (valid) sales to produce an individual jurisdiction sales ratio study.	Calculate	Indirect Equalization		
IN		Indirect Equalization	Indirect Equalization		
KS		Calculate	Calculate	Calculate	also calculate: geometric mean, harmonic mean, broadened median
KY			Calculate		
LA		Calculate	Calculate		
MA				Indirect Equalization	
MD		Calculate	Calculate	Calculate	
ME		Both direct and indirect	Direct Equalization	Direct Equalization	
MI				Indirect Equalization	
MN	Sample size must be 30 or more for statistics or trends.		Direct Equalization		
MO	50 sales for the residential sales studies or 1% of the population.		Calculate	Calculate	
MS		Calculate	Calculate	Calculate	
MT		Calculate	Calculate	Calculate	
NC			Indirect Equalization		
ND	In Statute	Calculate	Direct Equalization	Calculate	
NE		Both direct and indirect	Both direct and indirect	Both direct and indirect	
NH		Indirect Equalization	Indirect Equalization	Indirect Equalization	
NJ				Direct Equalization	
NM		Calculate	Calculate	Calculate	
NV	Yes, it varies based on the parcel count of the local jurisdiction as well as the prior ratio study coefficient of variation from standard. We then have an acceptable risk level and desired accuracy to help determine the sample size.	Calculate	Calculate	Calculate	

Appendix C. (continued)

NY		Calculate	Calculate	Indirect Equalization	
OH			Direct Equalization		
OK	1% up to 1,000 samples	Calculate	Both direct and indirect	Calculate	
OR	For small samples trim no more than 10%	Direct Equalization	Direct Equalization	Direct Equalization	
PA		Calculate	Calculate	Indirect Equalization	
RI				Indirect Equalization	
SC			Calculate		
SD		Calculate	Both direct and indirect	Calculate	The median is the only one used for direct equalization, however, all of the following are measures used in South Dakota sales ratio audits: Range; Average deviation; coefficient of dispersion; sales based average ratio, mean assessed ratio and price rel
TN		Calculate	Both direct and indirect	Calculate	
TX			Indirect Equalization	Indirect Equalization	
UT		Calculate	Indirect Equalization		
VA	Depends on the parcel count of the locality.	Direct Equalization	Direct Equalization	Direct Equalization	
VT	90% confidence interval required	Calculate	Calculate	Indirect Equalization	
WA	A minimum 1/2 of 1% of all personal property in the state is selected for ratio study			Indirect Equalization	
WI	Varies by quality of COD and COC, and number of parcels	Indirect Equalization	Indirect Equalization	Indirect Equalization	
WV		Calculate	Calculate	Calculate	
WY		Indirect Equalization	Calculate	Calculate	

Appendix C. (continued)

No. >	Q23			
	Check each measure of level that you calculate and indicate if it is used for direct and/or indirect (funding) equalization.			
State	Arithmetic Mean	Median	Weighted Mean	Other
AK	Calculate	Calculate	Both direct and indirect	
AL	Calculate	Direct Equalization	Calculate	
AR		Indirect Equalization		
AZ		Calculate		
CA				
CO	Calculate	Both direct and indirect	Calculate	
CT	Calculate	Indirect Equalization	Calculate	
DC	Calculate	Calculate	Calculate	
DE				
FL	Calculate	Calculate	Both direct and indirect	
GA	Indirect Equalization	Both direct and indirect	Both direct and indirect	
HM		Calculate	Calculate	
HN	Calculate	Calculate	Calculate	most of the general stats used to calc ratio studies.
IA	Calculate	Indirect Equalization	Calculate	
ID	Calculate	Direct Equalization	Indirect Equalization	Geometric mean
IL	Calculate	Indirect Equalization		
IN	Indirect Equalization	Indirect Equalization		
KS	Calculate	Calculate	Calculate	also calculate: geometric mean, harmonic mean, broadened median
KY		Calculate		
LA	Calculate	Calculate		
MA			Indirect Equalization	
MD	Calculate	Calculate	Calculate	
ME	Both direct and indirect	Direct Equalization	Direct Equalization	
MI			Indirect Equalization	
MN		Direct Equalization		
MO		Calculate	Calculate	
MS	Calculate	Calculate	Calculate	
MT	Calculate	Calculate	Calculate	
NC		Indirect Equalization		
ND	Calculate	Direct Equalization	Calculate	
NE	Both direct and indirect	Both direct and indirect	Both direct and indirect	
NH	Indirect Equalization	Indirect Equalization	Indirect Equalization	
NJ			Direct Equalization	
NM	Calculate	Calculate	Calculate	
NV	Calculate	Calculate	Calculate	
NY	Calculate	Calculate	Indirect Equalization	
OH		Direct Equalization		
OK	Calculate	Both direct and indirect	Calculate	
OR	Direct Equalization	Direct Equalization	Direct Equalization	
PA	Calculate	Calculate	Indirect Equalization	
RI			Indirect Equalization	
SC		Calculate		
SD	Calculate	Both direct and indirect	Calculate	The median is the only one used for direct equalization, however, all of the following are measures used in South Dakota sales ratio audits: Range; average deviation; coefficient of dispersion; sales based average ratio, mean assessed ratio and PRD.
TN	Calculate	Both direct and indirect	Calculate	
TX		Indirect Equalization	Indirect Equalization	
UT	Calculate	Indirect Equalization		
VA	Direct Equalization	Direct Equalization	Direct Equalization	
VT	Calculate	Calculate	Indirect Equalization	
WA			Indirect Equalization	
WI	Indirect Equalization	Indirect Equalization	Indirect Equalization	
WV	Calculate	Calculate	Calculate	
WY	Indirect Equalization	Calculate	Calculate	

Appendix C. (continued)

No. >	Q24	Q25
State	Do you test the distribution of ratios to see if they are statistically normal?	Do you use confidence intervals (CIs) to determine statistical compliance with standards for appraisal level?
AK	No	No
AL	Yes	No
AR	Yes	Yes
AZ	Yes	Yes
CA		
CO	No	Yes
CT	No	No
DC		No
DE	No	No
FL	No	No
GA	Yes	Yes
HM	Yes	Yes
HN	Yes	Yes
IA	No	No
ID	Yes	Yes
IL	Yes	Yes
IN	No	Yes
KS	Yes	Yes
KY	No	No
LA	No	No
MA	No	No
MD	Yes	No
ME	No	No
MI	No	No
MN	Yes	No
MO	Yes	Yes
MS	Yes	Yes
MT	Yes	Yes
NC	Yes	No
ND	Yes	Yes
NE		No
NH	Yes	Yes
NJ	Yes	No
NM	Yes	Yes
NV	No	Yes
NY	Yes	Yes
OH	No	No
OK	Yes	No
OR	Yes	Yes
PA	No	No
RI	No	No
SC	No	No
SD	Yes	No
TN	Yes	No
TX	Yes	Yes
UT	Yes	Yes
VA	Yes	No
VT	Yes	Yes
WA	No	No
WI	Yes	Yes
WV	Yes	No
WY	Yes	Yes

Appendix C. (continued)

No. >	Q26	Q27	
	If the calculated level of assessment is 86% with a CI ranging from 76% to 95% for a particular group of properties, would you consider the level to be in compliance?	If the calculated level of assessment (point estimate) is out of compliance except for the CI for a particular group of properties, and the calculated level of assessment remains below the required minimum level for several years, which action would your agency take?	
State			Other:
AK			
AL			
AR	Yes (the upper CI overlaps the required minimum level)	Continue to find the jurisdiction in compliance	
AZ		Continue to find the jurisdiction in compliance	
CA			
CO	No (the CI does not overlap 100%)	Other	Situationally, might do all three of the above.
CT			
DC			
DE			
FL			
GA	No (the CI does not overlap 100%)	Continue to find the jurisdiction in compliance	We would stick to the 95% confidence interval.
HM	No (the CI does not overlap 100%)		
HN		Not applicable (CI not used to determine compliance)	
IA	No (the CI does not overlap 100%)	Base the compliance decision on point estimates	
ID	Yes (the upper CI overlaps the required minimum level)	Lower the level of confidence and reevaluate	
IL	Yes (the upper CI overlaps the required minimum level)	Base the compliance decision on point estimates	
IN	Yes (the upper CI overlaps the required minimum level)	Other	Confidence interval, rather than the median ratio itself, is used to determine compliance with the level of assessment benchmark. Local officials would be advised to consider using more sales in their stratum.
KS	Yes (the upper CI overlaps the required minimum level)	Continue to find the jurisdiction in compliance	
KY			
LA			
MA			
MD		Not applicable (CI not used to determine compliance)	
ME			
MI			
MN			
MO	Yes (the upper CI overlaps the required minimum level)	Other	If the weighted median is between 90-110% the county is in compliance. If the weighted median is below 90% , but the COD is 25% or below and the confidence intervals overlap, then the county could still be in compliance.
MS	Yes (the upper CI overlaps the required minimum level)	Not applicable (CI not used to determine compliance)	
MT	Yes (the upper CI overlaps the required minimum level)	Not applicable (CI not used to determine compliance)	
NC			
ND	Yes (the upper CI overlaps the required minimum level)	Base the compliance decision on point estimates	
NE			
NH	Yes (the upper CI overlaps the required minimum level)	Other	
NJ			
NM	Yes (the upper CI overlaps the required minimum level)	Not applicable (CI not used to determine compliance)	
NV		Not applicable (CI not used to determine compliance)	
NY	Yes (the upper CI overlaps the required minimum level)	Lower the level of confidence and reevaluate	Other: Level of assessment may be determined by use of a regression model instead of a ration study if the latter is out of compliance.
OR	Yes (the upper CI overlaps the required minimum level)	other	If one year it is out of standard and if out of standard for 2 or more years, we as an oversight agency will take action under ORS 308.062 requiring 100% RMV. We will make plan with local agency to get into compliance.
PA			
RI			
SC			
SD			
TN			
TX	Yes (the upper CI overlaps the required minimum level)	Not applicable (CI not used to determine compliance)	
UT	No (the CI does not overlap 100%)	Continue to find the jurisdiction in compliance	
VA	Yes (the upper CI overlaps the required minimum level)	Not applicable (CI not used to determine compliance)	
VT	No (the CI does not overlap 100%)	Not applicable (CI not used to determine compliance)	CI required to certify ratios and ultimate ratio is deciding factor for reappraisal order
WA			
WI	No (the CI does not overlap 100%)	Not applicable (CI not used to determine compliance)	
WV			
WY	Yes (the upper CI overlaps the required minimum level)	Continue to find the jurisdiction in compliance	

Appendix C. (continued)

No. >	Q28						Q29
	Which measures or tests of vertical equity do you use? (check all that apply)						Are actions taken to correct vertical inequity?
State	PRD	PRB	Spearman-Rank	Mann-Whitney Test	t-test	Other:	
AK	X						Yes
AL	X						No
AR	X						No
AZ	X			X			No
CA							
CO	X	X		X	X		Yes
CT	X						No
DC	X	X					No
DE							
FL	X	X					Yes
GA	X	X	X	X	X		Unknown. This is performed by the Georgia Department of Audits and Accounts (DOAA)
HI	X						Yes
HN	X	X	X	X	X		Yes
IA	X						No
ID	X	X		X			No
IL	X					PMAD & COC	Yes
IN	X		X	X			Yes
KS	X	X					No
KY							No
LA	X						No
MA	X						Yes
MD	X						No
ME							No
MI	X						No
MN	X	X					Yes
MO	X						Yes
MS	X						Yes
MT	X	X			X		No
NC	X						No
ND	X						Yes
NE	X						Yes
NH	X						No
NI							No
NM	X						No
NV	X				X	Median Related Differential	Yes
NY	X			X	X		No
OH		X		X			No
OK	X					Test for compliance for residential properties for Performance Audit only. Shared with assessor for all property classes for both audits.	No
OR	X						Yes
PA	X						No
RI							No
SC							No
SD	X						Yes
TN	X	X					No
TX				X	X		No
UT	X						No
VA	X						No
VT	X						No
WA						Property is stratified by type and value and a weighted mean is computed for the ratio study and equalization	No
WI	X						No
WV							
WY	X						Yes

Appendix C. (continued)

No. >	Q30			Q31			
	Do you calculate confidence intervals or related tests of statistical significance around any of the following? (check all that apply)			If you compute jurisdiction wide ratio study statistical results, how are they made available? (check all that apply)			
State	Coefficient of dispersion (COD)	Price-related differential (PRD)	Price-related bias (PRB)	Website	Publication	Not made available	Not applicable (We do not compute statewide ratio study statistical results)
AK					X		
AL	X	X				X	
AR	X			X			
AZ	X						
CA							
CO		X		X			
CT							
DC							X
DE							X
FL			X	X	X		
GA							
HM						X	X
HN	X	X	X			X	X
IA				X			
ID	X		X	X	X		
IL				X			
IN							X
KS	X	X	X	X	X		
KY	X					X	
LA	X				X		
MA	X						X
MD				X	X		
ME	X			X			
MI				X			
MN	X	X	X	X	X		
MO	X	X		X			
MS	X	X					
MT				X			
NC				X	X		
ND	X	X		X	X		
NE				X			
NH	X	X		X			
NJ	X			X	X		
NM	X	X		X			
NV	X			X	X		
NY	X	X		X			
OH						X	
OK					X		
OR	X	X			other		
PA				X	X		
RI				X			
SC					X		
SD	X	X		X	X		
TN				X	X		
TX	X			X	X		
UT				X			
VA				X	X		
VT				X			
WA				X			
WI				X			
WV		X			X		
WY	X					X	

Appendix C. (continued)

No. >	Q32	Q33							
State	Do you trim outlier ratios?	If outliers are trimmed, what procedure do you use? (check all that apply)							
		1.5 X interquartile range	3.0 X interquartile range	Beyond 2 standard deviations	Fixed symmetric points (e.g., remove ratios 1.50)	Fixed asymmetric points (e.g., remove ratios 2.00)	Good judgment	Look for logical break points	Other:
AK	Yes	X							Only 1.5X interquartile range is removed, but a maximum of 5% of the sample is removed. Many times this results in 1.5X+ sales being left in the ratio.
AL	Yes				X		X		
AR	Yes	X							
AZ	Yes	X							
CO	Yes			X	X	X	X	X	
CT	No								
DC	Yes					X	Good judgment		
DE	No								
FL	Yes				X				
GA	Yes								Median ratios above .75 and below .10.
HM	Yes				X		X	X	
HN	Yes		X						
IA	No								
ID	Yes	X	X	X			X		
IL	Yes								6x interquartile range from sales data set
IN	Yes	X	X						Based on the first and third quartile.
KS	Yes		X						
KY	No								
LA	Yes	X	X						
MA	No								
MD	Yes				X				
ME	Yes						X		
MI	Yes			X			X	X	
MN	Yes	X							We trim outliers for determining trends only.
MO	Yes								
MS	Yes						X		
MT	Yes	X					X		
NC	Yes	X							
ND	No								
NE	No								
NH	Yes		X						
NJ	No								
NM	Yes		X						
NV	No								
NY	Yes	X							5% trim - 2.5% off both lower and upper ratios
OH	No								
OK	Yes							X	
OR	Yes	X	X						
PA	Yes		X						
RI	Yes					X			
SC	Yes								Our formula: 1/2 (Q3-Q1) divided by the median ratio. Answer is expressed in a percent. A percent over 15 is unacceptable.
SD	No								
TN	Yes			X					
TX	No								
UT	Yes								IAAO Trimming (sales ratio standard)
VA	Yes	X							
VT	Yes	X	X						1.5 questioned and mailer sent- remain in study unless proven otherwise. 3.0 removed
WA	Yes								Sales with ratios <25% and >175% are excluded from the study
WI	Yes						X	X	
WV	Yes			X					
WY	Yes	X	X						

Appendix C. (continued)

No. >	Q34		Q35			
	State	Comment	Order local officials to apply trending factors to individual classes or categories of property	Oversight agency modifies assessed or appraised values	Trend all types of property equally, based on a jurisdiction-wide adjustment factor	Give local officials a compliance grace period to apply indicated factors
		Is there a limit on the maximum percentage of sales that can be trimmed out of a sample? (e.g., 20%)	If you order adjustments to locally determined assessed or appraised values, which of the following procedures are used? (check all that apply)			
AK	Yes	5%				
AL	No		X			
AR	No					
AZ	No					X
CA						
CO	Yes	5% is typical				
CT						
DC	No					
DE						
FL	No					
GA	No					
HM	No					
HN	No					
IA			X			
ID	No		X			X
IL	No					X
IN	No					X
KS	Yes	20%				
KY						
LA	No					X
MA			X			X
MD	No					
ME	No					
MI			X			
MN	No		X			
MO	No					
MS	No					X
MT	No					
NC	No					
ND			X		X	
NE			X			
NH	No					
NJ						
NM	No					
NV						
NY	No					
OH						X
OK	No					
OR	Yes	10%				X
PA	No					
RI	No					
SC	No					
SD	No				X	
TN	No			X		
TX						
UT	No		X			
VA	Yes	10%				
VT	No					
WA	No					
WI	No		X		X	X
WV	No					
WY	No					

Appendix C. (continued)

No. >	Q36		Q37	Q38	
State	In the past three years, what is the average number of jurisdictions found to be out of compliance with appraisal level standards and ordered to adjust locally determined values?		Do you or another oversight agency have authority to order reappraisal of locally determined values on the basis of ratio study results?	In the past three years, what is the average number of local jurisdictions that have been found out of compliance and ordered to reappraise locally determined values?	
	Average number of jurisdictions out of compliance	Total number of assessing jurisdictions overseen		Average number ordered to reappraise per year	Number of months allowed for reappraisal completion
AK	0	24	No		
AL			Yes	0	
AR	0	48	Yes	0	
AZ	4	15	Yes	0	
CA					
CO	0	64	Yes	0	
CT	0	169	No	0	
DC			No		
DE			No		
FL	0	67	Yes	0	
GA			No		
HM			Yes		
HN		1	No		
IA	11	107	Yes	1	
ID	0	44	No		
IL		102	Yes		
IN	0	92 Counties	Yes	0	
KS	0 (about 10% fail to meet require standards, but no action)	105	Yes	0	
KY	9	120	Yes	9	2
LA	2	64	Yes	2	12
MA	< 1%	352	Yes	< 1%	< 6
MD	0	24	No		
ME	2	483 currently	Yes	0	
MI	23	1539	Yes	5	12
MN	8 counties	87 Counties	Yes	0 at county level. 2 jurisdictions within counties.	12
MO	40	115	Yes	25	8-24
MS	0	82	Yes	0	24
MT			No		
NC			Yes	1	36
ND	5	67	Yes	0	
NE	2-3	93 counties	No		
NH		259	No		
NJ	100	564	Yes	0	
NM	5	33	No	0	
NV	1	17	Yes	0-1	7-60 depending on compliance issue.
NY			No		
OH	25%	88	No		
OK	2.3333	all 77 each year	No		
OR	18	36	Yes	3	24
PA	35	67	No		
RI			No		
SC	0	46	No		
SD	3	66	Yes	0	
TN	3	95	No		
TX			No		
UT	0	29	Yes	0	
VA	2	132	No		
VT	15	250	Yes	15	36
WA	0	39	No		
WI	7		Yes		
WV	4		Yes		
WY	0	23	Yes		

Appendix C. (continued)

No. >	Q39			Q40	
	What are your ratio study standards for a range around the legally required level of appraisal?			Do you have a limit in the difference in appraisal level permitted between classes of property and the overall level in the jurisdiction? For example, where the overall level of appraisal is 98%, if residential property were at 104%, it would be more than 5% difference and would not comply with IAAO Standard on Ratio Studies. (Ratio Study Standard Section 11.1.2)	
State	0.95 to 1.05	0.90 to 1.10	Other:		Comment:
AK				Other	Our recommendations to assessors would differ based on whether the jurisdiction is rural or urban.
AL			.98 - 1.02	No	
AR		X		Yes	
AZ			.74 to .90		
CA					
CO	X			No	
CT		X		Yes	
DC		X			
DE			N/A	No	
FL			Equal or greater than 0.90; no upper limit.	Yes	
GA			Georgia property has a level of assessment of 40%. Our range for all classes of property, Residential, Agricultural, Commercial, Industrial acceptable range is .36 to .44.	Other	our level of assessment for Georgia must fall within .36 to .44 for local county jurisdictions to comply.
HM		X		No	
HN		X		No	
IA	X			No	
ID		X		No	
IL			To qualify for salary reimbursement, 3-year average must be 31.33 to 35.33		
IN		X		Yes	
KS		X		No	
KY		X		No	
LA		X		No	
MA		X		Yes	
MD		X		No	
ME			70% to 110%	No	
MI			.49 to .50 based on an assessment level of 50%	No	
MN			.90 to 1.05	No	
MO		X		No	
MS				No	
MT		X		No	
NC				No	
ND			.90-1.00	No	
NE			92 - 100 residential and commercial; 69-75 agricultural land	No	
NH		X		Other	Median Confidence Interval should overlap overall median +/- 5%
NJ			.85-1.00	Other	15% range
NM		X		Yes	
NV			32% to 36% of assessed value to Taxable Value	No	
NY	X			Yes	
OH		X		No	
OK		X	statutory limits 11-13.5% on fractional assessment rates	Other	no more than 1.5% on fractional assessment rates of all 3 classes
OR	X			Yes	
PA				No	
RI				No	
SC				No	
SD			No lower than 85% or higher than 100%	No	
TN		X		Yes	In CVU more than 10% from the overall Median triggers an update.
TX				No	
UT	X	X		No	
VA			.7-1.3	No	
VT			.85 to 1.15	No	
WA		X	assessed values are expected to be at 100% of market value	No	
WI		X		Yes	
WV		X			
WY	X	X		Yes	

Appendix C. (continued)

No. >	Q41		Q42	
State	If you have appraisal level standards, how are they set?		Which of the following horizontal uniformity measures are calculated or used to make compliance determinations? (check all that apply)	
		Other:	Coefficient of dispersion (COD)	Coefficient of variation (COV)
AK			Calculated	Calculated
AL	Administrative rule or regulation		Used to Test for Compliance	
AR	Administrative rule or regulation		Used to Test for Compliance	
AZ	Administrative rule or regulation		Used to Test for Compliance	Calculated
CA				
CO	Administrative rule or regulation		Used to Test for Compliance	Calculated
CT			Used to Test for Compliance	Calculated
DC	Administrative rule or regulation		Calculated	
DE				
FL	Administrative rule or regulation		Used to Test for Compliance	Calculated
GA	Statute		Used to Test for Compliance	Calculated
HM	Statute			
HN	Statute		Calculated	Calculated
IA	Statute		Calculated	
ID	Administrative rule or regulation		Calculated	Calculated
IL	Statute		Used to Test for Compliance	
IN	Administrative rule or regulation		Used to Test for Compliance	
KS	Administrative rule or regulation		Used to Test for Compliance	Calculated
KY	Administrative rule or regulation		Calculated	
LA	Administrative rule or regulation		Used to Test for Compliance	
MA	Administrative rule or regulation		Used to Test for Compliance	Calculated
MD	Administrative rule or regulation		Calculated	Calculated
ME	Statute		Calculated	
MI	Administrative rule or regulation		Calculated	Calculated
MN	Administrative rule or regulation		Used to Test for Compliance	
MO	Other	Study conducted and guidelines set at that time.	Used to Test for Compliance	Calculated
MS	Administrative rule or regulation		Used to Test for Compliance	Used to Test for Compliance
MT	Statute		Calculated	Calculated
NC			Calculated	
ND	Administrative rule or regulation		Calculated	
NE	Statute		Used to Test for Compliance	Calculated
NH	Statute		Used to Test for Compliance	
NJ	Administrative rule or regulation		Calculated	
NM	Other	IAAO Recommendations	Calculated	Calculated
NV	Statute		Used to Test for Compliance	Used to Test for Compliance
NY	Administrative rule or regulation		Used to Test for Compliance	Calculated
OH	Other	determined by EOC condition year by year	Calculated	
OK	Statute		Used to Test for Compliance	Calculated
OR	Statute		Used to Test for Compliance	
PA			Calculated	Calculated
RI				
SC				
SD	Statute		Calculated	
TN	Administrative rule or regulation		Used to Test for Compliance	Used to Test for Compliance
TX	Administrative rule or regulation		Calculated	
UT	Administrative rule or regulation		Used to Test for Compliance	Used to Test for Compliance
VA	Statute		Calculated	
VT	Statute		Used to Test for Compliance	Calculated
WA	Statute		Calculated	
WI	Statute			
WV	Statute		Calculated	
WY	Administrative rule or regulation		Calculated	

Appendix C. (continued)

No. >	Q43					
	If you have specific standards or requirements based on the COD, what is the highest acceptable COD for each of the following categories? (50 char limit per field, enter "NA" for categories that do not apply)					
State	Residential	Commercial / Industrial	Farmland	Timberland	Vacant Land	Other:
AK						
AL	20	20	20	20	20	
AR	20	25	NA	NA	25	
AZ	20%	25%	N/A	N/A	20%	
CA						
CO	15.99	20.99	n/a	n/a	20.99	
CT	20	20	N/A	N/A	20	
DC						IAAO Standards are used for all categories
DE						
FL	Based on IAAO Ratio Study Standard	Based on IAAO Ratio Study Standard	Based on IAAO Ratio Study Standard	Based on IAAO Ratio Study Standard	Based on IAAO Ratio Study Standard	Based on IAAO Ratio Study Standard
GA	0.15	0.2	0.2	0.2	0.2	
HM	15	20	20	20	20	20 per code
HN	IAAO STANDARDS	IAAO STANDARDS	NA	NA	NA	
IA						
ID	15%	20%	NA	NA	20%	
IL	NA	NA	NA	NA	NA	
IN	Improved: Less than or equal to 15.0	Less than or equal to 20.0	N/A	N/A	Less than or equal to 20.0	
KS	20 or less	20 or less	NA	NA	NA	
KY						
LA	20	20			20	
MA	10	20	N/A	N/A	20	2 & 3 Families (12), Multiple Dwellings & Apts (15)
MD	20%	20%	NA	NA	20%	
ME	20	20				
MI						
MN	10 New Homogeneous 15 Older Residential	15 Large Urban 20 Smaller Urban /Rural	20	20	20	Rural Residential and Seasonal Recreational Residential 20, Depressed Markets 25
MO						
MS	20%	20%			20%	
MT						
NC						
ND						
NE	20	20	20			
NH	no greater than .20	no greater than .20				
NJ						15% for all classes
NM	10%	n/a	n/a	n/a		
NV	Newer 5-10, Older 5-15, Rural 5-20	Large 5-15, small 5-20	n/a	n/a	5-25	
NY	15-IAAO	20-IAAO			25-IAAO	
OH						
OK	20	20	20			
OR	25	15	20		20	
PA	30	30	30	30	30	
RI						
SC	n/a					
SD						Per South Dakota Codified Law the COD for all classes of property may not exceed 25
TN	10	15	15	NA	NA	
TX						No maximum.
UT	20	25	25	NA	25	
VA	N/A	N/A	N/A	N/A	N/A	
VT						Overall 20-not per category
WA						
WI						
WV	Improved 15 or less	20 or less			20 or less	
WY	15 or less	20 or less	not specified	not specified	20 or less	

Appendix C. (continued)

No. >	Q44		Q45	
	If you have a standard for vertical inequity based on the PRD, what is the standard?		Do you have a standard for vertical inequity based on the PRB?	
State		Other:		Comment:
AK			No	
AL	PRD 0.98 to 1.03		No	
AR	PRD 0.98 to 1.03		No	
AZ			No	
CA				
CO	PRD 0.98 to 1.03		No	
CT			No	
DC			No	
DE		N/A		
FL	PRD 0.98 to 1.03		Yes	notes and analyzes the PRB when the coefficient is less than -0.05 or greater than 0.05 and the relationship is statistically significant to at least the 95 percent confidence level.
GA	Other	For Georgia Department of Audits and Accounts (DOAA) for QBE is .98-1.03. For Georgia Department of Revenue (DOR) we use .95-1.10 to measure bias and for the local county jurisdiction to comply.	Yes	.95-1.10
HM	PRD 0.98 to 1.03		No	
HN			No	no standard but we try to follow IAAO standards
IA			No	
ID	PRD 0.98 to 1.03		Yes	.05 - .1 considered questionable; >.1 fails standard
IL			No	
IN	PRD 0.98 to 1.03		No	
KS	PRD 0.98 to 1.03		No	
KY				
LA			No	
MA			No	
MD	PRD 0.98 to 1.03		Yes	
ME			No	
MI			No	
MN	PRD 0.98 to 1.03		Yes	-0.03 and 0.03
MO	PRD 0.98 to 1.03		No	
MS			Yes	.92-1.08
MT	PRD 0.98 to 1.03		No	
NC			No	
ND	PRD 0.98 to 1.03		No	
NE	PRD 0.98 to 1.03		No	
NH	PRD 0.98 to 1.03		No	
NJ				
NM	PRD 0.98 to 1.03		No	
NV	PRD 0.98 to 1.03		No	
NY	PRD 0.98 to 1.03		No	
OH				
OK	PRD 0.98 to 1.03		No	
OR	PRD 0.98 to 1.03		No	
PA	PRD 0.98 to 1.03		No	
RI			No	
SC				
SD	PRD 0.98 to 1.03		No	
TN	PRD 0.98 to 1.03		No	
TX			No	
UT	PRD 0.98 to 1.03		No	
VA	PRD 0.98 to 1.03		No	
VT			No	
WA			No	
WI	PRD 0.98 to 1.03		No	
WV	PRD 0.98 to 1.03		No	
WY	PRD 0.98 to 1.03		No	

Appendix C. (continued)

No. >	Q46			Q47					
	What actions can your agency initiate as a result of assessment uniformity?			Is the action dependent upon confidence intervals or related tests of statistical significance?					
State	Order a reappraisal	Withhold funding	Other	Yes, for PRD	Yes, for PRB	Yes, for COD	Yes, for COV	No (action based on point estimate)	Not applicable (no action taken)
AK			The State Assessor's Office could in theory issue a Letter of Major Error if property is not sufficiently uniform, but this has never been done.						X
AL	X					X			
AR	X	X	X			X			
AZ	X					X			
CA									
CO	X							X	
CT									X
DC									
DE									
FL	X							X	
GA			The county has to pay a \$5 per parcel penalty or agree to go under a consent order agreement authorized by the State Revenue Commissioner and the Local County jurisdiction to correct the deficiency (s) within the next 3 year digest cycle. In addition, the IDOR may withhold County Reimbursement and/or Performance Based Compensation					X	
HM								X	
IA	X								
ID									X
IL	X	X				X			
IN	X		Generally, local officials will be instructed to review and adjust assessments to achieve uniformity; however, a reappraisal could be ordered.					X	
KS	X	X	Could remove a county appraiser from office			X			
KY	X								X
LA	X	X				X			
MA			If the statistics do not conform to our standards, we can deny approval of the values.			X			
MD									X
ME	X								X
MI	X		Factor the assessment roll by county and class					X	
MN	X			X	X	X			
MO		X				X			
MS	X	X			X	X			
MT			If we noticed any issues we would direct our local field offices to evaluate their market models etc.						X
NC			We recently developed our NC Reappraisal Standards. If counties trigger thresholds in the Median or COD, our office will recommend (not mandatory) for that county to conduct a reappraisal within (3) years.						X
ND	X			X		X			
NE			Work with the local county assessor to ensure uniformity and proportionality					X	
NH								X	
NJ	X								X
NM			We can talk or work with the assessors to try and get them within acceptable uniformity levels.					X	X
NV			Recommendations are made to the Nevada Tax Commission which is the governing board and they can make orders.			X	X		
NY		X	Essentially no action is taken, but aid payments for conducting a reassessment can be withheld if assessments are found to be not uniform	X		X			
OH		X						X	
OK			extended noncompliance requires a formal action plan set by the Oklahoma Tax Commission and can move to placing appointed personnel into the county assessor's office					X	
OR	X	X		X		X			
PA									
RI									
SC									X
SD	X		If necessary to keep all tax spread uniformity throughout the State, we may require a higher equalization factor as the remedy to bring the county into compliance.			X			
TN			Potential non-compliance resulting in corrective action.	X		X			
TX									X
UT	X							X	
VA									
VT	X					X			
WA			Audit county assessor records and procedures and direct corrections						X
WI	X					X			
WV			Recommend steps to address assessment deficiencies			X			
WY									X

Appendix C. (continued)

No. >	Q48(1)	Q48(2)	Q48(3)	Q49	Q50
State	In the past three years, what is the average number of times your agency has ordered a jurisdiction to reappraise as a result of assessment uniformity?	In the past three years, what is the average number of times your agency has withheld funding as a result of assessment uniformity?	Total number of jurisdictions overseen	Do you have legal requirements to check for sales chasing?	Do you test for sales chasing?
AK	0	0	24	No	No
AL	0	0	67	Informal requirement	Yes
AR	0	0	48	Yes	Yes
AZ	0	0	15	Informal requirement	Yes
CA					
CO	0	0	64	No	Yes
CT	0	0	169	No	No
DC				Yes	Yes
DE				No	No
FL	0	0	67	No	Yes
GA				No	No
HM				No	Yes
HN				No	No
IA	0		107	No	No
ID				No	Yes
IL			102	No	No
IN	0		92 Counties	Informal requirement	Yes
KS	0	0	105	No	Yes
KY	9	0	120	No	No
LA	2		64	No	No
MA	< 1%		352	No	Yes
MD				No	Yes
ME	0	0	483 currently	Yes	Yes
MI	5	0	1539	No	Yes
MN	0	0	87	No	Yes
MO				Informal requirement	Yes
MS	0 for real property			No	No
MT				No	Yes
NC				No	No
ND	0	0	67	No	Yes
NE	1	0	93	No	Yes
NH			259	No	No
NJ	0		564	Yes	No
NM	0	0	33	Yes	Yes
NV	1	0	17	No	No
NY				Informal requirement	Yes
OH	25% of counties for that year	0	88	Informal requirement	Yes
OK				No	No
OR	2	0	36	Yes	Yes
PA			67	Informal requirement	No
RI	0	0	39	No	No
SC	-0-	0	46	No	No
SD	0		66	Informal requirement	Yes
TN	0	0	0	Informal requirement	Yes
TX				Informal requirement	Yes
UT	0	0	29	Informal requirement	Yes
VA				Yes	Yes
VT	5-10	0	250	Informal requirement	No
WA	0	0	39	Informal requirement	Yes
WI				No	Yes
WV	0	0	55	No	Yes
WY	0	0	23	Yes	No

Appendix C. (continued)

No. >	Q51					Q52
	If you test for sales chasing, what techniques do you use? (check all that apply)					Has a lower limit on the COD been established as an indicator of possible sales chasing?
State	Comparison of average percentage changes in appraised values of sold and unsold properties	Comparison of average unit values of sold and unsold properties	Split sample technique (using sales before and after the appraisal date)	Comparison of observed vs. expected distribution of ratios	Mass appraisal techniques	
AK						No
AL	X	X			X	No
AR	X					No
AZ	X					No
CA						
CO	X	X			X	5
CT						No
DC	X					No
DE						No
FL	X					COD=5
GA	X				X	
HM	X				X	Yes, 5
HN						
IA						
ID	X					5%
IL						No
IN	X					No
KS						No
KY						No
LA						No
MA				X		
MD	X	X	X			No
ME	X					No
MI					X	No
MN	X		X	X		5 are considered suspect. 4 and lower are flagged
MO	X					
MS						No
MT	X	X				No
NC						No
ND					X	No
NE	X	X	X		X	5 or less
NH						No
NJ						No
NM			X			
NV						
NY	X	X				No
OH	X	X				No
OK						No
OR	X		Split sample technique (using sales before and after appraisal date)		Mass appraisal techniques	No
PA						5
RI						No
SC						
SD			X			No
TN			X			5
TX	X			X		No
UT	X					IAAO Standard
VA	X	X	X	X	X	5
VT						No
WA	X					No
WI			X	X		No
WV			X		X	No
WY	X	X				No

Appendix C. (continued)

No. >	Q53	Q54						
	Is a ratio study conducted for personal property?	How are the results of your personal property ratio study used?						
State		To order adjustments to locally determined assessed values	To equalize higher-level government shared funding of local jurisdictions	To order local jurisdictions to reappraise	To advise assessment officials of assessment conditions	To assist mass appraisal programs	To approve tax assessment roll	To adjust or equalize centrally determined assessed values (such as public utilities or railroads)
AK	No							
AL	No							
AR	Yes			X	X			
AZ	No							
CA								
CO	Yes			X				
CT	No							
DC	Not applicable							
DE	No							
FL	No							
GA	No							
HM	Not applicable							
HN	No							
IA	No							
ID	No							
IL	No							
IN	No							
KS	No							
KY	No							
LA	No							
MA	No							
MD	Not applicable							
ME	No							
MI	Yes				X			
MN	No							X
MO	No							
MS	No							
MT	No							
NC	No							
ND	No							
NE	No							
NH	No							
NJ	Not applicable							
NM	Not applicable							
NV	Yes	X			X	X		
NY	No							
OH	Not applicable							
OK	No							
OR	No							
PA	Not applicable							
RI	No							
SC	No							
SD	No							
TN	No							
TX	Yes	X		X				
UT	No							
VA	No							
VT	No							
WA	Yes		X		X			X
WI	No		X	X	X			
WV	No							
WY	No							

Appendix C. (continued)

No. >	Q55	Q56					
State	Does your agency perform procedural audits of local assessment procedures/practices?	Which categories of real property are audited? (check all that apply)					
		Residential	Commercial	Industrial	Agricultural	Timberland	Other:
AK	Yes	X	X	X			
AL	No						
AR	Yes	X	X	X	X	X	
AZ	No						
CA							
CO	Yes	X	X	X	X		
CT	No						
DC	No						
DE	No						
FL	Yes	X	X	X			Government owned property
GA	No						
HM	No						
HN	No						
IA	Yes	X	X	X			
ID	Yes				X		
IL	No						
IN	No						
KS	Yes	X	X	X	X		
KY	Yes	X	X		X		
LA	No						
MA	Yes	X	X	X			
MD	No						
ME	Yes	X	X	X	X	X	
MI	Yes	X	X	X	X	X	
MN	Yes	X	X	X	X	X	
MO	Yes	X	X		X		Agricultural land is based on productivity value in Missouri
MS	Yes	X	X	X	X	X	
MT	No						
NC	No						
ND	No						
NE	Yes	X	X	X	X		
NH	No						
NJ	No						
NM	Yes						
NV	Yes	X	X	X	X		
NY	Yes	X	X	X	X	X	
OH	No						
OK	Yes	X	X	X	X		
OR	Yes	X	X	X	X	X	
PA	Yes	X	X	X	X	X	Oil, Gas, Mineral
RI	No						
SC	No						
SD	Yes	X	X	X	X		
TN	Yes	X	X	X	X		
TX	Yes	X	X	X	X	X	
UT	No						
VA	Yes	X	X	X	X	X	
VT	No						
WA	Yes				X		
WI	Yes						
WV	Yes	X	X	X	X		
WY	Yes	X	X	X	X		

Appendix C. (continued)

No. >	Q57	Q58						
	Is the audit used INSTEAD OF a ratio study?	How is the procedural audit used?						
State		To order adjustments to locally determined assessed values	To equalize higher-level government shared funding of local jurisdictions	To order local jurisdictions to reappraise	To advise assessment officials of deficiencies or to recommend improvements in assessment procedures	To assist mass appraisal programs	To approve tax assessment roll	Other:
AK	No				X	X		
AL								
AR	No			X	X			
AZ								
CA								
CO	No			X	X			
CT	No							
DC	Not applicable							
DE								
FL	No				X			
GA								
HM								
HN								
IA	No							Statutory compliance
ID	Yes	X			X			
IL								
IN								
KS	No				X	X		Statutes require the state oversight agency to identify all counties that are not in substantial compliance with mass appraisal procedures (annual requirement)
KY	No				X			
LA								
MA	No	X		X	X		X	
MD								
ME	No		X		X	X		
MI	No			X	X			
MN	No	X		X	X	X	X	
MO	No				X	X		
MS	Yes				X	X	X	
MT	No							
NC								
ND								
NE	No			X	X			
NH	No							
NJ								
NM	No				X	X		
NV	No				X	X		
NY	No				X	X		
OH								
OK	No				X	X		
OR	No				X	X		
PA	No							To verify total taxable assessments for market value calculations.
RI								
SC	No							
SD	No				X			
TN	No				X	X		
TX	No				X			
UT	No				X	X	X	
VA	No				X	X		
VT								
WA	Yes		X		X			equalize state-assessed utility company values
WI	No				X			
WV	No				X			
WY	No							

Appendix C. (continued)

No. >	Q59			Q60	Q61	Q62
State	Can any of the following initiate legal action as a result of your ratio study?			Some jurisdictions are seeing rapidly changing market conditions. With this in view, are you:	Please provide relevant information and comments about new issues, recent changes and court cases related to your ratio study practices. (600 char limit)	Please share any comments you may have about this survey (400 char limit)
	Taxing jurisdiction (e.g., school district)	Centrally assessed property (for example, railroads or public utilities)	Taxpayers			
AK						Alaska's State Assessor has very little authority in general. We make recommendations to communities but have very little power to order changes.
AL		X		Seeing more jurisdictions out of compliance with your standards		
AZ				Both seeing more jurisdictions out of compliance with your standards and contemplating a change to standards		
CA						
CO					The state prepared for possible significant changes due to the covid pandemic, but no changes were necessary. In the end, the counties did a great job.	
CT	X					
DC						
DE					All three Counties in the State of Delaware are currently under a court ordered mandate to reassess all real property.	
FL	X	X	X		Added more median requirements for roll approval	
GA	X	X		Seeing more jurisdictions out of compliance with your standards		
HM					With no oversight, ratio study is an internal document. Counties in HI have home rule so there is no state requirements	
HN					Our jurisdiction is fortunate enough to have lots of sales to make it easier to conduct studies with results mostly in compliance. Our values are relatively high compared with national numbers but our ratios are generally a little less than 1 probably due	It showed what I was lacking in my knowledge of sales ratios, mostly about using the CI and application to the report and our law.
IA						
ID		X		Seeing more jurisdictions out of compliance with your standards		
IL	X		X		Market conditions have been difficult to react to in a timely manner based on exterior forces exhibited from pandemic. Many areas are working to address shift of valuations.	Very comprehensive questions, thank you for including IDOR.
IN				Seeing more jurisdictions out of compliance with your standards	Over the past couple of years, we have implemented Microsoft Teams for jurisdictions to submit their ratio study. This has enhanced our review and communications with the jurisdictions. We have also migrated to using "R Software" which has enhanced our ef	
KS		X	X	Seeing more jurisdictions out of compliance with your standards		
KY	X	X	X	Seeing more jurisdictions out of compliance with your standards		
LA	X					
MA				Time trending of sales used in some communities		
ME	X				Due to uncharacteristically high selling prices state wide, many municipalities are revaluing properties, or applying a factor to existing values, as many reimbursement dollars are tied to assessment levels in Maine	

Appendix C. (continued)

MI	X	X			Our ratio studies are performed as part of state equalization. We also audit local unit assessment practices.	In Michigan, 1500+ local units set values by parcel. Each of the 83 counties conduct sales ratio +/- or appraisal studies to determine ratios by class which to local units must meet (.49 - .50). When out of that range, the counties can factor by unit and class, and the state can factor counties by class.
MO				Seeing more jurisdictions out of compliance with your standards		
NC	X	X				
NE				Seeing more jurisdictions out of compliance with your standards		
NH	X			Seeing more jurisdictions out of compliance with your standards		
NJ	X			Seeing more jurisdictions out of compliance with your standards		
NM				Seeing more jurisdictions out of compliance with your standards	Nothing set in stone yet we are compiling data and working with axiomatic to get the sales ratio studies streamlined. In years past we had the assessors perform their SBS and we would review and publish them. State statute are weak in this area and have b	
NV	X		X	Seeing more jurisdictions out of compliance with your standards		
NY	X		X	Seeing more jurisdictions out of compliance with your standards		
OH	X			Seeing more jurisdictions out of compliance with your standards		
OK				Both seeing more jurisdictions out of compliance with your standards and contemplating a change to standards		The Statutory Ratio Study (Equalization Study) reports median and COD on each property class. Compliance action is directly taken on measured fractional median assessments versus constitutional limits. COD's can be acted on but have not been.
OR	X	X	X	Both seeing more jurisdictions out of compliance with your standards and contemplating a change to standards		Will the results of the survey be shared with the participants?
PA	X	X	X	Seeing more jurisdictions out of compliance with your standards		
RI	X	X				The State performs the study, I am answering for the State as a local assessor. I worked for the Division of Municipal Finance, under the Department of Revenue. Municipal Finance is the division performing the ratio study, and I personally administered
SC						Ratio studies on only properties that sell 15% cap on increases in value due to reassessment. Residential (owner occupied) properties no longer pay school operating taxes
SD	X	X				
TN	X					
TX	X					
UT				Seeing more jurisdictions out of compliance with your standards		
VA				Seeing more jurisdictions out of compliance with your standards		
VT				Seeing more jurisdictions out of compliance with your standards		
WA		X				
WI	X			Seeing more jurisdictions out of compliance with your standards		
WV	X		X			
WY						

Appendix D. Results of 2022 Survey of Ratio Study Practices in Canada

Question No.		Q2	Q3		Q4	
State	Abbr.	What is your jurisdiction type?	How often does your jurisdiction conduct ratio studies? Indicate if annual or explain other variations.	Other:	Who produces the result of the ratio study? (check all that apply)	Comment:
Dept Municipal Affairs, Alberta	AB	Provincial agency	Annual		Provincial officials	
British Columbia	BC	Provincial agency	Annual		Provincial officials	
Manitoba	MB	Provincial agency	Other	Ratio studies are done every two years as a qualify assurance check on reassessment values	Provincial officials	
New Brunswick	NB	Provincial agency	Annual		Provincial officials	
Newfoundland	NF	Provincial agency	Not required			Not used
Property Valuation Services Corp (Nova Scotia Canada)	NS	Non Profit - Scope Provincial	Annual		Provincial officials	
Ontario	ON	Provincial agency	Other	Every four years to align with revaluation cycle	Contracted service provider (university or private company)	
Saskatchewan Assessment Management Agency	SK	Provincial agency	Annual		Provincial officials Local officials	

No. >	Q5							
	How is the oversight ratio study used? (check all that apply)							
State	To order adjustments to locally determined assessed values if necessary	To equalize higher-level, government-shared funding of local jurisdictions	To order local jurisdictions to reappraise	To advise assessment officials of assessment conditions	To assist mass appraisal programs	To approve tax assessment roll	To adjust or equalize centrally determined assessed values (such as public utilities or railroads)	Other (please specify)
AB	X	X	X	X		X	X	
BC				X	X			
MB				X	X			
NB				X				
NF								
NS				X	X			
ON				X	X	X		
SK				X		X		The Ratio Report is required by provincial legislation, pursuant to The Quality Assurance Order.

Appendix D. (continued)

No. >	Q6				Q7				Q8
State.	Please indicate any concepts from the IAAO Standard on Ratio Studies that have been incorporated into your statutes (legislation) or rules and regulations.				Please indicate any concepts from the IAAO Standard on Ratio Studies that have been incorporated into your guidelines.				Which of the following does the oversight agency real property ratio study include?
	None	Level	Horizontal uniformity	Vertical uniformity	None	Level	Horizontal uniformity	Vertical uniformity	
AB		X	X	X	X				Sales only
BC	X					X	X	X	Sales only
MB	X					X	X	X	Sales only
NB		X	X	X		X	X	X	Sales only
NF	X				X				Sales only
NS						X	X	X	Sales only
ON	X					X	X	X	Sales only
SK		X				X	X	X	Sales only

No. >	Q9	Q10					Q11	Q12
State.	If both sales and appraisals are used in the question above, can they be combined in order to study one type or category of property?	What is the time period from which sales are used in the oversight agency ratio study? (check all that apply)					Which agency primarily performs the sales sample selection? (check all that apply)	Which agency primarily conducts the sales validation (screening)? (check all that apply)
		One year	Multiple years	Flexible time period (varies by jurisdiction or category)	Sales period mostly before assessment date	Sales period mostly after assessment date		
AB				X			Provincial agency	Local agency
BC		X	X	X	X		Local agency	Provincial agency
MB			X		X		State agency	Provincial agency
NB				X	X		Local agency	Provincial agency
NF			X				Provincial agency	Not applicable
NS		X			X		State agency	Not applicable
ON			X				Local agency	Local agency
SK			X	X	X		Local agency	Combination of government levels

Appendix D. (continued)

No. >	Q13	Q14	Q15		Q16	
State.	If the oversight agency does NOT conduct the sales validation, does the agency perform an audit of the sales validation process?	Does your jurisdiction have a law requiring disclosure of real estate sales prices to assessment officials?	Are disclosed sale prices public records?	Comment:	Is a value-related fee charged (e.g., transfer tax, deed stamp) for real property transfers?	Fee amount:
AB	Yes	Yes, disclosure made to both	Yes		Yes	\$50 base plus \$2 for every \$5,000 or portion thereof the property value.
BC	Not applicable	Yes, disclosure made to state/provincial/national/territory officials	Yes		Yes	
MB	Yes	Yes, disclosure made to state/provincial/national/territory officials	Yes		Yes	Land transfer tax is pro-rated based on transaction price. \$0-30K 0%, next \$60K is 1%, next \$50k is 1.5%, portion over \$200k is 2.0%.
NB	Not applicable	Yes, disclosure made to state/provincial/national/territory officials	Yes		Yes	
NF	Yes	Yes, disclosure made to state/provincial/national/territory officials	No		Yes	The land registry does charge a rate, I think it is approximately \$150
NS	Not applicable	Yes, disclosure made to both	Yes		Yes	Up to MU to determine if they will charge. Can charge up to 1.5% based on current legislation.
ON	Yes	Yes, disclosure made to state/provincial/national/territory officials	Yes		Yes	All land transfers are subject to a provincial land transfer tax paid at time of registration. Rates range from 0.5 - 2.5% based on the sale price of the property. The City of Toronto has an additional land transfer tax with similar rates as the province
SK	No	Yes, disclosure made to local assessors	Yes	Yes; A list of sales used in the study are available. Some jurisdictions post the sales on its website.	Yes	Fees vary on a sliding scale on value and property type. Up to \$500 is free; \$501 to \$8,400 is \$25; \$8,401 > is 0.3% of the value on the transfer document. Condominiums have a slightly different fee structure.

Appendix D. (continued)

No. >	Q17	Q18					Q19				
State.	Does your jurisdiction have a law making recordation/registration mandatory for real property transfers?	Is there authority to adjust sale prices in your ratio studies? (check all that apply)					Which of the following adjustments to sale price are used in your ratio studies? (check all that apply)				
		No authority	Time	Personal property (chattels)	Intangible personal property	Other:	Not applicable	Time	Personal property (chattels)	Intangible personal property	Other:
AB	Yes		X	X		assumed leases, off-site levies, non-assessable property.		X	X		Assumed leases, off-site levies, non-assessable property.
BC	Yes	X						X	X	X	Sale prices may be adjusted for goodwill or beneficial financing
MB	Yes		X	X	X			X	X	X	
NB	Yes		X	X	X			X			
NF	No		X	X	X			X			
NS	Yes		X	X	X	HST (tax on sale) and deed transfer tax			X	X	
ON	Yes		X	X		Atypical financing		X			
SK	Yes		X	X				X	X		

Appendix D. (continued)

No. >	Q23				Q24	Q25	Q26
State	Check each measure of level that you calculate and indicate if it is used for direct and/or indirect (funding) equalization.				Do you test the distribution of ratios to see if they are statistically normal?	Do you use confidence intervals (CIs) to determine statistical compliance with standards for appraisal level?	If the calculated level of assessment is 86% with a CI ranging from 76% to 95% for a particular group of properties, would you consider the level to be in compliance?
	Arithmetic Mean	Median	Weighted Mean	Other			
AB		Calculate	Indirect Equalization		No	No	
BC		Calculate			Yes	Yes	Yes (the upper CI overlaps the required minimum level)
MB		Calculate			No	Yes	Yes (the upper CI overlaps the required minimum level)
NB		Calculate			No	No	
NF	Calculate	Calculate	Calculate		Yes	No	
NS	Calculate	Calculate	Calculate		No	Yes	Yes (the upper CI overlaps the required minimum level)
ON		Calculate			No	Yes	Yes (the upper CI overlaps the required minimum level)
SK		Calculate			No	No	

No. >	Q27		Q28						Q29
State	If the calculated level of assessment (point estimate) is out of compliance except for the CI for a particular group of properties, and the calculated level of assessment remains below the required minimum level for several years, which action would your agency take?		Which measures or tests of vertical equity do you use? (check all that apply)						Are actions taken to correct vertical inequity?
		Other:	PRD	PRB	Spearman-Rank	Mann-Whitney Test	t-test	Other:	
			X						No
BC		It is not a question of legal compliance. There is no legal reference to ratio studies in BC. However, we have internal standards. A jurisdiction with a calculated level below the standard would be rectified prior to completion of the assessment roll.	X	X					Yes
MB		We would flag the area for further analysis and revise valuation models to meet standards.	X	X					Yes
NB			X						Yes
NF			X						Yes
NS	Base the compliance decision on point estimates		X	X		X		Mann-Whitney compliance used for internal only. Kruskal-Wallis	No
ON	Continue to find the jurisdiction in compliance		X	X				Graphical representation of ratios vs. primary property value attributes	No
SK			X			X			No

Appendix D. (continued)

No. >	Q30			Q31				Q32
State	Do you calculate confidence intervals or related tests of statistical significance around any of the following? (check all that apply)			If you compute jurisdiction wide ratio study statistical results, how are they made available? (check all that apply)				Do you trim outlier ratios?
	Coefficient of dispersion (COD)	Price-related differential (PRD)	Price-related bias (PRB)	Website	Publication	Not made available	Not applicable (We do not compute statewide ratio study statistical results)	
AB					X			No
BC	X							No
MB	X	X	X			X		Yes
NB						X		Yes
NF								
NS			X	X				Yes
ON	X	X	X					Yes
SK				X				Yes

No. >	Q33								Q34
State	If outliers are trimmed, what procedure do you use? (check all that apply)								Is there a limit on the maximum percentage of sales that can be trimmed out of a sample? (e.g., 20%)
	1.5 X interquartile range	3.0 X interquartile range	Beyond 2 standard deviations	Fixed symmetric points (e.g., remove ratios 1.50)	Fixed asymmetric points (e.g., remove ratios 2.00)	Good judgment	Look for logical break points	Other:	Comment:
AB									
BC									
MB	X								No iaao Standard +/- 10%
NB				X					Yes We specify a limit of 10% of the sample size.
NF									
NS	X							Use natural logarithm of ASR to get a statically symmetrical outlier range.	Yes less than 20% can be trimmed
ON	X	X							Yes typically 5%
SK									Yes No more than 10%. Per IAAO.

Appendix D. (continued)

No. >	Q35				Q36		Q37
State	If you order adjustments to locally determined assessed or appraised values, which of the following procedures are used? (check all that apply)				In the past three years, what is the average number of jurisdictions found to be out of compliance with appraisal level standards and ordered to adjust locally determined values?		Do you or another oversight agency have authority to order reappraisal of locally determined values on the basis of ratio study results?
	Order local officials to apply trending factors to individual classes or categories of property	Oversight agency modifies assessed or appraised values	Trend all types of property equally, based on a jurisdiction-wide adjustment factor	Give local officials a compliance grace period to apply indicated factors	Average number of jurisdictions out of compliance	Total number of assessing jurisdictions overseen	
AB					2	335	Yes
BC					0	200	Yes
MB							No
NB	X				50% segments	10,000+ segments	No
NF							No
NS							No
ON					0	0	No
SK					0	0	No

No. >	Q38		Q39			Q40	
State	In the past three years, what is the average number of local jurisdictions that have been found out of compliance and ordered to reappraise locally determined values?		What are your ratio study standards for a range around the legally required level of appraisal?			Do you have a limit in the difference in appraisal level permitted between classes of property and the overall level in the jurisdiction? For example, where the overall level of appraisal is 98%, if residential property were at 104%, it would be more than 5% difference and would not comply with IAAO Standard on Ratio Studies. (Ratio Study Standard Section 11.1.2)	
	Average number ordered to reappraise per year	Number of months allowed for reappraisal completion	0.95 to 1.05	0.90 to 1.10	Other:		Comment:
AB	0		X			No	
BC	0			X		Other	There are no prescribed limits for assessments. However, there are some limitations with respect to the difference in tax rates that can be applied to different classes within a given jurisdiction.
MB			X			Yes	
NB				X		No	
NF			X			No	
NS				X		Other	Internally like to see within 5% - informational only
ON	0			X		Yes	
SK			X			Other	Yes; There are two groups. Residential and Non-Residential. Each group is required to strive for the target of 1.00 and be in the range 0.95 to 1.05.

Appendix D. (continued)

No. >	Q41		Q42	
State	If you have appraisal level standards, how are they set?		Which of the following horizontal uniformity measures are calculated or used to make compliance determinations? (check all that apply)	
		Other:	Coefficient of dispersion (COD)	Coefficient of variation (COV)
AB	Administrative rule or regulation		Used to test compliance	
BC	Other	The legislation requires "market value" for most property types.	Calculated	
MB	Other	IAAO Standards are used by provincial agency as a guideline	Used to test compliance	
NB	Administrative rule or regulation		Calculated	
NF	Administrative rule or regulation			
NS	Other	Internal Policy and procedures	Calculated	
ON	Other	Internal policy	Used to test compliance	
SK	Other	Statute requires the adherence of the Quality Assurance Standard (QAS) Order. The QAS is established by the Agency and approved by Board Order and has the force of law.	Calculated	

No. >	Q43						Q44	
State	If you have specific standards or requirements based on the COD, what is the highest acceptable COD for each of the following categories? (50 char limit per field, enter "NA" for categories that do not apply)						If you have a standard for vertical inequity based on the PRD, what is the standard?	
	Residential	Commercial / Industrial	Farmland	Timberland	Vacant Land	Other:		Other:
AB	0-15	0-20			0-20			
BC	15 and 20% for urban and rural respectively						PRD 0.98 to 1.03	
MB							PRD 0.98 to 1.03	
NB	<=15%	<=20%	<=20%		<=20%		PRD 0.98 to 1.03	
NF								
NS	5-20%	5-20%	5-20%	5-20%	5-20%			
ON	25	25	25		30		PRD 0.98 to 1.03	
SK	12%-16% Urban; Ag small community 30%-35%	17%-21% Urban; Ag small community 35%-40%			17% to 21% Urban res & comm urban; Ag small comm 35% to 40% res & comm	A Benchmark Matrix was developed by community type with performance categories from excellent to poor. The target is "typical" represented above from the most active market to least active markets. Better results can be achieved in larger active markets.	PRD 0.98 to 1.03	

Appendix D. (continued)

No. >	Q45		Q46		
State	Do you have a standard for vertical inequity based on the PRB?		What actions can your agency initiate as a result of assessment uniformity?		
		Comment:	Order a reappraisal	Withhold funding	Other
AB	No				Audit can order a review of the municipality's assessment function. Called a detailed audit.
BC	Yes				Assessment uniformity issues are addressed prior to completion of the annual assessment roll if practical. Data quality issues (data quality not meeting internal standards) are addressed within a multi-year data maintenance plan.
MB	Yes	IAAO Standard (+/- 10%)	X		
NB	No		X		
NF	No				
NS	Yes	-10 to +10			
ON	Yes	+/- .10 (align with IAAO Standards)			
SK	Yes	IAAO Standard. However, the PRD is not a mandatory or statutory compliance measure.			

No. >	Q47						Q48(1)	Q48(2)	Q48(3)
State	Is the action dependent upon confidence intervals or related tests of statistical significance?						In the past three years, what is the average number of times your agency has ordered a jurisdiction to reappraise as a result of assessment uniformity?	In the past three years, what is the average number of times your agency has withheld funding as a result of assessment uniformity?	Total number of jurisdictions overseen
	Yes, for PRD	Yes, for PRB	Yes, for COD	Yes, for COV	No (action based on point estimate)	Not applicable (no action taken)			
AB						X	0	335	
BC							0	0	
MB					X				
NB					X		2	11 regions	
NF									
NS							0	0	
ON						X	0	0	
SK							0	0	

Appendix D. (continued)

No. >	Q49	Q50	Q51					Q52
State	Do you have legal requirements to check for sales chasing?	Do you test for sales chasing?	If you test for sales chasing, what techniques do you use? (check all that apply)					Has a lower limit on the COD been established as an indicator of possible sales chasing?
			Comparison of average percentage changes in appraised values of sold and unsold properties	Comparison of average unit values of sold and unsold properties	Split sample technique (using sales before and after the appraisal date)	Comparison of observed vs. expected distribution of ratios	Mass appraisal techniques	
AB	Informal requirement	Yes	X					less than 5%
BC	No	Yes	X				X	Below 5% for most properties.
MB	No	Yes	X	X				5
NB	No	Yes	X	X				<5%
NF	No	Yes	X					
NS	Informal requirement	Yes	X					below 5% can indicate
ON	No	Yes	X	X				5
SK	Informal requirement	Yes	X	X				

No. >	Q53	Q54						Q55
State	Is a ratio study conducted for personal property?	How are the results of your personal property ratio study used?						Does your agency perform procedural audits of local assessment procedures/practices?
		To order adjustments to locally determined assessed values	To equalize higher-level government shared funding of local jurisdictions	To order local jurisdictions to reappraise	To advise assessment officials of assessment conditions	To assist mass appraisal programs	To approve tax assessment roll	To adjust or equalize centrally determined assessed values (such as public utilities or railroads)
AB	No							Yes
BC	Not applicable							Yes
MB	Not applicable							No
NB	No							Yes
NF	No							No
NS	Not applicable							No
ON	Not applicable							No
SK	No							Yes

Appendix D. (continued)

No. >	Q56						Q57
State	Which categories of real property are audited? (check all that apply)						Is the audit used INSTEAD OF a ratio study?
	Residential	Commercial	Industrial	Agricultural	Timberland	Other:	
AB	X	X	X	X	X		No
BC	X	X	X	X	X		No
MB							
NB	X	X	X				No
NF							
NS							
ON							
SK	X	X					Yes

No. >	Q58							Q59		
State	How is the procedural audit used?							Can any of the following initiate legal action as a result of your ratio study?		
	To order adjustments to locally determined assessed values	To equalize higher-level government shared funding of local jurisdictions	To order local jurisdictions to reappraise	To advise assessment officials of deficiencies or to recommend improvements in assessment procedures	To assist mass appraisal programs	To approve tax assessment roll	Other:	Taxing jurisdiction (e.g., school district)	Centrally assessed property (for example, railroads or public utilities)	Taxpayers
AB				X						
BC				X	X					
MB										
NB				X						
NF										
NS										
ON										
SK				X						

Appendix D. (continued)

No. >	Q60	Q61	Q62
State	Some jurisdictions are seeing rapidly changing market conditions. With this in view, are you:	Please provide relevant information and comments about new issues, recent changes and court cases related to your ratio study practices. (600 char limit)	Please share any comments you may have about this survey (400 char limit)
AB			
BC			
MB			
NB	Seeing more jurisdictions out of compliance with your standards		
NF			
NS			Answered as the assessment agency. Minister has accountability for the legislation (Assessment Act), there is a Memo of Understanding (MOU) with the DMAH (and other impacted departments with data exchange) whereby the Dept may conducted a periodic audit if required.
ON			No provincial oversight exists in Ontario. All reporting on ratio studies etc is completed by the Office of the Quality Commissioner and reported up to MPAC's Board of Directors Quality Assurance Committee as information. Results are reported to local municipalities through as part of Service Level Agreement (SLA) after each province-wide revaluation
SK		One outstanding Court of Appeal case has yet to be decided on the legality of the COD measure of uniformity and whether the strict IAAO guidelines apply to Saskatchewan's small rural communities.	

Appendix E. Results of 2022 Survey of Ratio Study Practices in countries outside North America

Question No. >		Q2	Q3		Q4	
State	Abbr.	What is your jurisdiction type?	How often does your jurisdiction conduct ratio studies? Indicate if annual or explain other variations.	Other:	Who produces the result of the ratio study? (check all that apply)	Comment:
Estonia	ES	National agency	Other	Not historically done	State officials	
the Netherlands	NT	National agency	Annual		Local officials	
New Zealand	NZ	State agency	Annual		State officials Territory officials	
Western Australia	WL	State agency	Annual		State officials	

No. >	Q5							
	How is the oversight ratio study used? (check all that apply)							
State	To order adjustments to locally determined assessed values if necessary	To equalize higher-level, government-shared funding of local jurisdictions	To order local jurisdictions to reappraise	To advise assessment officials of assessment conditions	To assist mass appraisal programs	To approve tax assessment roll	To adjust or equalize centrally determined assessed values (such as public utilities or railroads)	Other (please specify)
Estonia					X			
the Netherlands	X					X		
New Zealand	X		X	X	X	X		
Western Australia						X		

No. >	Q6				Q7				Q8
	Please indicate any concepts from the IAAO Standard on Ratio Studies that have been incorporated into your statutes (legislation) or rules and regulations.				Please indicate any concepts from the IAAO Standard on Ratio Studies that have been incorporated into your guidelines.				Which of the following does the oversight agency real property ratio study include?
State	None	Level	Horizontal uniformity	Vertical uniformity	None	Level	Horizontal uniformity	Vertical uniformity	
Estonia	X					X	X	X	Both sales and appraisals conducted by or contracted by the agency
the Netherlands		X	X	X			X	X	Sales only
New Zealand			X	X			X	X	Both sales and appraisals conducted by or contracted by the agency
Western Australia			X	X			X	X	Appraisals conducted by or contracted by the agency only

Appendix E. (continued)

No. >	Q9	Q10						Q11	Q12
	If both sales and appraisals are used in the question above, can they be combined in order to study one type or category of property?	What is the time period from which sales are used in the oversight agency ratio study? (check all that apply)						Which agency primarily performs the sales sample selection? (check all that apply)	Which agency primarily conducts the sales validation (screening)? (check all that apply)
State		One year	Multiple years	Flexible time period (varies by jurisdiction or category)	Sales period mostly before assessment date	Sales period mostly after assessment date	Sales period equally before and after the assessment date		
Estonia	Yes		X					Combination of government levels	State agency
the Netherlands	Not applicable						X	State agency	Local agency
New Zealand	Yes			X	X			State agency	Contracted service provider Combination of government levels
Western Australia	Not applicable				X			State agency	State agency

No. >	Q13	Q14	Q15	Comment:	Q16
State	If the oversight agency does NOT conduct the sales validation, does the agency perform an audit of the sales validation process?	Does your jurisdiction have a law requiring disclosure of real estate sales prices to assessment officials?	Are disclosed sale prices public records?		Is a value-related fee charged (e.g., transfer tax, deed stamp) for real property transfers? Fee amount:
Estonia		Yes, disclosure made to state/provincial/national/territory officials	No		Yes It is very limited, depends of the sum, less than 0.5% in most cases
the Netherlands	Yes	Yes, disclosure made to both	Yes		Yes
New Zealand	Yes	Yes, disclosure made to state/provincial/national/territory officials	Yes		No
Western Australia		No	Yes		Yes 0 - \$80,000 \$1.90 per \$100 or part thereof \$80,001 - \$100,000 \$1,520 + \$2.85 per \$100 or part thereof above \$80,000 \$100,001 - \$250,000 \$2,090 + \$3.80 per \$100 or part thereof above \$100,000 \$250,001 - \$500,000 \$7,790 + \$4.75 per \$100 or part thereof

Appendix E. (continued)

No. >	Q17	Q18					Q19				
	Does your jurisdiction have a law making recordation/ registration mandatory for real property transfers?	Is there authority to adjust sale prices in your ratio studies? (check all that apply)					Which of the following adjustments to sale price are used in your ratio studies? (check all that apply)				
State		No authority	Time	Personal property (chattels)	Intangible personal property	Other:	Not applicable	Time	Personal property (chattels)	Intangible personal property	Other:
Estonia	Yes		X					X			
the Netherlands	Yes		X					X			
New Zealand	Yes			X	X				X	X	
Western Australia	\$1.90 per \$100 or part thereof \$80,001 - \$100,000	\$1,520 + \$2.85 per \$100 or part thereof above \$80,000 \$100,001 - \$250,000	\$2,090 + \$3.80 per \$100 or part thereof above \$100,000 \$250,001 - \$500,000	\$7,790 + \$4.75 per \$100 or part thereof"	Yes	Sale prices may be adjusted to consider special circumstances. Suitable evidence and reasoning must be recorded to support this opinion.		X			Adjustment for incentives (sales and rents) Adjustment for non-real property such as chattels (sales and rents) Adjustment for value of improvements (improved sales) Adjustment for value of outgoing (rents)

No. >	Q20				Q21	Q22	
	Which time adjustment methods are used in ratio studies? (check all that apply)				Regarding sample size, what is the smallest sample you will use to evaluate any category of property?	Do you establish sample size quotas or goals (e.g., 3% of parcels in category or a number based on a statistical sample size formula)?	
State	Tracking trends in sales ratios over time	Tracking changes in value per unit over time	Analysis of repeat sales	Other:		Comment:	
Estonia		X	X		It is not limited	Yes	
the Netherlands	X				20 to 30 observations	No	
New Zealand					5 to 9 observations	No	
Western Australia		X			At the discretion of the Valuer and Valuer-General	No	

Appendix E. (continued)

No. >	Q23				Q24	Q25	Q26
	Check each measure of level that you calculate and indicate if it is used for direct and/or indirect (funding) equalization.				Do you test the distribution of ratios to see if they are statistically normal?	Do you use confidence intervals (CIs) to determine statistical compliance with standards for appraisal level?	If the calculated level of assessment is 86% with a CI ranging from 76% to 95% for a particular group of properties, would you consider the level to be in compliance?
State	Arithmetic Mean	Median	Weighted Mean	Other			
Estonia	Calculate	Calculate	Calculate		Yes	Yes	
the Netherlands	Calculate	Calculate	Calculate		Yes	No	
New Zealand	Calculate	Calculate			Yes	Yes	No (the CI does not overlap 100%)
Western Australia	Calculate	Calculate	Calculate		No	No	No

No. >	Q27		Q28						Q29
	If the calculated level of assessment (point estimate) is out of compliance except for the CI for a particular group of properties, and the calculated level of assessment remains below the required minimum level for several years, which action would your agency take?		Which measures or tests of vertical equity do you use? (check all that apply)						Are actions taken to correct vertical inequity?
State		Other:	PRD	PRB	Spearman-Rank	Mann-Whitney Test	t-test	Other:	
Estonia	Not applicable (CI not used to determine compliance)		X	X					Yes
the Netherlands			X						Yes
New Zealand	Continue to find the jurisdiction in compliance		X						Yes
Western Australia		No	No				X		

No. >	Q30			Q31				Q32
	Do you calculate confidence intervals or related tests of statistical significance around any of the following? (check all that apply)			If you compute jurisdiction wide ratio study statistical results, how are they made available? (check all that apply)				Do you trim outlier ratios?
State	Coefficient of dispersion (COD)	Price-related differential (PRD)	Price-related bias (PRB)	Website	Publication	Not made available	Not applicable (We do not compute statewide ratio study statistical results)	
Estonia	X	X				X		Yes
the Netherlands							X	No
New Zealand	X	X				X		No
Western Australia				Yes				

Appendix E. (continued)

No. >	Q33							Q34	
	If outliers are trimmed, what procedure do you use? (check all that apply)							Is there a limit on the maximum percentage of sales that can be trimmed out of a sample? (e.g., 20%)	
State	1.5 X interquartile range	3.0 X interquartile range	Beyond 2 standard deviations	Fixed symmetric points (e.g., remove ratios 1.50)	Fixed asymmetric points (e.g., remove ratios 2.00)	Good judgment	Look for logical break points	Other:	Comment:
Estonia							X		No
the Netherlands									
New Zealand									
Western Australia				No					

No. >	Q35				Q36		Q37
	If you order adjustments to locally determined assessed or appraised values, which of the following procedures are used? (check all that apply)				In the past three years, what is the average number of jurisdictions found to be out of compliance with appraisal level standards and ordered to adjust locally determined values?		Do you or another oversight agency have authority to order reappraisal of locally determined values on the basis of ratio study results?
State	Order local officials to apply trending factors to individual classes or categories of property	Oversight agency modifies assessed or appraised values	Trend all types of property equally, based on a jurisdiction-wide adjustment factor	Give local officials a compliance grace period to apply indicated factors	Average number of jurisdictions out of compliance	Total number of assessing jurisdictions overseen	
Estonia							No
the Netherlands	X			X	30	352	No
New Zealand	X			X	30%	67	Yes
Western Australia							

Appendix E. (continued)

No. >	Q38		Q39			Q40	
	In the past three years, what is the average number of local jurisdictions that have been found out of compliance and ordered to reappraise locally determined values?		What are your ratio study standards for a range around the legally required level of appraisal?			Do you have a limit in the difference in appraisal level permitted between classes of property and the overall level in the jurisdiction? For example, where the overall level of appraisal is 98%, if residential property were at 104%, it would be more than 5% difference and would not comply with IAAO Standard on Ratio Studies. (Ratio Study Standard Section 11.1.2)	
State	Average number ordered to reappraise per year	Number of months allowed for reappraisal completion	0.95 to 1.05	0.90 to 1.10	Other:		Comment:
Estonia					Not fixed	No	
the Netherlands			X			Yes	
New Zealand	30%	6 mos		X		No	
Western Australia				No			

No. >	Q41		Q42		Q43					
	If you have appraisal level standards, how are they set?		Which of the following horizontal uniformity measures are calculated or used to make compliance determinations? (check all that apply)		If you have specific standards or requirements based on the COD, what is the highest acceptable COD for each of the following categories? (50 char limit per field, enter "NA" for categories that do not apply)					
State		Other:	Coefficient of dispersion (COD)	Coefficient of variation (COV)	Residential	Commercial / Industrial	Farmland	Timberland	Vacant Land	Other:
Estonia			Calculated							
the Netherlands		The Netherlands Council for Real Estate Assessments sets the appraisal level standards	Used to Test for Compliance		20					
New Zealand	Administrative rule or regulation		Used to Test for Compliance		12	12	12	12	12	
Western Australia					Administrative rule or regulation		Used to Test for Compliance	Calculated	GRV<7% UV<15%	GRV<7% UV<15%

Appendix E. (continued)

No. >	Q44		Q45		Q46		
	If you have a standard for vertical inequity based on the PRD, what is the standard?		Do you have a standard for vertical inequity based on the PRB?		What actions can your agency initiate as a result of assessment uniformity?		
State		Other:		Comment:	Order a reappraisal	Withhold funding	Other
Estonia			No				
the Netherlands	PRD 0.98 to 1.03		No				X
New Zealand	PRD 0.98 to 1.03		No		X		
Western Australia	GRV<7% UV<15%		GRV<7% UV<15%		PRD 0.98 to 1.03		No

No. >	Q47						Q48(1)	Q48(2)	Q48(3)	Q49
	Is the action dependent upon confidence intervals or related tests of statistical significance?						In the past three years, what is the average number of times your agency has ordered a jurisdiction to reappraise as a result of assessment uniformity?	In the past three years, what is the average number of times your agency has withheld funding as a result of assessment uniformity?	Total number of jurisdictions overseen	Do you have legal requirements to check for sales chasing?
State	Yes, for PRD	Yes, for PRB	Yes, for COD	Yes, for COV	No (action based on point estimate)	Not applicable (no action taken)				
Estonia										No
the Netherlands	X	X	X				0	0	352	Yes
New Zealand	X		X				30%		67	No
Western Australia		X			X		X	X		

No. >	Q50	Q51					Q52
	Do you test for sales chasing?	If you test for sales chasing, what techniques do you use? (check all that apply)					Has a lower limit on the COD been established as an indicator of possible sales chasing?
State		Comparison of average percentage changes in appraised values of sold and unsold properties	Comparison of average unit values of sold and unsold properties	Split sample technique (using sales before and after the appraisal date)	Comparison of observed vs. expected distribution of ratios	Mass appraisal techniques	
Estonia	No						No
the Netherlands	Yes	X	X	X		X	5
New Zealand	Yes	X	X	X		X	No
Western Australia	0	0	Entire state	Informal Req	No		

Appendix E. (continued)

No. >	Q53	Q54							Q55
State	Is a ratio study conducted for personal property?	How are the results of your personal property ratio study used?							Does your agency perform procedural audits of local assessment procedures/practices?
		To order adjustments to locally determined assessed values	To equalize higher-level government shared funding of local jurisdictions	To order local jurisdictions to reappraise	To advise assessment officials of assessment conditions	To assist mass appraisal programs	To approve tax assessment roll	To adjust or equalize centrally determined assessed values (such as public utilities or railroads)	
Estonia	No								No
the Netherlands	Not applicable								Yes
New Zealand	No								Yes
Western Australia				No	No				

No. >	Q56						Q57
State	Which categories of real property are audited? (check all that apply)						Is the audit used INSTEAD OF a ratio study?
	Residential	Commercial	Industrial	Agricultural	Timberland	Other:	
Estonia							No
the Netherlands	X	X	X	X			No
New Zealand	X	X	X	X	X		No
Western Australia				Yes	X	X	X

No. >	Q58							Q59		
State	How is the procedural audit used?							Can any of the following initiate legal action as a result of your ratio study?		
	To order adjustments to locally determined assessed values	To equalize higher-level government shared funding of local jurisdictions	To order local jurisdictions to reappraise	To advise assessment officials of deficiencies or to recommend improvements in assessment procedures	To assist mass appraisal programs	To approve tax assessment roll	Other:	Taxing jurisdiction (e.g., school district)	Centrally assessed property (for example, railroads or public utilities)	Taxpayers
Estonia										
the Netherlands				X		X				
New Zealand				X	X					
Western Australia	X			No				X	X	

Appendix E. (continued)

No. >	Q60	Q61	Q62
State	Some jurisdictions are seeing rapidly changing market conditions. With this in view, are you:	Please provide relevant information and comments about new issues, recent changes and court cases related to your ratio study practices. (600 char limit)	Please share any comments you may have about this survey (400 char limit)
Estonia	Not applicable		This study is probably mainly related to US. Estonian system is quite different. Valuation is carried out by the state authority. The only annual property tax is based on land values only. We do not have any special regulation about ratio studies.
the Netherlands	Not applicable		
New Zealand	Seeing more jurisdictions out of compliance with your standards	Ratios are set in the NZ Rating Valuations Rules 2008 and have been consistent since 1998 - they have proven reliable barometers of revaluation accuracy and no plans to increase/decrease the 4 tests we run nor change to parameters	Ratio studies remain a critical part of our regulatory process when deciding whether or not to certify a revaluation
Western Australia			