CITY AND BOROUGH OF JUNEAU

ASSESSOR OFFICE

APPEAL #2023-0052

2023 REAL PROPERTY APPEAL PACKET

BOARD OF EQUALIZATION JUNE 29th, 2023

Appellant: Steven Ricci

Location: 5735 Thane Rd.

Parcel No.: 1B0201070052

Property Type: Single Family Residence

Appellant's basis for appeal: My property value is excessive and overvalued. "Attached is the appeal form and an analysis of neighborhood comparable properties. Clearly demonstrating that the value of 5735 building is one of the highest in the area, and yet one of the oldest being built in 1960. The house is small making it less attractive than others with similar sq/ft values. The house is also in need of major repair. Roof, driveway and siding all need significant work. I can produce estimates for the work if required but the roof alone is $40K."

"The property (land) is well overvalued. The adjacent neighbor is at $1.17 sq/ft - it is flat buildable land. 5735 is hilly and unusable with streams eroding the hillside. Several others are listed, all of which are larger tracks making them more attractive and have better usable land."

Appellant's Estimate of Value		**Original Assessed Value**		**Recommended Value**	
Site:	$101,873	Site:	$151,500	Site:	$151,500
Buildings:	$230,400	Buildings:	$343,800	Buildings:	$333,000
Total:	$332,273	Total:	$495,300	Total:	$485,000

Subject Photo

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Overview

The subject is a 1,536 square foot average quality, two-story single-family residence that includes a 463sf detached, good quality cabin that was finished in 2021. The residence is located on a 1.87-acre lot at 5735 Thane Rd in the Thane neighborhood. The original single-family home was built in 1960 according to CBJ records. The subject resides on a neighborhood lot with moderate steepness and slight wetness.

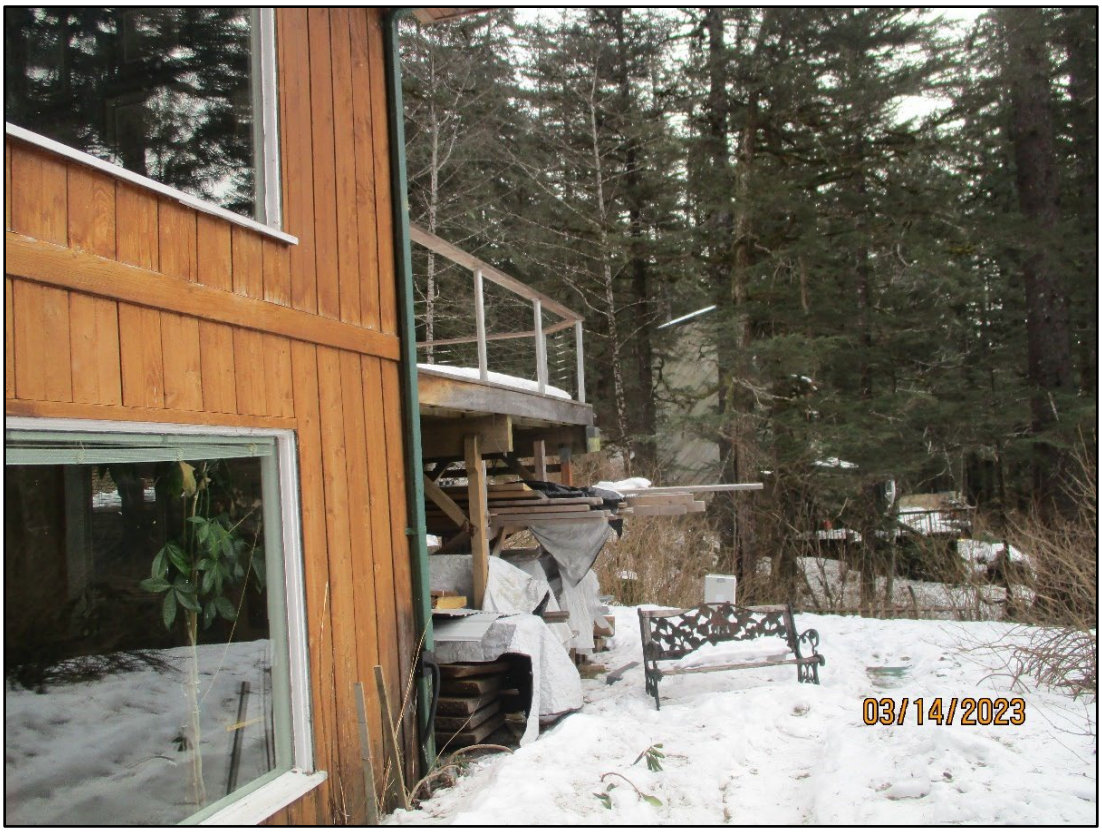
The appellant refused our request for an interior inspection and request for interior photos. After reviewing our information, an increase in depreciation was made to the single-family residence.

Subject Characteristics:

- Land
  - 1.87 Acre / 81,499 Sf lot
  - No view
  - Moderate Steepness
  - Slightly Wet
- Main Building
  - Average Quality
  - Average Condition
  - 1,536 SF GLA
  - Average depreciation
- Cabin
  - Good Quality
  - Good Condition
  - 464sf
  - Below Average Depreciation

Front:

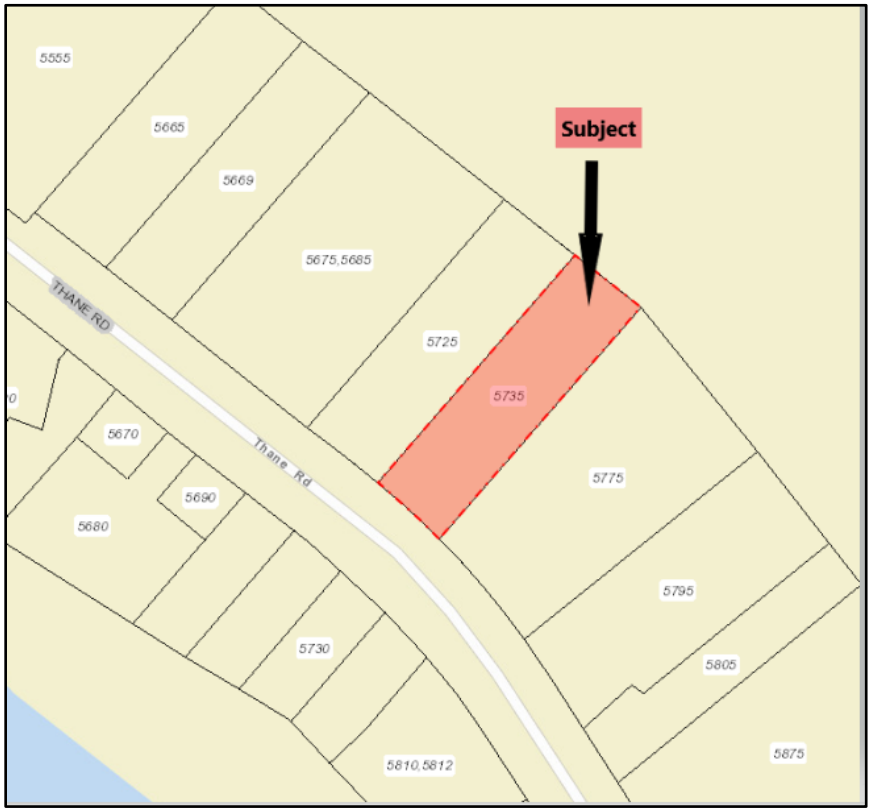
Photos


03/14/2023


03/14/2023

2 Story Cabin/Yoga studio:

Area Map & Aerial



Land Valuation

Land values are developed on a neighborhood basis. The land is examined to understand the typical land characteristics within the neighborhood. These characteristics include size, slope, view, water frontage, significant wetlands and other factors which are used to develop a neighborhood land valuation model. This model is tested and refined in consideration of sales of vacant and developed parcels. The resulting model is then applied to all land in the neighborhood to establish assessed site values. The subject parcel's base rate value of $175,223 is in equity with the Thane neighborhood single family residences that are of similar square footage. The subject parcel is characteristically below average for its neighborhood due to steep topography and wetness.

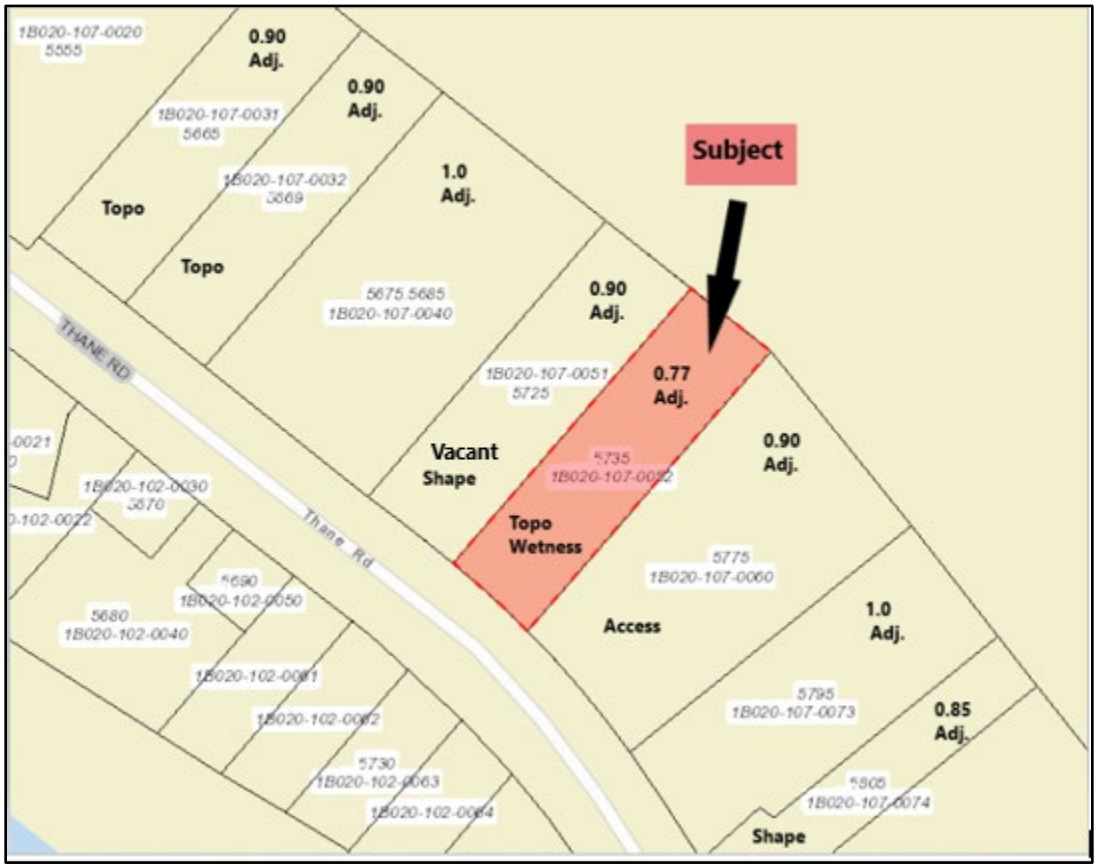
Land Characteristics:

- 81,499 SF lot
- Moderate Topography Adjustment
- Slight Wetness Adjustment

Land base rate valuation –Thane– Lot size 34,284 sf – 86,551 sf

PCN	Z	AreaAC	AreaSF	BaseRateSF	LOC	SIZE	TOPO	ACCESS	WET	VIEW	WTFT	SHAPE	Base.Value	SiteAdj.Fc	VacAdj	Site.Value	EffRate.SF
1B0201070074	D1	1.24	54,039	3.05	100	100	100	100	100	100	100	85	164,819	0.85		158,300	2.93
1B0201070032	D1	1.85	80,789	2.16	100	100	90	100	100	100	100	100	174,504	0.90		177,500	2.20
1B0201070052	D1	1.87	81,499	2.15	100	100	85	100	90	100	100	100	175,223	0.77		151,500	1.86
1B0201070051	D1	1.99	86,551	2.03	100	100	100	100	100	100	100	90	175,699	0.90	50,000	116,800	1.35
1B0201070031	D1	1.99	86,826	2.03	100	100	90	100	100	100	100	100	176,257	0.90		179,300	2.07
1B0201070073	D1	2.54	110,841	1.71	100	100	100	100	100	100	100	100	189,538	1.00		214,200	1.93
1B0201070060	D1	3.48	151,589	1.35	100	100	100	90	100	100	100	100	204,645	0.90		176,900	1.17
1B0201070040	D1	3.84	167,270	1.23	100	100	100	100	100	100	100	100	205,742	1.00		232,500	1.39

Land Adjustments – Subject and Neighbors:



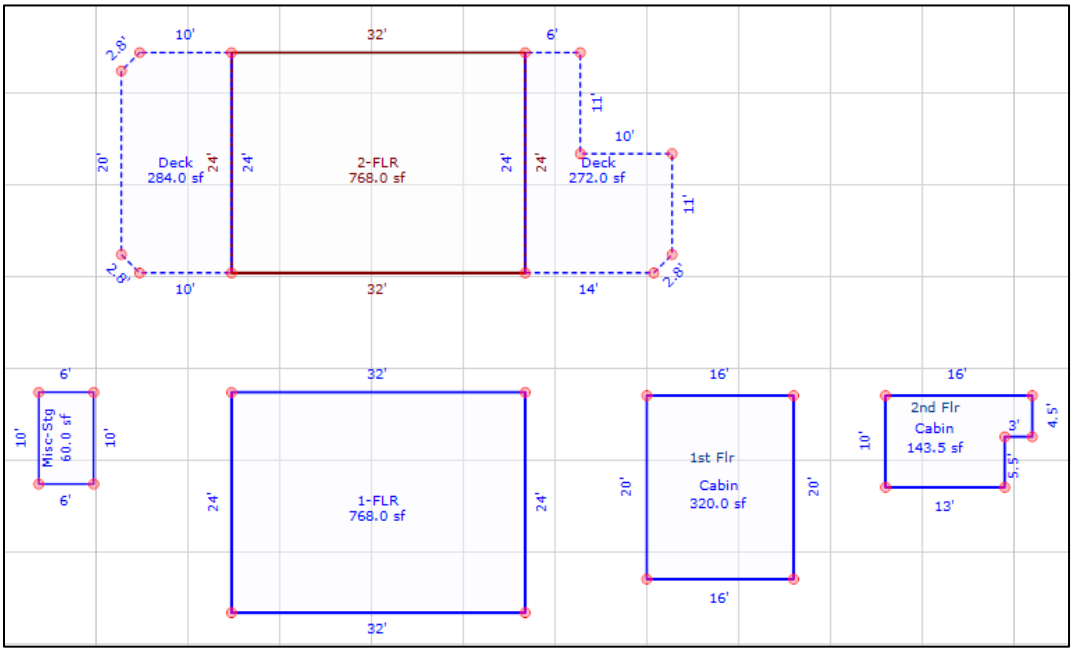
Building Valuation

Buildings are valued using a cost approach to value by: (1) calculating the current cost to reproduce or replace improvements such as buildings and (2) subtracting out physical, functional, or economic depreciation evident in the structures. This provides a uniform basis for the valuation of all buildings in the Borough.

For any given parcel, the buildings are valued by the Cost Approach and the land value is determined by the neighborhood model. These two values combined produce a total basis value for the parcel. This combined value is then adjusted to market value by application of neighborhood adjustments developed by analysis of neighborhood sales. This sales analysis is done each year to establish assessed values.

- Building Characteristics:
  - Average Quality
  - Average Condition
  - 1,536 SF GLA
  - Average Depreciation
- Cabin
  - Good Quality
  - Good Condition
  - 464sf
  - Below Average Depreciation

Sketch of Improvements:



Area Code	Base Area	Actual Area	Heated Area	Heated Percentage	Living Area	Effective Area
Main Living Area	768	768	768		768	768
2nd Level	768	768	768		768	768
Misc. Storage Area	60	60	0		0	60
Cabin	464	464	0		0	464
Wood Deck	556	556	0		0	556

Cost Report

5/11/2023 3:00:57PM Page 1

Cost Report - Residential

72		Record	1
Parcel Code Number	**1B0201070052**	**Building Type**	R- Single-family Residence
Owner Name	**RICCI STEVEN D**	**Quality**	3
Parcel Address	**5735 THANE RD**	**Construction**	Stud Frame
Effective Year Built	2001	**Total Livable**	1536
Year Built	1960	**Style**	Two Story

Improvement	Description	Quantity	Unit Cost	Percent	+/-	Total
Base						
Exterior	Frame, Siding, Wood		104.00	100%		
Roof	Metal, Preformed		2.56	100%		
Heating	Electric Baseboard		-0.53	90%		
Heating	Floor Radiant, Hot Water		0.26	10%		
Adjusted Base Cost		1,536	106.29			163,266
Exterior Improvement(s)						
Porch	Wood Deck (SF)	556	15.00			8,340
Total						**8,340**
Additional Feature(s)						
Feature	Fixture	8				14,400
Total						**14,400**
Sub Total						**186,006**
Condition	Average					
Local Multiplier				1.22	[X]	226,927
Current Multiplier				1.14	[X]	258,697
Quality Adjustment					[X]	258,697
Neighborhood Multiplier					[X]	258,697
Depreciation - Physical			1.00 [X]	23.00	[-]	59,500
Depreciation - Functional					[-]	0
Depreciation - Economic					[-]	0
Percent Complete				100.00	[-]	199,197
Cost to Cure						
Neighborhood Adjustment				132	[X]	63,743
Replacement Cost less Depreciation						**262,940**

Miscellaneous Improvements				
Miscellaneous Improvement	Misc stg with carpor		[+]	2,500
Solid Fuel Heater			[+]	2,000
HDV			[+]	4,000
Storage Shed Under 200SF			[+]	1,000
Cabin Avg to Gd Quality	Moved to complete fo		[+]	61,100
Total Miscellaneous Improvements				**70,600**
Total Improvement Value		**[Rounded]**		**$333,500**

Assessment History

Note: 2023 history value below does not show proposed change to $485,000.

1B0201070052
STEVEN D RICCI
5735 THANE RD
KENAI LT 25B

YEAR_ID	LAND_VALUE	MISC_VALUE	BLDG_VALUE	CAMA_VALUE
2023	$151,500.00	$70,600.00	$273,200.00	$495,300.00
2022	$144,800.00	$70,600.00	$213,200.00	$428,600.00
2021	$144,800.00	$30,900.00	$192,100.00	$367,800.00
2020	$144,800.00		$196,800.00	$341,600.00
2019	$144,800.00	$8,500.00	$182,600.00	$335,900.00
2018	$147,500.00	$8,500.00	$180,200.00	$336,200.00
2017	$146,100.00		$184,200.00	$330,300.00
2016	$141,900.00		$179,300.00	$321,200.00
2015	$130,200.00		$190,800.00	$321,000.00
2014	$130,200.00		$190,800.00	$321,000.00
2013	$130,200.00		$184,400.00	$314,600.00
2012	$130,000.00	$2,000.00	$195,000.00	$327,000.00

Summary

As a result of this petition for review, **a change was made** to the depreciation of the single-family building. Land and buildings are valued using the same methods and standards as all other properties in the Borough.

The appellant states that “value is excessive”. State statute requires the Assessor to value property at “full and true value”. According to appraisal standards and practices set by the Alaska Association of Assessing Officers, the State of Alaska Office of the State Assessor, and the International Association of Assessing Officers, correct procedures of assessment were followed for the subject. These standards and practices include consideration of any market value increase or decrease as determined by analysis of sales. Values have risen in Juneau; the current valuation of the subject reflects this increase.

The appellant declined multiple requests for interior photos or an inspection.

After the above referenced changes were made as the result of this review, the Assessor proposes a slight decrease to the 2023 assessment as follows:

2023 Proposed Value: Site: $151,500 Improvements: $333,500 Total: $485,000

Mary Hammond

From: Jacob Clark
Sent: Tuesday, March 21, 2023 10:55 AM
To: Tony Perletti
Subject: FW: Petition For Review - 1B0201070052
Attachments: BOE Hearing of Appeal Code.pdf

Hey Tony,

Can you have the Clerk's Office schedule Steven for a BOE hearing?

Thanks,

Jacob Clark
Appraiser I
Assessor's Office
City and Borough of Juneau, AK
(907) 586-5215 ext 4038
Jacob.Clark@Juneau.gov

From: Jacob Clark
Sent: Tuesday, March 21, 2023 9:48 AM
To: Steven Ricci <steven.d.ricci@gmail.com>
Subject: RE: Petition For Review - 1B0201070052

Hi Steven,

Here is some information regarding the BOE. I will have the Clerk's Office schedule the hearing.

Something that I would like to stress is that the primary task of the Board of Equalization is to review the work of my office for errors and review your evidence to prove we have erred. A feeling that your home is overvalued or out of equity is not evidence. The burden of proof is on the appellant to prove with actual evidence that your property is overvalued or in your case, unequally valued. To see a change in value, you are required to have substantial evidence proving an error or inequity in your assessment vs your neighbors (treating you differently than your neighbors). Please be sure to address these errors with me so that we can discuss them and have a better understanding on both sides, yours being why you believe there is an error, and mine showing we are not making an error – if that is the case.

Jacob Clark
Appraiser I

Assessor's Office
City and Borough of Juneau, AK
(907) 586-5215 ext 4038
Jacob.Clark@Juneau.gov

From: Steven Ricci <steven.d.ricci@gmail.com>
Sent: Monday, March 20, 2023 5:54 PM
To: Jacob Clark <Jacob.Clark@juneau.gov>
Subject: Re: Petition For Review - 1B0201070052

Hi Jacob,

Thank you for taking the time to reevaluate the value of the property. We still disagree on the value of the land and building. I would like to have a hearing scheduled with the BOE. Please let me know what if anything you will need from me.

Steve

On Mon, Mar 20, 2023 at 2:18 PM Jacob Clark <Jacob.Clark@juneau.gov> wrote:

> Hi Steven,
>
> I'm just reaching out to let you know that I have yet to receive a response regarding my proposal. I'd like to remind you that if I do not receive a response to my proposal email by March 21st, 2023, I will consider this case closed and your tax bill will reflect the original assessed value. I look forward to hearing from you soon.
>
> Thanks,
>
> **Jacob Clark**
>
> Appraiser I
>
> Assessor's Office
>
> City and Borough of Juneau, AK
>
> (907) 586-5215 ext 4038

Jacob.Clark@Juneau.gov

From: Jacob Clark
Sent: Wednesday, March 15, 2023 12:43 PM
To: steven.d.ricci@gmail.com
Subject: Petition For Review - 1B0201070052

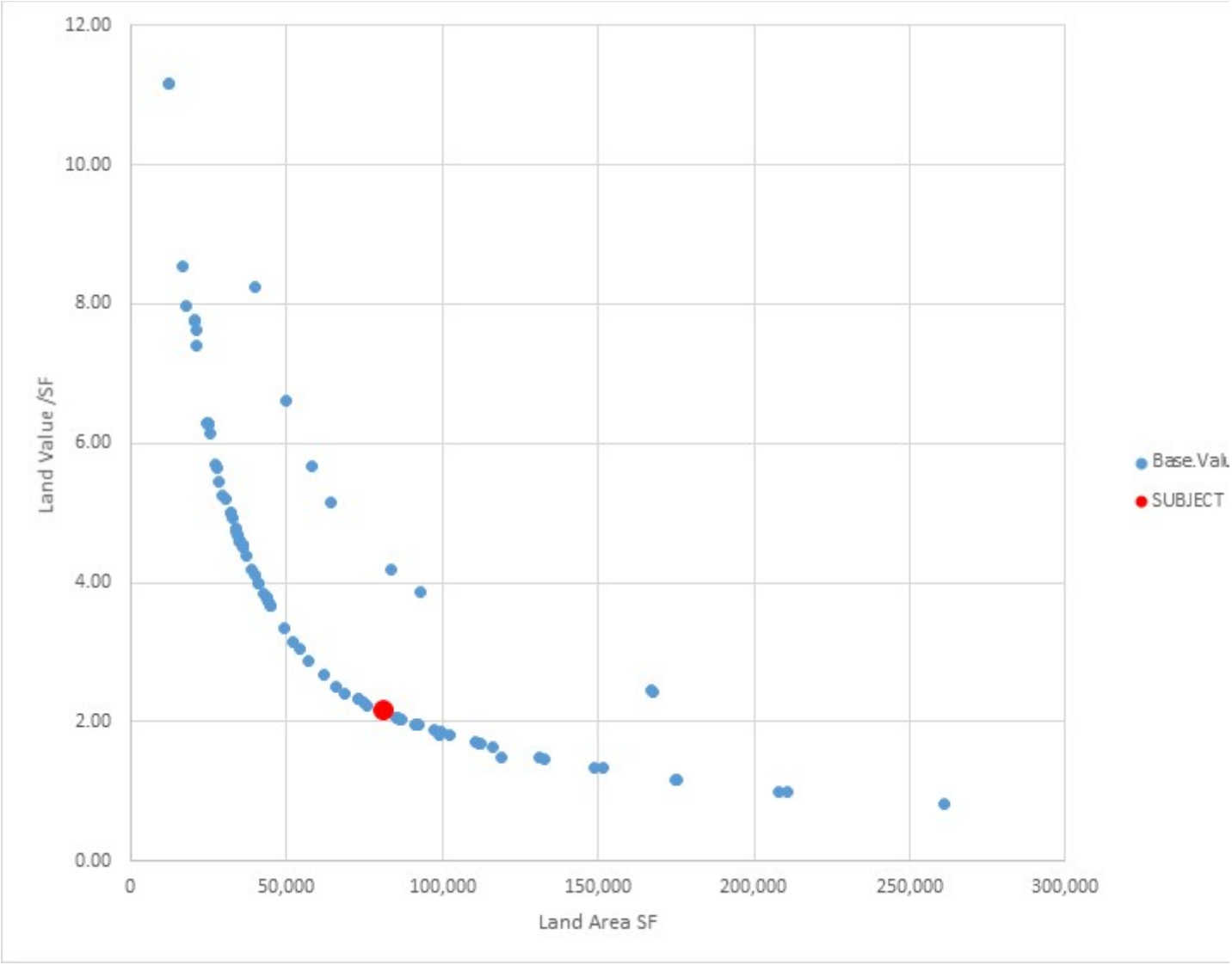
Hi Steven,

Upon review of your appeal I find our assessment of your property to be overvalued and propose a change to your 2023 Assessment. At the bottom of my email you will find my proposal. I added a more appropriate amount of deprecation to your building given its age and condition. After skimming over your yoga/art studio addition, I noticed it called for a mini split heat pump to be installed. We have yet to pick up that heat pump and since you said it's currently not heated, I have decided to leave it off until we review again come building permit season. On the other hand, I found no evidence to adjust your land value. I attached our data and supporting evidence below. Your property has already been adjusted for slope and wetness. As you'll see, no other property in your area has these adjustments. The vacant lot to your left has a vacancy adjustment due to the fact that it has zero improvements. If someone were to develop your neighbor's lot, it would cost them a pretty penny to do so and until someone does, that value will always have an adjustment. If you have any questions or would like to discuss this further, please call me at 586-5215 ext. 4038.

Here are some lots surrounding you:

PCN	Z	AreaAC	BaseRateAC	EffRateAC	AreaSF	BaseRateSF	LOC	SIZE	TOP
1B0201070010	D1	3.85	53,143	57,403	167,706	1.22	100	100	1(
1B0201070020	D1	4.03	51,401	55,509	175,547	1.18	100	100	1(
1B0201070031	D1	1.99	88,427	85,940	86,826	2.03	100	100	9
1B0201070032	D1	1.85	94,090	91,445	80,789	2.16	100	100	9
1B0201070040	D1	3.84	53,579	57,865	167,270	1.23	100	100	1(
1B0201070051	D1	1.99	88,427	58,784	86,551	2.03	100	100	1(
1B0201070052	D1	1.87	93,654	77,393	81,499	2.15	100	100	8
1B0201070060	D1	3.48	58,806	48,592	151,589	1.35	100	100	1(
1B0201070073	D1	2.54	74,488	80,446	110,841	1.71	100	100	1(
1B0201070074	D1	1.24	132,858	121,961	54,039	3.05	100	100	1(
1B0201070080	D1	4.01	51,401	55,511	174,676	1.18	100	100	1(
1B0201070090	D1	2.12	84,942	32,311	92,347	1.95	100	100	1(
1B0201070100	D1	2.14	84,071	77,197	93,218	1.93	100	100	1(
1B0201070112	D1	2.67	71,003	76,688	116,159	1.63	100	100	1(
1B0201070113	D1	1.71	99,317	54,228	74,544	2.28	100	100	1(
1B0201070122	D1	0.79	203,425	197,700	34,284	4.67	100	100	1(
1B0201070123	D1	1.67	101,495	88,811	72,885	2.33	100	100	1(
1B0201070124	D1	2.29	81,022	78,771	99,705	1.86	100	100	1(

Under the Site Adjusted Factor column you'll see that your property has a 23% adjustment (1.0 = 100%) on it making it the highest adjusted residential lot in the area. Anything you see that has a lower adjusted site factor (Ex 0.68) is a government owned or vacant lot. You are also well within the curve as shown below regarding land area and land value/sqft. Any points above the curve are waterfront properties.



Here is my proposal:

2023 Original Value: Site: $151,500 Improvements: $343,800 Total: $495,300

2023 Proposed Value: Site: $151,500 Improvements: $333,500 Total: $485,000

Please respond by clearly stating your acceptance or rejection of this change. Upon receipt of your acceptance I will take this to the Assessor for approval, at which point a letter of correction would be issued. If you reject these proposed changes, I will schedule the case for the next available Board of Equalization and you will be notified of the date.

If I do not receive a response to this email by March 21st, 2023, I will consider this case closed and your tax bill will reflect the original assessed value.

Jacob Clark

Appraiser I

Assessor's Office

City and Borough of Juneau, AK

(907) 586-5215 ext 4038

Jacob.Clark@Juneau.gov

--
Steve Ricci
(907) 321-2646

Tony Perletti

From: Aaron Landvik
Sent: Wednesday, March 15, 2023 10:59 AM
To: steven.d.ricci@gmail.com
Cc: Jacob Clark
Subject: Assessment process
Attachments: Standard_on_Verification_Adjustment_of_Sales.pdf; Standard_on_Ratio_Studies.pdf; StandardOnMassAppraisal 2017.pdf

Hi Steven,

Here is residential information we talked about on the phone today.
https://juneau.org/wp-content/uploads/2023/03/2023-Assessment-Report-Residential-Final.pdf

Jacob will follow regarding your petition for review.

Aaron Landvik
Deputy Assessor
Assessor's Office
City and Borough of Juneau, AK

PHONE (907) 586-5215 ext 4037 – FAX (907) 586-4520
aaron.landvik@juneau.gov

STANDARD ON
Verification and Adjustment of Sales

A criterion for measuring fairness, quality, equity and accuracy

(Approved April 2020)

IAAO
INTERNATIONAL ASSOCIATION
of ASSESSING OFFICERS

STANDARD ON VERIFICATION AND ADJUSTMENT OF SALES

Revised Approved, April 2020

International Association of Assessing Officers

IAAO assessment standards represent a consensus in the assessing profession and have been adopted by the Board of Directors of the International Association of Assessing Officers (IAAO). The objective of the IAAO standards is to provide a systematic means for assessing officers to improve and standardize the operation of their offices. IAAO standards are advisory in nature and the use of, or compliance with, such standards is voluntary. If any portion of these standards is found to be in conflict with national, state, or provincial laws, such laws shall govern. Ethical and/or professional requirements within the jurisdiction may also take precedence over technical standards. February 2022

About IAAO

The International Association of Assessing Officers, formerly the National Association of Assessing Officers, was founded for the purpose of establishing standards for assessment personnel. IAAO is a professional membership organization of government assessment officials and others interested in the administration of the property tax. Over the years IAAO members have developed assessment practice and administration standards and many of these standards have been adopted by state and international oversight agencies, and some have been incorporated into legislation.

IAAO continues at the forefront of assessment in North America and has been expanding its reach to the global community for the last five decades. Because standards form the rules by which North American assessors perform their duties, they may not be directly applicable to an overseas audience. The standards have been updated to also present the broad principles upon which the rules are based. IAAO believes those principles may be adapted to many differing statutory and regulatory scenarios worldwide.

Acknowledgments

At the time that the initial draft was started in 2019, the Task Force on the Standard on Verification and Adjustment of Sales comprised chair Carmela Quintos, Ph.D., MAI; members August Dettbarn, Robert Gloudemans, William Marchand, Joshua Myers, and Russ Thimgan; and IAAO liaison Larry Clark.

Revision notes

This standard replaces the 2010 Standard on Verification and Adjustment of Sales and is a complete revision.

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CONTENTS

STANDARD ON VERIFICATION AND ADJUSTMENT OF SALES

1. SCOPE

The primary responsibility of the assessor is to estimate the market value of each property within the jurisdiction. The integrity of the property tax is dependent on the accuracy of these estimates of market value. This is accomplished by analyzing market data to determine the price that the property being appraised would probably bring in the marketplace on the date of appraisal. Appraisal accuracy refers to the degree to which properties are appraised at market value, as defined by professional standards (see the IAAO Glossary for Property Appraisal and Assessment [IAAO 2013a] and the IAAO Standard on Ratio Studies [IAAO 2013b]). This standard provides guidance to ensure that only sales that meet the definition of market value and that have been adjusted for any monies (including financing) not attributable to the real estate are used in developing these estimates of market value. Accuracy is dependent upon proper verification and adjustment of sales data.

The key principles discussed in this standard that would enable a jurisdiction to conduct proper verification and adjustment of sales are as follows.

Principles

- ***There must be a system of record that tracks and digitally stores information collected from real estate transfer documents (such as deeds, sales contracts, and transfer affidavits), sales questionnaires, follow-up interviews, and third-party sources.***
- ***Data collection must be administered in a consistent and timely manner, and data collected must be as comprehensive and accurate as possible to ensure that there is sufficient information to verify that the sale price reflects the market value of the real property being transferred and to determine adjustments to the price if necessary.***
- ***Sales verification should be performed in a timely, uniform, and transparent manner with guidance on when a sale should be considered valid and what methodologies are acceptable for the validation process.***
- ***Adjustments to the sale price should be performed with the goal of representing only the value of the real property transferred in a manner that is consistent and transparent and that documents how adjustments are derived and the sources used.***
- ***The results of the verification and adjustment process should be documented in a timely manner to limit the loss of information, comprehensive to inform the results of verification and derivation of adjustments, stored preferably in electronic format, and completed for all sales that have had questionnaires and follow-up interviews and for which usable information has been received.***

In the following major sections, the principles that are covered in that section are stated and then followed by a discussion of those principles.

2. INTRODUCTION

Sales data should be collected, verified, and adjusted as necessary for model calibration and ratio study purposes. In some cases, sales may be valid for model calibration but should not be considered valid for ratio study purposes. A verified sale is more reliable than an unverified sale.

In jurisdictions that do not have laws mandating full disclosure of sales data, assessing officials work under a severe handicap and should seek legislation that provides for such disclosure (see the results of the 2013 *Survey of Ratio Study Practices* [Technical Standards Committee 2015]). In addition, jurisdictions that have disclosure but not adequate sale disclosure documents should work toward that goal. The terminology for determining whether a sale meets the definition of a valid transaction differs throughout the industry (validation, verification, confirmation, qualification, screening, and so on); however, for this standard, the term *verification* is used. It is important to remember that all sales should be considered candidates for valid sales unless sufficient information can be documented to show otherwise. While it is imperative that sales be verified uniformly and accurately, it is also important to process and verify sales in a timely manner so they are available for analysis. Sales should be trimmed for outliers during the statistical phase, not during the verification phase of a mass appraisal or sales ratio study program.

3. SOURCES OF SALES DATA

The primary sources of sales data include real estate transfer documents, sales verification questionnaires, parties to the transaction, and third-party sources. The information collected from these sources is entered into the system of record that serves as the database for the proper verification and adjustment of sales.

Principles in this standard that guide a jurisdiction in the creation and administration of a sales database are as follows.

Principles

- ***Jurisdictions that record real estate transfer documents have an essential database that tracks changes in property ownership, the type of interest transferred, the rights conveyed, and other conditions specific to the transaction and property at the time of sale.***
- ***Jurisdictions that further require a sales verification form to accompany recording of the real estate transfer document can significantly shorten the sales verification process by reducing the need for follow-up interviews and third-party sources.***
- ***When data collected from follow-up interviews and third-party sources are entered into the system of records, they must be verified and noted for their reliability as a data source.***

3.1 REAL ESTATE TRANSFER DOCUMENTS

Real estate transfer documents include deeds, sales contracts, and transfer affidavits (i.e., land contracts, contract for deed) completed at the time of sale. Some jurisdictions require recordation of transfer documents, and some do not (see *Ratio Study Practices in the United States and Canada: Results of 2013 Survey* [Technical Standards Committee 2015]). In the sale verification process, the transfer document must be reviewed for the type of interest transferred, the rights conveyed, and other conditions that could affect the arm's-length nature of the sale.

Common transfer documents used to convey real property are as follows:

- A *deed* is a written legal instrument that, when duly executed, conveys an interest in the legal title to a property.
- The *general warranty* deed provides the highest level of protection to the buyer and establishes that the seller owns the property and has the legal right to sell it. Unless stated specifically in the deed, the property is free of any liens or encumbrances; the buyer is guaranteed the title will stand against third parties attempting to establish title to the property; and the seller promises, in order to make the title good, he or she will deliver any document or instrument necessary.
- A *special warranty* deed is not nearly as protective as the general warranty deed in that the seller warrants he or she has received title and ensures the property was not encumbered during his or her ownership.
- *Bargain and sale* deeds implicitly or explicitly assert the grantor's ownership of the property conveyed, but they make no guarantee to defend the title. They provide the grantee with more protection than a quitclaim deed but less than a special warranty deed. The words of conveyance "bargain and sale" distinguish a bargain and sale deed.
- A deed in which the grantor conveys or relinquishes all interests in a property without

warrant as to the extent or validity of such interests is known as a *quitclaim* deed. The quitclaim deed is the least protective deed for the buyer and conveys only whatever rights or interests the grantor has in the property. There are no warranties or covenants to the buyer. If the grantor has a good title, it is as good as the warranty deed; however, there are no warranties or guarantees.

- *Tax deeds* are deeds by which title to real property, sold to discharge delinquent taxes, is transferred by a tax collector or other authorized officer of the law to the purchaser at a tax sale.
- *Sheriff deeds* are deeds that give ownership rights in property bought at a sheriff's sale. A sheriff's sale is a sale conducted by a sheriff or authorized officer of the court upon order of a court after the legal owner of the property fails to pay a judgment. Often the property is involved in a mortgage foreclosure action or is subject to a mechanics lien incurred by a failure to pay for labor and materials to improve the property.
- *Trust deeds* transfer the title to the property to a trustee to be held in trust. These deeds are also known as *deeds of trust*. There are three parties involved in a deed of trust: the trustor (borrower), trustee (holder of the legal title), and the beneficiary (lender). The trustee holds the power of sale in the event of default.
- *Land contracts* are executory contracts for the purchase of real property under the terms of which legal title to the property is retained by the seller until such time as all the conditions stated in the contract have been fulfilled. These contracts are commonly used for the installment purchase of real property and are often referred to as a *contract for deed*. The actual deed is not recorded until the title passes to the buyer upon fulfillment of the contract.

3.2 SALES VERIFICATION QUESTIONNAIRES

Sales verification questionnaires, which can be written or in electronic format, are affirmed or sworn statements regarding the sale of the property. Typically, these forms are required to be completed prior to recordation of the deed. A more comprehensive questionnaire may limit the need for follow-up verification of the sale. (See Appendix A for a copy of a sales verification questionnaire. Also, refer to the ratio study survey results [Technical Standards Committee 2015] for the number of jurisdictions currently using a comprehensive sales verification form.) A set of instructions for completing the form should accompany or be a part of the questionnaire.

3.3 PARTIES TO THE SALE AND THIRD-PARTY SOURCES

Buyers and sellers of real property should be contacted directly to secure or confirm sales data. When buyers or sellers are parties to the sale, it is important to contact all parties to verify agreement on the data.

Third-party sources are a source of sales data and are especially important when transfer and disclosure documents do not provide full disclosure or omit important data. The following is a partial listing of third-party sources:

- Multiple listing services
- Title companies
- Financial institutions
- Leasing agencies
- Property managers
- Real estate brokers and agencies
- Government and private fee appraisers
- Attorneys
- Appraisal organizations.

4. DATA COLLECTION: USEFUL SALES INFORMATION

The goal of data collection is to ensure that the database contains sufficient information to verify that the sale occurred as an arm's-length transaction and that the sale price reflects the market value of the real property transferred. A primary task in developing a comprehensive database is to identify the relevant sales data information that should be collected.

Principles

- ***A sales database should contain the factual information of the sale: full consideration, date of transfer, property legal description, buyer and seller names and addresses, and the type of transfer document used to convey the property (see Section 3.1).***
- ***Jurisdictions that require a sales questionnaire should structure the questions to capture the transaction conditions helpful in determining the arm's-length nature of the sale.***
- ***The sales questionnaire should also have questions on the property characteristics at the time of sale to determine whether the sale sold before or after any significant repairs or renovations, to isolate the value of the real property being transferred, and to determine whether adjustments are warranted for lease contracts.***

These data elements should be maintained in a separate data file or sales history file component of a computer-assisted mass appraisal (CAMA) system. In addition, the file should include information useful for stratification and other analytical purposes. Sales data files should reflect the physical characteristics of the property at the time of sale. If significant legal, physical, or economic changes have occurred between the sale date and the assessment date, the sale should not be used for ratio studies. The sale may still be valid for mass appraisal modeling by matching the sale price against the characteristics that existed on the date of sale.

4.1 SALE AND DEED INFORMATION

It is important to document and verify the sale transaction and obtain information on the type of deed associated with the sale.

4.1.1 Full Consideration

Full consideration is the total amount paid for the property, including the cash down payment and amounts financed. The actual sale price is the most essential item of information concerning the sale, and its accuracy should be carefully scrutinized. In many jurisdictions it is common practice in deeds of conveyance to state considerations in terms such as "one dollar plus other due and just consideration." These amounts are rarely the actual selling price and should be ignored in favor of information from the buyer and seller or other reliable source, such as sales verification questionnaires.

4.1.2 Date of Transfer

This is the date on which the sale was closed or completed. Not all jurisdictions require recordation of deeds; therefore, the deed date should be considered the most reliable date of sale, not the recording date. If a copy of the deed is not available, the date on the sales verification questionnaire should be used.

4.1.3 Legal Description, Address, and Parcel Identifier

Each parcel should be assigned a unique parcel identifier (see *Standard on Digital Cadastral Maps and Parcel Identifiers* [IAAO 2015]. If this number is noted on the document at the time it is recorded, the assessor can locate the parcel in the file directly. This information links the sale to the assessor's records and identifies the property's location. Without careful matching of the parcel identifier with the legal description, the wrong appraised or assessed value may be used in a ratio study, and the incorrect set of parcel characteristics may be transferred to the sales history file. The legal description also helps identify parcel splits, which are not usable in ratio studies. This information also may be used to prevent sales from being included twice. The situs address can be useful in locating and confirming the physical location of a parcel in the field.

4.1.4 Names of Buyers and Sellers

This information permits the assessor to maintain a current record of the owners of all property in the jurisdiction. Transfer documents often refer to the buyer as the grantee or transferee and the seller as the grantor or transferor.

4.1.5 Addresses, Phone Numbers, and Other Contact Information of Buyer and Seller or Their Legal Designee

This information helps to identify more positively the parties to the sale. If the buyer will not reside at the property, the buyer's address may be needed for future correspondence. If the seller has established a new ad- dress, this information aids the assessor in contacting the seller regarding the sale.

4.1.6 Type of Transfer

The type of transfer document often helps determine whether the sale is usable. If the source of sales data does not include a copy of the transfer document, the type of transfer document should be specifically required. A warranty deed, for example, is generally associated with a usable sale; sheriff's deeds are not; and quitclaim deeds are questionable, while contracts for deed and certain transfer affidavits may require an adjustment for financing (see Section 6.1.3).

4.1.7 Deed Instrument Number

The deed instrument or document number, as well as the record or deed book and page, indicates where the deed is located in the official records and is an important asset in researching sales and leases.

4.1.8 Unique Sale Number

A unique sale number can tie a sale validation questionnaire to a particular parcel and eliminate confusion if the parcel sells more than once. A unique number should be assigned to sales verification questionnaires completed at the time of recordation of the deed. Legislation requiring that the sales verification questionnaire be provided at the time of deed recordation provides leverage in ensuring the form is completed properly, a unique number is applied, and each transfer is accounted for. For electronic reporting to oversight agencies, this unique number could then be tied to the jurisdiction's identification number and parcel identification number.

4.2 TRANSACTION CONDITIONS

It is important to verify whether the sale occurred as an arm's-length transaction or with conditions that would require an adjustment to reflect market prices. Information gathered on the interest transferred, the financing terms, the relationship between parties, the method of marketing, and the exposure time on the market is useful to determine whether the sale is usable or requires an adjustment prior to use as a comparable sale or in ratio studies.

4.2.1 Interest Transferred

A transaction that conveys the full rights of ownership to a property is known as a *fee simple* transfer. Fee simple is defined in land ownership as the complete interest in a property, subject only to governmental powers such as eminent domain. (for further clarification on fee simple definition see IAAO position paper - Setting the Record Straight on Fee Simple [IAAO 2015]) Transfers that convey less than full interest are rarely usable in mass appraisal or in ratio studies without adjustments, unless the appraised value and sale price reflect the same ownership rights. Examples of partial interest transfers include sales involving life estates, fractional interest, air rights, and mineral rights.

4.2.2 Type and Terms of Financing

Certain types of financing can affect the sale price. The information needed to determine the amount of adjustment to the sale price includes the amount of the down payment, type of loan, interest rate, amortization provisions, and the type and value of any trade. It is also important to know whether the sale conveys title to the property or whether it is a land contract, in which title is not conveyed until sometime in the future, typically several years.

4.2.3 Relationship of Buyer and Seller

Any close relationships including marital between individuals (parents, children, aunts, uncles, nephews, nieces, grandparents) or corporate relationships between businesses should be discovered, because sales between related parties may not reflect market value (see Section 5.4.5).

4.2.4 Method of Marketing

Property listed with a real estate broker is the most prevalent method of marketing real property. Typically, when a comprehensive sales verification questionnaire is completed, no further verification is required if no factors exist that would require further verification and/or adjustment. Additional marketing methods are as follows:

- Auctions
- For sale by owner (FSBO)
- Internet
- Newspaper advertisements
- Sealed bids
- Word-of-mouth.

4.2.4.1 Auction

An auction is a method of marketing and selling real property. Auctions fall into two general groups: *absolute auctions* in which the property will sell at any price to the highest bidder and *reserve auctions* in which a minimum acceptable bid is set. Verification should be made prior to including the sale as a valid transaction (see Section 5.5.1). Auction sales are typically more prevalent in rural areas. The auctioneer is the best contact for verification; then the seller. Rarely is the buyer able to provide all the necessary information.

4.2.4.2 FSBO

FSBO marketing may be defined as the process of selling *real estate* without the representation of a *real estate broker* or agent. Sellers may employ the services of a marketing or online listing company or may actively market their own property. A sale meeting these marketing criteria may be considered as a potentially valid transaction.

4.2.4.3 Internet

Property that sells on the internet and meets the criteria of being an open-market, arm's-length transaction should be included as a valid transaction. Brokerage and realty firms are using the internet as an additional method for advertising and marketing their inventory of properties. All sales require diligent verification. In the case of internet sales, the primary focus should be on whether the parties to the sale are informed buyers and sellers. Indicators of an uninformed buyer could include one or more of the following:

- No knowledge of the market in the area in which the property was purchased
- No broker/realtor involved
- No other similar properties in the area examined
- Bought sight unseen.

4.2.4.4 Newspaper Advertisements

A newspaper advertisement is a method of marketing real property and requires no further verification if a comprehensive sale's validation questionnaire has been completed and no factors exist that would require further verification and/or adjustment.

4.2.4.5 Sealed Bids

Verification of sales of properties that are marketed and sold by sealed bids should follow the guidelines for property that is sold by auction (see Section 5.5.1); it is also important to discover how many bids were received. If only one bid was offered and no fee appraisal was made on the property, the sale should not be considered a valid transaction. If a fee appraisal was made on the property and the bid was within a typical range, the sale may be considered a valid transaction especially when sample sizes are small.

4.2.4.6 Word-of-Mouth

Word-of-mouth marketing is typically more prevalent in rural areas. This method of marketing real property requires verification to answer the following questions:

- How did the buyer discover the property was for sale?
- How widely was the property marketed?
- Is word-of-mouth typical exposure for the area?
- How was the sale price determined?
- Was a fee appraisal made on the property, and if so, what was the amount?
- What was the condition of the property at the time of sale?
- Was the seller actively marketing the property at the time of sale?

Since the buyer would not be able to provide an answer to the majority of these questions, the seller is the best source of information.

4.2.5 Time on the Market

Sales of properties that have been exposed to the open market too long, not long enough, or not at all may not represent market value. The jurisdiction should monitor typical marketing time. The typical marketing time may be longer in a depressed market.

4.3 PROPERTY CHARACTERISTICS

It is important to document and verify details of the property at the time of sale: its use, nonrealty components included in the sale, and its geographical information system (GIS) coordinates. Information on property use is important in determining the economic condition of the property, whether additional lease information is required, and whether adjustment to the sale price is warranted. Information on personal property is important to isolate the realty component of the sale. Information on a property's GIS coordinates is important for verification of the sale using maps (see Section 5.3.3 on analytical methods of sales verification).

4.3.1 Property Use

The use and occupancy of the property affect the sale price. Sales verification should include information needed to determine whether the property use at the time of sale was residential or commercial. Commercial sales are typically more complex and require more information to verify whether the sale price reflects market, to determine the necessary adjustments when the sale is used as a comparable, and to identify whether the sale can be used in the development of capitalization rates for the income approach. To obtain information on property use and its effect on sale price requires verification of

- Type of use
- Occupancy
- Highest and best use consideration (intended use after the sale).

4.3.1.1 Type of Use

Sales verification should include determination of the use of the property at the time of sale. Use types are to be grouped according to how the jurisdiction values properties and the information necessary to complete valuation. Typical use type groupings are residential (single-family homes, condominiums, attached/townhomes, and mobile homes):commercial (office, retail, hotel, apartments, warehouse/industrial, and special property such as amusement park, gas station, car wash, bowling alley); and vacant land.

4.3.1.2 Occupancy

Sales questionnaires or interviews should include determination of whether the space was occupied or vacant at the time of sale. Vacant spaces can be subject to highest and best use consideration, which could affect pricing and thus proper classification for appraisal analysis. Occupied spaces are typically sold with leases so more information may be required to determine whether the sale is representative of market value and usable as a comparable for properties with similar use, rights, and interests.

4.3.1.3 Highest and Best Use Consideration

Sales verification should not assume that the sale price reflects current use. Sales questionnaires should include questions that determine whether the sale was influenced by changes in zoning or intended use. Sales in areas of transition, sales of dilapidated buildings, and sales of vacant properties are examples of instances in which prices could reflect a use change.

4.3.2 Personal Property

The sales verification questionnaire should note the type and value of any significant personal property (both tangible and intangible, listed separately) included in the sale price.

4.3.3 GIS Location

The creation of the GIS coordinates of a parcel should be done to conform to the following:

- Physical location of the sale parcel must be identified in a standardized manner.
- Location should be confirmable by the widest possible audience.
- Location should be presented in a form to allow spatial analysis.

The process that creates the GIS record is called *geocoding*:

- *Geocoding* is the process of converting addresses, parcel numbers, valuation account numbers, common place names, and other local identifiers into geographic coordinates, which can be used to study locational relationships between sales and other data.
- *Reverse geocoding* is the process of converting geographic coordinates into a human-readable address or common location identifier.
- Geocoding systems often use the internal centroid of the parcel. The internal centroid is a point within the boundary of the parcel uniquely identifying its location. This is of great importance when aerial imagery is used for analyses and verification of physical attributes.
- For parcels in which the elevation (typically referred as the z axis) could be a significant indicator of value, for example, the floor level in high-rise condominiums, the floor elevation data should be collected in a standardized and reproducible method.
- Measures of appraisal valuation performance can use the elevation as stratification criteria to test for uniformity based on the floor level of parcels.

5. SALES VERIFICATION

Sales should be verified to determine whether they reflect the market value of the real property transferred. The verification process should be conducted in a manner that is timely, uniform, and transparent.

Principles

- ***Specific objectives for sales verification should be documented, and they should include but not be limited to the following:***
  - ***Sale prices should be adjusted to reflect only the market value of the real property transferred net of personal property, financing, or leases.***
  - ***Sales verification should include all sales that occurred during the time frame being tested or modeled.***
  - ***Sales should be invalidated only when they fail to meet the requirements of an open-market, arm's-length transaction.***
- ***Jurisdictions should ensure verification is administered in a timely manner as close to the sale date as possible to minimize loss of information.***
- ***The methods of sales verification—whether by questionnaires, follow-up interviews, or analytical methods—should be performed in a uniform and transparent manner with guidance and documentation.***
- ***Sales that are considered invalid due to generally accepted non-arm's-length conditions (see Section 5.4) need not be adjusted for nonrealty components and should be excluded for use in ratio studies or modeling.***
- ***Sales that have special conditions, settlements, or arrangements that are otherwise an arm's-length transaction may be adjusted to reflect market value, and jurisdictions should be clear on which conditions would warrant such adjustments.***
- ***In verifying the property use and characteristics at the time of sale, jurisdictions should provide guidance on which conditions they would deem adjustable and whether lease questionnaires should accompany sales questionnaires for commercial properties.***

All sales meeting the definition of market value should be included as valid transactions unless one of the following two conditions exists:

> ***Data for the sale are incomplete, unverifiable, or suspect.***
> ***The sale fails to pass one or more specific tests of acceptability.***

Although all sales should normally be verified for use in modeling and appraisal analyses, for ratio studies a subset of sales can be selected for verification if the verified sales provide a sufficiently representative sample for purposes of the study (see *Standard on Ratio Studies* [IAAO 2013b] for discussion of representative samples).

The position should be taken that all sales are candidates as valid sales unless sufficient information can be documented to show otherwise. If sales are excluded for ratio studies without substantiation, the study may appear to be subjective. Reason codes may be established for valid and invalid sales for both ratio studies and model calibration.

No single set of sales-screening rules or recommendations can be universally applicable for all uses of sales data or under all conditions. Sales verification guidelines and procedures should be consistent with the provisions of the value definition applicable to the jurisdiction. Assessors should use their judgment, but they should not be arbitrary. For uniform judgments, verification procedures should be in writing. All personnel should be thoroughly familiar with these procedures as well as with underlying real estate principles (Tomberlin 2001).

5.1 IMPORTANCE OF SALES VERIFICATION

Sales data are needed for the valuation process and for sales ratio studies. The reliability of any valuation model or sales ratio study depends on the quality and quantity of its data. Sales data should be collected, edited, and adjusted to obtain valid indicators of market value. Sales data should be verified by contacting a party to the sale (buyer, seller, or other knowledgeable party) when there is a question or an answer is unclear on a sales questionnaire completed prior to the recordation. In general, the fewer the sales, the less common or more complex the property, and the more atypical the sale price, the greater the effort should be to confirm the particulars of the sale.

5.2 TIMELINESS OF SALES VERIFICATION

The effectiveness of sales validation is partly a function of when it is performed. Contacting parties to the sale shortly after the sale occurred can help improve response rates and accuracy of responses, as parties are more likely to recall circumstances and details of the sale. Further, sales need to be verified in a timely manner to be available for appraisal analyses and ratio studies. Thus, in principle, sales should be verified as close to the sale date as possible. Each jurisdiction should determine a time period from close of sale that maximizes response rates and accuracy of information received. In general, sales should be validated within three months of occurrence.

5.3 METHODS OF SALES VERIFICATION

Sales can be verified with sales questionnaires and follow-up interviews. For commercial properties with leased spaces, verifying whether contract rents are at market can be done by sending out lease verification questionnaires (Appendixes B.1 and B.2 give sample lease verification forms). Additional verification can be done using analytical methods on sales ratios or income ratios (contract-to-market rent ratios).

5.3.1 Sales Questionnaires and Follow-up Interviews

In general, the completeness and accuracy of sales data are best confirmed by requesting the particulars of a sale from parties to the sale. Historically, people consent to interviews if they know what is expected of them, understand the importance of the request, and are treated with respect. When sales data are not available on transfer documents or disclosure documents are incomplete, or require further verification, parties to the transaction may be contacted using the following methods:

- Sales verification questionnaires (other than the mandatory disclosure questionnaire completed at time of sale)
- Telephone interviews
- Personal interviews.

5.3.1.1 Sales Verification Questionnaires (Other than Mandatory Disclosure Questionnaires Completed at the Time of Sale)

While mailing sales verification questionnaires may be the least expensive method of obtaining or verifying information subsequent to the sale, this method has several disadvantages, as follows:

- Response is not immediate.
- Additional contact may be needed.
- Information is limited to what is stated on the sales verification questionnaire.
- Printing and mailing costs are incurred.

Mailed sales verification questionnaires should be as concise as possible and include the following:

- Postage-paid return envelope
- Official stationery
- Purpose of the sales verification questionnaire
- Contact person (name, telephone number, and e-mail address for additional information)
- Authorized signature (of person completing the questionnaire).

Specialized questionnaires may be designed for a specific type of property or situation such as an income-producing property or a property that sells with atypical financing. Specialized questionnaires can be developed for numerous situations; however, all should follow the guidelines for the regular questionnaire suggested above.

5.3.1.2 Telephone Interviews

Telephone interviews provide quick responses and the opportunity for immediate clarification. Disadvantages are as follows:

- Inability to prove caller's identity
- Need for trained staff
- Difficulty in reaching the party to the sale.

An opening script should be written for telephone interviews. Always state your name, the office you represent, and the purpose of the telephone call. If the individual is unable to talk, ask for a specific time that would be more convenient. It is extremely important to use simple conversational words and avoid slang and industry jargon. Interviews should be short, courteous, and to the point.

5.3.1.3 Personal Interviews

The disadvantages of the in-person interview are that they are the most costly and that qualified analysts or appraisers should perform this task. However, they are most effective for the following reasons:

- Refusals less frequent
- Information more reliable
- More unusual or special considerations revealed.

For personal interviews, it is critical to be on time. An identification badge or business card should be presented upon introduction. All paperwork and forms should be available and in order before the interview begins. The style and tone of the conversation should be geared to the interview

setting. It can sometimes be helpful to establish rapport through brief small talk. Maintain eye contact, smile, and be friendly and respectful throughout the conversation.

Comprehensive sales verification questionnaires reduce the number of follow-up verifications required but do not totally eliminate them. Sales information should never be considered absolutely trustworthy. An ideal sales verification system would provide a mechanism for the accurate and timely completion of the sales verification questionnaire. One of these methods should be used when a question remains unanswered or there are other questions regarding a sale.

For both telephone and personal interviews, it may be necessary to provide verification of the purpose of the interview. The contact person should be ready to supply names and a phone number of a supervisor or human resource contact who can verify their employment and the purpose of the contact.

Preparing a list of basic questions for staff to ask during the interview ensures uniformity and consistency and often leads to discovery of problems regarding the transaction. Specific questions should be prepared and staff trained for sales involving the following (see Appendix C for examples of questions for specific situations):

- Adjoining property owner
- Auctions
- Internet marketing
- Leasebacks
- Lease contracts
- Personal property
- Property characteristic changes
- Related parties
- Sealed bids
- Uninformed buyers and sellers
- Word-of-mouth
- Internal Revenue Code Section 1031 exchanges.

5.3.2 Lease Questionnaires (for Commercial Properties)

Lease questionnaires may accompany or be a follow-up to a sales questionnaire when the property has commercial space. The lease questionnaires should contain sufficient information to determine whether contract rents are above or below market rent. When price adjustments are warranted, a jurisdiction should have sufficient information to determine the present value of the difference between contract and market rents to add or subtract from the sale price.

A comprehensive lease verification process should collect information via a lease verification questionnaire and store the data preferably in digital format. Appendix B.1 gives a sample lease questionnaire at the unit level; Appendix B.2 gives a sample lease questionnaire for instances in which rents are aggregated by use and lease type. Regardless of the level of aggregation, the following information is useful in collecting income data from commercial properties:

- *Use of the space*. See Section 4.3.1 on collecting data on property use. The definition of use stratifies properties for valuation, for example, residential for apartments, offices, retail, and so on.
- *Size of the space*. A jurisdiction must specify the definition used in the valuation. Typically, the space is measured as net rentable square feet.
- *Remaining lease term*. If the remaining lease term is short, for example, less than three years, then the expectation of a lease renewal could result in the sale price reflecting market rent. However, regardless of the length of the remaining lease term, it is important to verify whether the sale price reflects contract or market rents and make the appropriate adjustments.
- *Total rent at sale including pass-throughs*. The base rent includes step-ups or inflationary adjustments up to sale date, plus pass-throughs received by the landlord. A common pass-through expense is common area maintenance (CAM).
- *Type of lease*. Lease questionnaires should capture whether a lease is gross or net and the types of expenses paid by tenants. This is important if gross rents are considered typical, since net rents have to be grossed up to market to enable comparison.

Section 5.6.1 illustrates how information from a lease questionnaire can be used to verify sales with leased contracts.

5.3.3 Analytical Methods

It is a best practice to further verify sales with an atypical ratio. Such atypical ratios may be the result of problems that warrant further investigation. One simple method of identifying such sales is to use a ratio threshold (e.g., less than 50 percent or greater than 150 percent). A more sophisticated strategy, however, is to identify atypical sales with a ratio markedly different from sales of other surrounding or similar properties using graphical or statistical techniques. For surrounding sales, this could be done through a visual examination of the sales ratios on a GIS map, through the sorting of ratios by neighborhood or other location identifiers, or through a geostatistical method that detects spatial outlier ratios. For similar sale properties, this could be done graphically (e.g., scatter or box plots in which ratios are plotted against property characteristics), through the sorting of ratios within prominent property characteristic strata, or through statistical tests that identify outlier ratios. However, during sales verification sales should never be excluded from a ratio study solely on the basis of the computed ratio. If no problems are discovered with an atypical sale, it will likely emerge as an outlier and be subject to removal during the statistical trimming process.

These graphical, statistical, and geospatial methods can be applied to analyzing income ratios (contract-to-market rent ratios). Outlier ratios are indicative of rents below or above market, and the sale should be further analyzed if price adjustments are warranted.

5.4 SALES GENERALLY CONSIDERED INVALID

The following types of sales are often found to be invalid and can be excluded unless a larger sample size is needed. If a larger sample size is needed, these sales require verification.

- Sales involving government agencies
- Sales involving charitable, religious, or educational institutions
- Sales involving financial institutions as buyer or seller
- Sales between relatives or between corporate affiliates
- Sales settling an estate
- Forced sales resulting from a judicial order
- Sales of doubtful title.

5.4.1 Sales Involving Government Agencies

Sales to government agencies can involve an element of compulsion and often occur at prices higher than would otherwise be expected. When the governmental agency is the seller, values typically fall on the low end of the value range. The latter should not be considered in model calibration or ratio studies unless an analysis indicates governmental sales have affected the market in specific market areas or neighborhoods. Each sale in this category should be thoroughly researched prior to use. See Appendix D for a listing of some of the government agencies in this category.

5.4.2 Sales Involving Charitable, Religious, or Educational Institutions

A sale to such an organization can involve an element of philanthropy, and a sale by such an organization can involve a nominal consideration or restrictive covenants. These sales often involve partial gifts and therefore are generally not representative of market value.

5.4.3 Sales Involving Financial Institution as Buyer

These sales are often made in lieu of foreclosure and are not exposed to the open market. However, open-market sales in which a financial institution is a willing buyer, such as the purchase of vacant land for a branch bank, may be considered potentially valid transactions.

5.4.4 Sales Involving Financial Institution as Seller

A foreclosure is not a sale but the legal process by which a lien on a property is enforced. The majority of the sales in which the financial institution is the seller are properties that were formerly foreclosed on by the financial institution. Also, they are easily identified because the seller is the financial institution. These sales typically are on the low side of the value range because the financial institution is highly motivated to sell and may be required by banking regulations to remove the property from its books. The longer the property is carried on the books by the financial institution, the lower the asking price is likely to be. If the financial institution was ordered by banking regulators to dispose of the property regardless of the sale price, the sale should not be included as a valid transaction.

Sales in which a financial institution is the seller typically should be considered as potentially valid for model calibration and ratio studies if they account for more than 20 percent of sales in a specific market area. Care should be taken in validating this type of sale to account for changes in property characteristics (see Section 5.6.3). Any properties that have been vandalized should be excluded.

5.4.5 Sales between Relatives or Corporate Affiliates

Sales between close relatives (parents, children, aunts, uncles, nephews, nieces, grandparents) or corporate affiliates are usually non-open-market transactions. If the following factors apply during the follow-up verification, the sale may be considered a valid transaction.

- The property was exposed on the open market.
- The asking and selling price was within the range that any party purchasing the property would be expected to pay.
- The sale meets all other criteria of being an open-market, arm's-length transaction.

5.4.6 Sales Settling an Estate

A conveyance by an executor or trustee under powers granted in a will may not represent fair market value, particularly if the sale takes place soon after the will has been filed and admitted to probate in order to satisfy the decedent's debts or the wishes of an heir.

5.4.7 Forced Sales Resulting from a Judicial Order

These sales should never be considered for model calibration or ratio studies. The seller in these sales is usually a sheriff, receiver, or other court officer.

A *partition sale* is an example. A partition sale is a term used in the law of real property to describe an act, by a court order or otherwise, to divide a concurrent estate into separate portions representing the proportionate interests of owners of property. It is sometimes described as a forced sale. It is often the result of a dissolution of marriage or the division of an estate among heirs.

5.4.8 Sales of Doubtful Title

Sales in which title is in doubt tend to be below market value. When a sale is made on other than a warranty deed, there is a question of whether the title is merchantable. A quitclaim deed is an example.

5.5 TRANSACTION CONDITIONS

Transaction conditions include situations, settlements, or arrangements surrounding a sale. Adjustments to the sale price may be considered for the following transaction conditions:

- Sales with special conditions
- Acquisitions or divestments by large property owners
- Internal Revenue Code Section 1031 exchanges
- Adjoining property owners
- Leasebacks
- Short sales.

5.5.1 Sales with Special Conditions

Sales with special conditions can be open-market transactions; however, they should be verified thoroughly. The following are types of sales with special conditions:

- Trades
- Partial interests
- Land contracts
- Incomplete or unbuilt common property
- Auctions.

5.5.1.1 Trades

In a trade, the buyer gives the seller one or more items of real or personal property as all or part of the full consideration. If the sale is a pure trade with the seller receiving no money or securities, the sale should be excluded from analysis. If the sale involves both money and traded property, it may be possible to include the sale in the analysis if the value of the traded property is stipulated, can be estimated with accuracy, or is small in comparison to the total consideration. However, transactions involving trades should be excluded from the analysis whenever possible, particularly when the value of the traded property is substantial.

5.5.1.2 Partial Interest

A sale involving a conveyance of less than the full interest in a property should be excluded as a valid transaction. Sometimes all the partial interest owners of a property may agree to syndication and sell their portions of the estate to a buyer (typically on the same day). However, the sum of all the sale prices may not necessarily indicate the market value of the whole property. These transfers should not be used as valid sales without thorough testing, analysis, and documentation.

5.5.1.3 Land Contracts

Land contracts (also known as contracts for deeds) and other installment purchase agreements in which title is not transferred until the contract is fulfilled require careful analysis. Deeds in fulfillment of a land contract often reflect market conditions several years in the past, and such dated information should not be considered. Sales data from land contracts also can reflect the value of the financing arrangements. In such instances, if the transaction is recent, the sale price should be adjusted for financing, if warranted, and included as a valid transaction (see Section 6.1.3). Because the contract itself often is not recorded, discovery of these sales is difficult until the deed is finally recorded. The sale then is likely to be too old to be used.

5.5.1.4 Incomplete or Unbuilt Common Property

Sales of condominium units and of units in planned unit developments or vacation resorts often include an interest in common elements (e.g., golf courses, clubhouses, or swimming pools) that may not exist or be usable on the date of sale or on the assessment date. Sales of such properties should be examined to determine whether prices might be influenced by promises to add or complete common elements at some later date. Sales whose prices are influenced by such promises should be excluded or the sale price should be adjusted to reflect only the value of the improvements or amenities in existence on the assessment date.

5.5.1.5 Auction Sales

In general, auction sales of real property tend to be at the lower end of the price spectrum and are more prevalent in rural areas. Absolute auctions do not have a low bid clause or right of refusal and typically are advertised as absolute auctions. The property is sold to the highest bidder whatever that

bid may be. All absolute auctions should be considered invalid. Before auction sales are considered as valid transactions, the following criteria should be met:

- Was the auction well-advertised?
- Was the auction well-attended?
- Did the seller have a minimum bid or the right of refusal on all bids (with reserve)?

5.5.2 Acquisitions or Divestments by Large Property Owners

Acquisitions or divestments by large corporations, pension funds, or real estate investment trusts (REITs) that involve multiple parcels typically should not be considered for analysis.

5.5.3 Internal Revenue Code Section 1031 Exchanges

Internal Revenue Code Section 1031 stipulates that investment properties can be sold on a tax-deferred basis if certain requirements are met. These transactions enable the taxpayer to defer capital gains tax on the sale of a business use or investment property. All net equity must be reinvested in a certain time period. A certain amount of undue stimuli may be present as this time period lapses. Sale transactions that represent Section 1031 exchanges should be analyzed like any other commercial transaction and, absent conditions that would make the sale price unrepresentative of market value, should be considered valid sales.

5.5.4 Adjoining Property Owners

Sales in which the buyer already owns adjoining property should be examined carefully to determine whether the buyer possibly paid more or less than the property is worth on the open market. In some cases, because of the neighbor relationship, the buyer may even receive a *deal* on the property. These sales should not be excluded solely because the buyer owns adjoining property unless one or more of the following reasons exists:

- Buyer is willing to pay more than the asking price.
- Buyer is willing to pay more than the fee appraisal.
- Selling price is substantially less than the asking price.
- Buyer is under undue stimuli to purchase the adjoining property.

5.5.5 Leasebacks

A leaseback is defined as the sale of a building, land, or other property to a buyer under special arrangements for simultaneously leasing it on a long-term basis to the original seller, usually with an option to renew the lease. These transactions are also referred to as *sale and leaseback* and *sale-leaseback*. Leasebacks occur in the commercial and industrial class of property. Sales involving leasebacks should be analyzed to ensure that they are market transactions. This can be determined only by further verification of the sale (see Appendix C for questions involving leasebacks).

Typically, the land and location is purchased, the building erected, and the property sold with a long-term leaseback clause. A major benefit of the leaseback is cash flow issues.

5.5.6 Short Sales

Short sales are difficult to recognize because the parties to the sale are typical buyers and sellers. In a short sale, the lien holder agrees to accept a payoff for less than the outstanding balance of the mortgage or loan. This negotiation is achieved through communication with a bank's loss mitigation or workout department. The homeowner or debtor sells the mortgaged property for less than the outstanding balance of the loan and turns over the proceeds of the sale to the lender. In such instances, the lender would have the right to approve or disapprove a proposed sale. Extenuating circumstances influence whether banks will discount a loan balance. These circumstances are usually related to the current real estate market and the borrower's financial situation. A short sale is typically faster and less expensive than a foreclosure. A short sale is nothing more than negotiating with lien holders a payoff for less than what they are owed, or rather a sale of a debt on a piece of real estate short of the full debt amount. It does not extinguish the remaining balance unless settlement is clearly indicated on the acceptance of offer. As with all foreclosure-related sales, the element of undue stimuli exists. Therefore these sales should be treated like other foreclosure-related sales and considered for model calibration and ratio studies when, in combination with other foreclosure-related sales, they represent more than 20 percent of all sales in the market area, but only after a thorough verification process for each sale. Again, care should be taken when validating these types of sales to account for changes in property characteristics (see Section 5.12).

5.6 PROPERTY CONDITIONS

This includes a property's physical and economic condition (as measured by lease contracts for commercial properties) at the time of sale. Adjustments to the sale price may be considered if the following conditions exist:

- Lease contracts
- Multiple-parcel sales
- Property characteristic changes
- Property change in use.

5.6.1 Lease Contracts

Sales of commercial properties with lease contracts should be analyzed before they are used in a model, in a ratio study, or as a comparable in the sales approach. A thorough sales verification process should be conducted to gather lease information needed to determine, to the extent possible, whether the lease reflects market rents.

Sale prices that reflect the leased fee interest should be analyzed to determine whether they are equivalent or can be adjusted to market value. To make the proper adjustments, the differences between the lease rents and market rents must be known and the present value of the difference must be determined and added or subtracted from the sale price (see Section 6.2.1 on adjustments for long-term leases). The amount of detail that a jurisdiction requires for leases varies and can be gathered on a unit level or aggregated by use type. More detailed information can be gathered on the unit level; however, this information is more difficult to obtain because of privacy issues and the amount of data to be reported, particularly for multitenant buildings. While data reported by use type are less precise, compliance is more likely because details of the lease are not reported and the information is more succinct.

In principle, a jurisdiction must be consistent and transparent in its sales verification process by providing guidance for when a lease is to be considered below or above market. As a general rule, a lease is considered to be "at market" if the lease rent is within 10 percent of the market rent. It is considered to be significantly "below market" if the lease rent is less than 90 percent of market rent and "above market" if the lease rent is greater than 110 percent of market rent.

Example 1. Lease Verification with Reporting at the Unit Level (Gross Leases)
The lease table is part of the Lease Verification Questionnaire given in Appendix B.1. Table 1 is an example is of a 10-story, 20-unit (2 units per floor), mixed-use building with retail and office tenants.

TABLE 1.1. Lease verification with reporting at the unit level (gross leases)

Unit No.	Floor or Range of Floors	Use (Include Vacant and Owner-Occupied)	Unit Size or Net Rentable Sq Ft	No. of Bedrooms and Baths (Residential Use)	Lease Term Remaining (years)	Rent at Time of Sale ($/sq ft/year)	Expenses paid by Tenant (Tax, Insurance, Maintenance, Other)	CAM and Other Pass-throughs ($/sq ft/year)
101	1	Retail	5,000		7	62		0.25
102	1	Retail	5,000		5	65		0.25
201, 202, 301, 302	2–3	Office	20,000		9	45		1
401–1002	4–10	Office	70,000		4	55		3.5

The market rental rate for office tenants is $60/sq ft/year. The market rental rate for retail tenants is $65/sq ft/year.

All four tenants have a gross lease. Comparing the market rental rate with total rent including pass-throughs (see Table 2) indicates that one of the office leases is significantly below market. (The sale verification table is part of the lease verification form in Appendix G.1.)

TABLE 2. Sale verification table for example 1

Tenant or Unit No.	Use	Total Rent with CAM and Pass-throughs	Percentage Change to Market Rent	Sale Verification
Tenant 1	Retail	$62.25	−4.23%	At market
Tenant 2	Retail	$65.25	0.38%	At market
Tenant 3	Office	$46.00	−23.33%	Below market
Tenant 4	Office	$58.50	−2.50%	At market

Since the sale reflects an office lease rent significantly below market, the sale price needs to be adjusted (see Section 6.2.1 for adjustment of long-term leases).

Example 2. Lease Verification with Reporting at the Unit Level (Gross and Net Leases)
The lease table is part of the Lease Verification Questionnaire in Appendix B.1. Table 3 is an example is of a one-story building with six retail units.

TABLE 3. Lease verification with reporting at the unit level (gross and net leases)

Unit No.	Floor or Range of Floors	Use (Include Vacant and Owner-Occupied)	Unit Size or Net Rentable Square Feet	Number of Bedrooms and Baths (Residential Use)	Lease Term Remaining (years)	Rent at Time of Sale ($/sq ft/year)	Expenses paid by Tenant (Tax, Insurance, Maintenance, Other)	CAM and Other Pass-throughs ($/sq ft/year)
101	1	Retail	5,000		5	47	Tax, insurance, maintenance	1.67
102	1	Retail	5,000		6	55	Tax, insurance,	1.67
103	1	Retail	5,000		8	45	Tax, insurance, maintenance	1.67
104	1	Retail, owner-occupied	5,000					
105	1	Retail	5,000		8	60	Tax	1.67
106	1	Retail	5,000		7	62		1.67

The market (gross) rental rate for retail tenants is $65/sq ft/year. The estimated triple net expenses for retail tenants are $9/sq ft/year ($7 taxes, $1 insurance, $1 maintenance).

Four tenants are on a net lease while one tenant (unit no. 106) is on a gross lease. One unit is owner-occupied. When net rental rates are converted to gross rates (see Table 4), two leases are substantially below the gross market rate of $65/sq ft/year. (The sale verification table is part of the lease verification form in Appendix G.1.)

TABLE 4. Sale verification table for example 2

Tenant or Unit No.	Use	Rent	Estimated Expenses Paid by Tenant	Estimated Gross Rent	Total Rent with CAM and Pass-throughs	Percentage Change to Market Rent	Sale Verification
Tenant 1	Retail	$47	$9	$56	$57.67	−11.28%	Below market
Tenant 2	Retail	$55	$8	$63	$64.67	−0.51%	At market
Tenant 3	Retail	$45	$9	$54	$55.67	−14.35%	Below market
Owner	Retail						
Tenant 5	Retail	$60	$7	$67	$68.67	5.65%	At market
Tenant 6	Retail	$62	0	$62	$63.67	−2.05%	At market

Because the sale reflects lease rents that are well below market, the sale price needs to be adjusted (see Section 6.2.1 for adjustment of long-term leases).

Example 3, Lease Verification with Aggregate Reporting by Property Use (Gross and Net Leases)
The lease table is part of the lease verification questionnaire given in Appendix B.2. The example in Table 5 is the same property as in example 2 with six retail units in a one-story building. In this case, a jurisdiction chooses to verify leases aggregated by use and rent type (gross or net) rather than at a unit level.

TABLE 6. Sale verification table for example 3

Use	Lease Type	Rentable Sq Ft	Income*	Estimated Triple Net Expenses*	Additional Pass-throughs*	Est. Gross Rent*	Est. Gross Rent**	% Change to Market Rent	Sale Verification
Retail	Gross	5,000	$310,000	0	$8,350	$318,350	$63.67	−2.05%	At market
Retail	Net	20,000	$1,035,000	$180,000	$33,400	$1,248,400	$62.42	−3.97%	At market

** $ Annual **$ sq ft/year*

The market (gross) rental rate for retail tenants is $65/sq ft/year. The estimated triple net expenses for retail tenants are $9/sq ft/year ($7 taxes, $1 insurance, $1 maintenance).

Five units are leased with 5,000 square feet covered by a gross lease and 20,000 square feet covered by a net lease, and the remaining 5,000 square feet is owner-occupied. There is no vacancy.

Converting net rental rates to gross rates requires adding back triple net expenses to total collected rents under a net lease (Table 6). (Note that because this is aggregate reporting, the exact expenses under each lease are not known, and this makes it less precise than unit reporting. In this case, triple net rents are considered typical, so that $9.00/sq ft/year has been added: 20,000 × $9.00 = $180,000).

On average, rents in this building are at market, so no adjustment to the sale price for long-term leases is warranted.

Verification of lease contracts requires knowledge of market rental rates and typical expenses that are passed through to tenants such as taxes, insurance, and maintenance. The following is a partial list of third-party sources:

- Market reports
- Parties to transactions
- Leases of similar properties obtained through reporting, leasing agencies, or brokers
- Insurance agencies
- County records for taxes
- Property managers.

5.6.2 Multiple-Parcel Sales

A multiple-parcel sale is a transaction involving more than one parcel of real property. These transactions present special considerations and should be researched and analyzed prior to being used for valuation or ratio studies.

If appraisers need to include multiple-parcel sales, they should determine whether the parcels are contiguous and whether the sale is a single economic unit or multiple economic units. Regardless of whether the parcels are contiguous, any multiple-parcel sale that involves multiple economic units generally should not be used in valuation or ratio studies.

The sum of the appraised values for the parcels involved in the transaction should be compared to the total sale price (see Appendix E for a copy of a multiple-parcel form). Table 7 presents an example of a multiple-parcel sale.

TABLE 7. Example of a multiple-parcel sale

Parcel No.	Appraised Value	Sale Price
001	$150,000	
002	$50,000	
003	$100,000	
Total	**$300,000**	**$315,000**

The three parcels in Table 7 are separately appraised, and their summed appraised value of $300,000 should be compared to the multiple-parcel sale price of $315,000 to determine whether the price is within market.

5.6.3 Property Characteristic Changes

Sales data files should reflect the physical characteristics of the property when sold. For ratio studies, if significant physical changes have occurred to the property between the date of sale and the appraisal date, the sale should not be included. The sale may still be valid for mass appraisal modeling by matching the sale price to the characteristics existing on the date of sale. For consistency in application, written guidelines should be provided as to what constitutes significant change. For example, an improvement of $3,500 may not be significant for a property with a selling price of $255,000 (1.4 percent) but is significant for a property selling for $21,000 (16.7 percent).

5.6.4 Property Change in Use

In ratio studies, property in which the use has changed between the date of appraisal and the date of sale should be excluded from further analysis. However, the sale may be used for analytical purposes if it can be matched with its use and physical characteristics at the time of sale.

6. ADJUSTMENTS

Sales should be adjusted to represent only the value of the real property as of the assessment date prior to model calibration and ratio studies. Adjustments to sale price can be a result of factors underlying the transaction, property conditions at time of sale, and market trends.

Principles

- ***Jurisdictions should provide training on the methodology for adjustments including assumptions, such as market rates and interest rates, used in the adjustment process.***
- ***Jurisdictions that require follow-up lease questionnaires for commercial properties should provide guidance on the structure of the questionnaire and training on the use of collected data.***
- ***There should be a program to track changes in price levels over time and adjust sale prices for time as required so that time adjustments are based on market analysis and are appropriately supported.***

The conditions that may require adjustments to the sale price are especially true for nonresidential properties. The real property tax is based on the market value of real property alone as of a specific date. This value may not be the same as investment value (i.e., the monetary value of a property to a particular investor) and does not include the value of personal property or financing arrangements. If adjustments for more than one purpose are to be made, they should be made in the following order:

1. Adjustments that convert the price to a better representation of the market value as of the date of sale (these include adjustments for financing, assumed long-term leases, and special assessments).
2. Adjustments that develop or isolate the price paid for taxable real property (these include adjustments for personal property received by the buyer, property taken in trade by the seller, the combination of partial interest sales, delinquent real estate taxes, and incomplete or unbuilt common property).
3. Adjustments for differences in market value levels between the date of sale and the date of analysis (time trends).

6.1 TRANSACTIONAL ADJUSTMENTS

Transactional adjustments to the sale price may be considered if the following exist.

- Buyer's closing costs (paid by seller)
- Delinquent taxes (paid by buyer)
- Financing (nonmarket rates)
- Real estate commissions.

6.1.1 Buyer's Closing Costs (Paid by Seller)

Closing costs are settlement fees and expenses incurred in transferring property ownership that are paid at the real estate closing. Expenses charged commonly include the following (these vary among the various jurisdictions and individual transactions):

- Attorney's fee
- Costs of recording the deed and mortgage
- Survey
- Title insurance
- State transfer taxes (if any).

These costs do not affect the sale price of the property, and no adjustment should be made when they are paid by the buyer. However, when paid by the seller, the costs should be deducted from the sale price.

6.1.2 Delinquent Taxes (Paid by Buyer)

Prepaid property taxes or current tax liabilities are usually prorated to the buyer and the seller and have no bearing on the sale price. However, if the buyer agrees to pay delinquent taxes, this amount should be added to the sale price.

6.1.3 Financing

The market value of property is its most probable selling price in terms of cash or the equivalent. Sale prices that reflect prevailing market practices and interest rates require no adjustment for financing. Under such conditions, neither the buyer nor the seller gains any advantage as a result of the manner of financing; hence, there is no reason for the sale price to differ significantly from its cash value. Because of different financing arrangements, the sale price of one property may be different from the sale price of another that is virtually identical. If a sale is adjusted for atypical financing, this adjustment should be made before any other adjustments are made. After the sale price has been adjusted for financing, it becomes the appropriate sale price to use as the basis for further adjustments. Adjustments for financing require data on actual and market interest rates, the amount of the loan, and the term and amortization provisions of the loan. Obtaining and properly analyzing such data, as well as estimating the extent to which the market actually capitalizes nonmarket financing, are difficult and time-consuming and require specialized skills.

Typically, new loans from financial institutions are at the prevailing market rates, and for seller-financing, rates can be higher (for a lower sale price) or lower (for a higher sale price). Sales prices should be adjusted when the rates are above or below market rates.

Adjustments for financing should be considered if the sale contains any of the following atypical financing:

- Assumed mortgages (nonmarket rates)
- Gift programs
- Points (paid by the seller)
- Seller-financing (nonmarket rates).

The preferred method of making adjustments for financing is the use of compound interest tables (IAAO 1996, 416–453).

6.1.3.1 Assumed Mortgages (Nonmarket Rates)

In an assumption of a mortgage, the buyer accepts liability for repayment of an existing debt of the seller. The adjustment process is similar to that of seller-financing except for the assumption fee (lender's processing fee), which is added to the sale price (see Table 8). In order to make an adjustment for loan assumptions that are at nonmarket rates, the following information is needed:

- Loan assumption fee
- Market interest rate
- Actual interest rate
- Amount of the loan
- Term and amortization provisions
- Down payment (if any).

TABLE 8. Example of an adjustment for assumed mortgages—cash-equivalent sale price

Sale price	$160,000		
Down payment	$40,000	Use monthly tables	
Assumption	$120,000		
Market rate of interest	8%		
Rate on current mortgage	6%		
Term of the loan	15 years		
Assumption fee	1%		
Payments based on the actual and market rates of interest would be as follows.			
$120,000 (Assumption) × .009556 (partial payment factor for 15 years @ 8%) = $1,146.84			
$120,000 (Assumption) × .008439 (partial payment factor for 15 years @ 6%) = $1,012.68			
		Difference	**$134.16**
Difference in monthly payments ($134.16) × the present worth of one per period for 15 years @ 8% (104.64059) = $14,038.58, rounded $14,000			
$14,000 is the indicated worth to the buyer for the lower interest rate.			
The sale price ($160,000) minus the indicated worth to the buyer ($14,000) = the adjusted sale price ($146,000)			
The adjusted sale price ($146,000) plus the assumption fee (1% of $120,000) = $146,000 + $1,200 = $147,200 (adjusted sale price including the assumption fee)			

6.1.3.2 Gift Programs

Gift programs are a type of creative financing for qualified residential home buyers by certain lending institutions that provide the buyer with monies to use as part of a down payment or for property improvements (e.g., AmeriDream, Inc., Housing Action Resource Trust [HART], Citizens' Housing and Planning Association [CHAPA] are only a few). These federal programs are typically associated with low-value residential properties and are difficult to discover. Typically, the reported sale price for the property is inflated to include the gift amount (monies not received by the seller). The sale price should be adjusted to reflect only the sale price of the real property received by the seller (Table 9).

TABLE 9. Example of an adjustment for gift programs

Sale price minus gift amount = adjusted sale price

6.1.3.3 Points (Paid by Seller)

Points may be defined as a percentage of the loan amount (charged by the lender) for making the money available to the borrower. Lenders often charge points in lieu of a higher interest rate, sometimes to comply with interest rate ceilings. One point is equal to 1 percent of the amount of the loan. Points paid by the buyer (borrower) are part of the down payment and do not require an adjustment, because the points merely represent prepaid interest. However, when the seller pays points, the sale price should be adjusted downward by the value of the points, because the buyer receives a below-market interest rate subsidized by the seller (Table 10). Under the market value assumption of informed buyers and sellers, the seller must put the property on the market at a higher price in order to realize the same amount of money for it.

TABLE 10. Example of an adjustment for points paid by Seller

Sale price	$50,000
Points paid by seller	2 (1 point = 1%)
Sales price minus points = adjusted sale price $50,000 – $1,000 = $49,000	

6.1.3.4 Seller-Financing (Nonmarket Rates)

Sales in which the seller and the lender are the same party need to be thoroughly examined to determine whether the interest rate is the prevailing rate. If it is, no adjustment should be made for financing (Table 11). In some cases, the seller/lender may accept a low sale price in exchange for a high rate of interest. In other cases there may be an agreement on a low rate of interest in exchange for a higher sale price. If the interest rate is above or below the going rate of interest, the *difference* in monthly payments required under the going and assumed rates of interest should be discounted to its present value. This amount should be subtracted from the sale price when the assumed rate of interest is less than the going rate, and added to the sale price when the assumed rate exceeds the going rate. The ultimate goal is to bring the sale price up or down to market.

TABLE 11. Example of an adjustment for seller-financing—cash-equivalent sale price

Lower rate **Goal = market value** **Higher rate**	Higher sale price (deduct) Lower sale price (add)	
Sale price	$120,000	
Down payment	$20,000	Use monthly tables
Financed by seller	$100,000	
Market rate	8.5%	
Actual rate	10.0%	
Term	20 years	

Partial payment factor for 20 years @ 10% = 0.00965 × $100,000 (financed) = $965.00 partial payment factor for 20 years @ 8.5% = 0.00868 × $100,000 (financed) = $868.00

Difference $97.00

The present value of the difference in the amount of monthly payments = difference $97.00 × present worth of 1 per period for 20 years @ 8.5% (always use market rate) 115.23084 = $11,177.39, rounded $11,177

Sale price $120,000 + $11,177 value to seller-lower sale price = adjusted sale price

$131,177

6.1.4 Real Estate Commissions

The real estate commission is the fee the seller pays to a real estate broker to obtain a buyer for the property. A knowledgeable seller can avoid the fee by advertising and showing the property, negotiating with potential buyers, and performing the necessary paperwork. The commission then represents the cost of such services, and the sale price cannot be expected to be any more or any less if these services are performed by a real estate broker or by the seller. Therefore, a real estate commission should not be subtracted from the sale price. The sole exception to this rule occurs when the buyer agrees to pay the seller's commission, in which case the amount of the commission is added to the sale price.

6.2 PROPERTY CONDITIONS ADJUSTMENTS

The following economic and physical conditions may require price adjustments:

- Assumed long-term leases (nonmarket rates)
- Personal property (paid by buyer)
- Repair allowances
- Special assessments.

6.2.1 Assumed Long-Term Leases

When a property is encumbered by a lease, the buyer receives the right to the contract rent stated in the lease. The sale price reflects the relative desirability of this lease. The sale price of a property encumbered by a long-term lease of at least three years should be adjusted if the contract rent differs significantly from market rent. The sale price should be adjusted by the difference between

the present worth of the two income streams.
If the contract rent exceeds market rent, the present worth of the difference in the two income streams should be subtracted from the sale price (Table 12).

TABLE 12. Example 1 of a long-term lease adjustment

Sale price	$500,000	
Monthly contract rent	$6,000	
Monthly market rent	$5,000	Use monthly tables
Years remaining on lease	5	
Discount rate	12%	
The difference between the market and contract rent is $1,000. The present worth of 1 per period for 5 years @ 12% ($1,000 × 44.95504) = $44,955 This is the present worth of monthly premium paid for above market rent. Adjusted sale price = $500,000 (sale price) minus $44,955 (monthly premium) or $455,045		

When the contract rent is less than current market rent, the present worth of the difference in the two income streams should be added to the sale price (Table 13).

TABLE 13. Example 2 of a long-term lease adjustment

Sale price	$100,000
Monthly contract rent	$1,000
Monthly market rent	$1,200
Years remaining on lease	5
Discount rate	11%
The difference between the market and contract rent is $200 per month for five (5) years capitalized at 11% (monthly tables) $200 × 45.99303 (present worth 1/p factor @ 11%) or $9,198.60. This is the portion of the present worth of the property that the buyer cannot realize and that consequently should be added to the sale price to determine the full cash value of the property as indicated by the sale. The indicated full cash value is $100,000 + $9,199 or $109,199.	

In a multitenant building, contract rents and lease terms differ by unit. If a jurisdiction sends a Lease Verification Questionnaire (see Appendixes B.1 and B.2 for examples), then adjustments can be done on a unit level or by property use. The risk of the lease, as summarized in the discount rate, differs by property use and length of remaining years on the lease. For example, if retail is more risky than apartment use, given the same amount of years remaining on a lease, then a higher discount rate for retail is required for the present value calculation. Similarly, a lease with more years on the horizon has a higher risk than one that will end sooner.

Example 3, Long-Term Lease Adjustment (Multitenant Adjustments)
This example is a one-story building with six retail units as given in example 2 of Section 5.6.1. Recall that two retail units, tenant 1 and tenant 3, were below the assumed market rental rate of $65. The present value difference of the market and contract rent including all pass-throughs must be added to the price.

A sample lease verification form with the worksheet calculation is given in Figure 1 (see Appendix G.1).

FIGURE 1. Sample lease verification form

Lease Verification Form

For Commercial Properties, this form supplements the Lease Verification Questionnaire

Current Date:	6/10/2019
Subject Property Address:	333 E. 33rd St

Sale Information

Sold Price:	$12,000,000.00	Sold Date:	5/17/2019
Total Adjusted Price:	$12,850,000.00		
Adjustment due to long term leases (use worksheet below):	$398,373.20		

Sale Verification & Price Adjustment

	RETAIL	USE TYPE 2	USE TYPE 3
Market (Gross) Rental Rate ($psf/year):	$ 65.00	$	$

SALE VERIFICATION

Tenant or Unit No.	Use	Total Rent with CAM and Pass Throughs ($psf/year)	% Change to Market Rent	Sale Verification
Tenant 1	retail	$57.67	-11.28%	Below market
Tenant 2	retail	$64.67	-0.51%	At market
Tenant 3	retail	$55.67	-14.35%	Below market
Owner	retail	$0.00		
Tenant 5	retail	$68.67	5.65%	At market
Tenant 6	retail	$63.67	-2.05%	At market

ADJUSTMENT CALCULATION

Difference Between Market and Contract Rent ($psf/year)	Unit Size or Net Rentable Sqft	Rent Difference ($ year)	Lease Term Remaining	Discount Rate	Present Value of Rent Difference
$7.33	5,000	$36,650.00	5	9.00%	$142,555.72
$9.33	5,000	$46,650.00	8	9.25%	$255,817.48
				Adjustment for Leases:	$398,373.20

The sold price is $12,000,000. The price was adjusted up to $12,850,000, of which $398,373.20 is due to the two retail units having long-term leases (greater than three years) that are below market.

6.2.2 Personal Property

Personal property values that may be included in the sale price are either *tangible* or *intangible* personal property. Sales verification includes determining the contributory value of any significant personal property included in the sale price. If these sales are to be included as potentially valid transactions, the value of these contributory items should be subtracted from the sale price to determine the price paid for the real estate. Personal property includes such tangibles as machinery, furniture, and inventories and such intangibles as franchises, licenses, and noncompete agreements (see Appendix H for a more thorough description of intangible personal property, and Appendix I for a sample verification form). Ordinarily, it is not necessary to consider goodwill, going-concern value, business enterprises value, or the like, unless the value of these intangible assets has been itemized in a sales contract or a formal appraisal has been prepared for either party.

It is necessary to decide whether each item included in the sale should be classified as real or personal property (see *Standard on Valuation of Personal Property* [IAAO 2018], which provides guidance on classification of property as real or personal).

Sale prices should be adjusted by subtracting the contributory value of personal property received by the buyer. Ordinary window treatments, outdated models of freestanding appliances, and common-grade used furniture included with residential property do not usually influence the sale price of real property and do not require an adjustment unless the items were specifically broken out in the contract as personal property included in the sale price. If the value of personal property

appears to be substantial (10 percent for residential, 25 percent for commercial/industrial), the sale should be excluded as a potential valid transaction unless the sample sizes are small.

6.2.3 Repair Allowances

Sometimes the seller provides a repair allowance to the buyer to cure defects in the property. In sales ratio studies it is important to match the property assessed with the property sold. Repair allowances should be deducted from the sale price only if the property was in an unrepaired state on the appraisal date but sold at a higher price reflecting the value of the repairs. If the sale occurred before the appraisal date and the repairs were made prior to the appraisal date, no adjustment should be made. For example, if a property sold for $200,000 with the seller agreeing to credit the buyer $10,000 for needed repairs at closing and both the sale and repairs were completed before the appraisal date, no adjustment to the sale is required. However, if the repairs are not made as of the appraisal date, then the sale price should be adjusted to $190,000 to reflect the value of the unrepaired property on the appraisal date.

6.2.4 Special Assessments

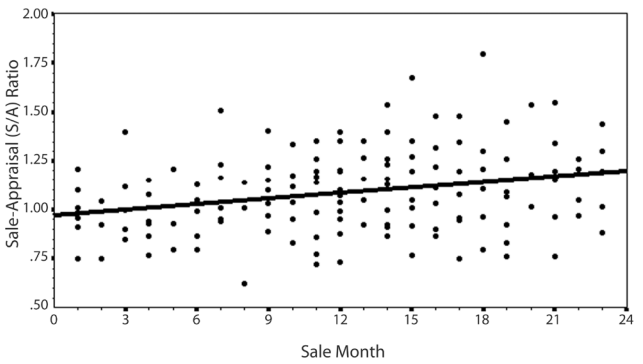
A special assessment is a special tax imposed on property, individual lots, or all property in the immediate area. These taxes are collected for road construction, sidewalks, sewers, and street lights, among other government services. Special assessments are used to finance capital improvements or provide services adjacent to the properties they directly benefit. Typically, the property owner is obligated to make annual payments of principal and interest to a local unit of government over a specified number of years. The sale price of a property encumbered by a special assessment can require adjustment if the current balance of the defrayed amount is significant. The sale price can be adjusted upward to account for this lien. If the effect on market value is significant and can be ascertained, an adjustment should be made.

6.3 Market/Time Adjustments

There should be a program to track changes in price levels over time and adjust sale prices for time as required. Time adjustments should be based on market analysis and be appropriately supported. Valid time adjustment techniques are as follows:

- Tracking sales-to-appraisal ratios over time (*Figure 2*)
- Including date of sale as a variable in regression or feedback models
- Analyzing resales
- Comparing per-unit values over time in homogeneous strata, such as a subdivision or condominium complex
- Isolating the effect of time through paired sales analysis.

FIGURE 2. Example of a time adjustment plot of sale-to-appraisal ratios



These techniques are discussed in *Mass Appraisal of Real Property* (Gloudemans 1999), *Property Appraisal and Assessment Administration* (Eckert, Gloudemans, and Almy 1990, Appendix 5-3), and *Improving Real Property Assessment* (IAAO 1978, Section 4.6). If sale prices have generally been rising, ratios for sales that occurred after the assessment date tend to understate the overall level of appraisal. Similarly, sales ratios for sales that occurred before the assessment date tend to overstate the level of appraisal. If prices are generally declining, an opposite pattern results. When tracking sale-to-appraisal ratios over time (using the inverse ratio technique) for determining time adjustments, it is important that ratios for chased sales be excluded, since there is no correlation of such sales ratios with the date of sale.

Changes in price levels should be monitored and time adjustments made by geographic area and type of property, because different segments of the market tend to change in value at different rates.

Oversight agencies can make any appropriate time adjustments after making all other adjustments. Time adjustments should be applied prior to any statistical analysis; however, atypical sales should be removed for the time-trend application. These atypical sales should, however, be included during the outlier trimming process, which occurs during the statistical phase of the ratio study program.

7. DOCUMENTING THE RESULTS OF THE VERIFICATION PROCESS

Sales verification should be documented and should enable review of the derivation of the price adjustments.

Principles

- ***A documentation form, preferably in electronic format, should be completed in a timely manner for all sales that have had a follow-up verification, and the form should become part of the sales file.***
- ***Sales of commercial properties that have had a follow-up request for lease information should also have a lease documentation form that is stored in electronic format, and it should accompany the sales verification form as part of the sales file.***

Documentation forms should be completed at the time each sale has been verified to limit the loss of valuable information or the possibility of mixing information from different transactions. It is far better to over-document than under-document to eliminate the need for additional follow-up contacts.

7.1 SALE VERIFICATION FORM

The form should contain the results of the sale verification and the adjustments made to price if any. Helpful items on the form are as follows:

- *Parcel identification number*. The parcel identification number is the numeric or alphanumeric description of a parcel that identifies it uniquely.
- *Unique sale number*. Unique sale numbers tie a specific sale to a parcel(s) and eliminate problems caused by parcels with multiple sales.
- *Contact information*. Contact information includes the name of the person interviewed, his or her role in the transaction (buyer, seller, other), and a telephone number (also an e-mail address, if available). The record should contain space or fields to record multiple contact attempts (date, time, and outcome). At least three contact attempts should be made on different dates and times before the verification effort is declared unsuccessful.
- *Conclusions and comments*. Verification results should be accurately documented. Too much information is better than insufficient documentation. Professionalism in completing the form is important because of all the possible uses of the form, including helping to resolve possible differences of opinion between local and oversight agencies regarding the validity of sales.
- *Sales source or screening codes*. Sales source or screening codes are used to identify the source of the sales information or how the sale was verified and are separate from the validity code. Screening codes afford the user the ability to extract data for further stratification. These codes are especially beneficial during changes in the market or when specific situations require tracking. They also allow the user of the data to identify those sales for which follow-up verifications have been made, multiple-parcel sales, and specifics unique to the sale such as foreclosure-related sales and partial interest sales (Tomberlin 2001). Also, see Appendix F for an example of source codes on the documentation form example.

- *Validity codes*. Even more important than the source codes are codes to document the validity of the sale. Codes should be assigned to indicate whether a sale is valid and, if not, the reason for exclusion or adjustment. See Appendix F for an example of validity codes on the documentation form example.
- *Name of person completing the form*. The name of the person completing the form should be on the form in case there is a question or unresolved problem regarding the sale.
- *Date the form was completed*. The form should be dated to ensure interview dates are consistent with the completion date on the form.

7.2 LEASE VERIFICATION FORM (FOR COMMERCIAL PROPERTIES)

For commercial properties, a documentation form should be completed for all sales that have had follow-up requests for lease information (see Appendixes G.1 and G.2 for examples of a documentation form). The form should document whether and how the requested lease data was used to adjust the price. Documentation codes should indicate whether adjustment to the price was warranted and whether the lease information received was sufficient to calculate the price adjustment.

Documentation of the results of the lease verification process should contain sufficient information to understand the derived adjusted numbers. Helpful items on the form are as follows:

- *Market rental rate by use*. The market rental rate can be gross or net depending on what is typical in the market. Rental rates can be estimated from collected income data or derived from market reports.
- *Total rent including pass-throughs*. This information is collected through lease verification questionnaires. It is the base rent, including step-ups or inflationary adjustments up to sale date, plus pass-throughs received by the landlord including CAM.
- *Remaining lease term*. This information is part of the lease verification questionnaire and should be part of the documentation form. It is used in the calculation of the price adjustment due to long-term leases.
- *Discount rate*. The assumed discount rate must be documented. The rate is used in discounting the present value difference between contract and market rent.
- *Lease verification code*. The code should indicate whether the lease follow-up information is sufficient to determine and calculate the adjustment to price.

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GLOSSARY

Abstract of Title. An abstract is a complete summary of all recorded documents affecting the title to a property. These documents include all conveyances, such as deeds or wills, and all legal proceedings relating to ownership of the property. Abstracts are arranged to show the history of ownership, describe the land and improvements, and give the name(s) of past and present owners(s).

Absolute Ownership. Ownership of all real property rights and interests in real estate parcel. See also Fee Simple.

Accuracy. Accuracy is the closeness of an estimated value (e.g., measured or computed) to a standard or accepted value of a particular quantity. Compare to Integrity, Precision, Validity.

Address. (1) A location, expressed in terms of a conventional spatial reference scheme, at which a property or person may be found. (2) In a computer file, a specific juncture of circuits in computer machinery at which information is stored in the form of magnetic polarities. (3) The name a programmer uses to refer to such a juncture. *Note: For a file of human-readable information, one must establish rules about whether and how to record various relevant addresses, including the situs address, owner's address, and mortgagee's address.*

Adjusted Sale Price. Defined under Price, Adjusted Sale.

Adjustments. Adjustments are modifications in the reported value of a variable, such as sale price. For example, adjustments can be used to estimate market value in the sales comparison approach by modifications for differences between comparable and subject properties. *Note: Adjustments are applied to the characteristics of the comparable properties in a particular sequence that depends on the method of adjustment selected.*

Adverse Possession. The exclusive occupation and continuous possession of (another's) real property under an evident claim of title or right.

Affidavit. A written form of an affirmed or sworn statement.

Agreement. A general term describing a common view of two or more people regarding the obligations and rights of each with regard to a specific subject.

Air Rights. The right to use space above real estate.

Alienation. The transfer of title from one person to another.

Alienation Clause. A type of acceleration clause that calls for a debt under a deed or mortgage to be due in its entirety upon transfer of ownership from the secured party.

Annuity. (1) The right to receive money or its equivalent in (usually) fixed equal amounts or at regular intervals for a definite or indefinite term; (2) a level, increasing, or decreasing stream of scheduled and predictable income or payment amounts.

Arm's-Length Sale. Defined under Sale, Arm's-Length.

Assemblage. Assemblage is the assembling of adjacent parcels of land into a single unit. Compare plottage.

Assembly Value. The excess of the value of a large parcel of land formed from a number of smaller parcels over the sum of the values of the unassembled parcels.

Assumption Fee. A lender's fee for processing records when a new buyer assumes an existing loan.

Assumption of Mortgage. An assumption of a mortgage is an agreement in which the buyer accepts liability for repayment of an existing debt. Unless the seller is released, he or she remains liable for the payment of such debt.

Affidavit of Equitable Interest. Affidavits are contracts for the purchase of real property under the terms of which legal title to the property is retained by the seller until such time as all the conditions stated in the contract have been fulfilled. These are commonly used for the installment purchase of real property; however, the deed is not recorded until the terms of the contracts have been fulfilled.

Amortize. The process of repaying a loan or recovering a capital investment by means of a series of scheduled payments, typically includes interest charges and principal repayment in each of the scheduled payments.

Assessment Ratio. (1) The fractional relationship an assessed value bears to the market value of the property in question. (2) By extension, the fractional relationship the total of the assessment roll years to the total market value of all taxable property in a jurisdiction.

Attachment. Property seizures by a court order.

Attestation Clause. The witness clause in a document that affirms the document is properly executed.

Attribute. Characteristic of a property.

Absolute Auction. An auction in which the property is sold to the highest bidder regardless of the amount. No minimum bid clause.

Auction. A method of marketing and selling real property. Property that sells by absolute auction should never be included in model calibration and ratio studies.

Bailment. A transaction in which personal property is delivered by its owner (the bailor) to a second party (the bailee) into whose possession it is put for safekeeping or for some other temporary purpose or use with no intention that title shall pass to the second party.

Balloon Mortgage. A mortgage not fully amortized at maturity and requiring a lump-sum (or balloon) payment.

Beneficial Estate. An estate of which the right to possession has not yet passed.

Beneficial Interests. The property interests resulting from equitable ownership in a property rather than legal ownership, for example, the interests of the beneficiary of a trust.

Beneficiary. (1) The person for whose benefit property is held in trust. (2) The person to whom the proceeds of an insurance policy are payable upon the happening of the event insured against or the nonhappening of the insured event.

Blanket Mortgage. A mortgage covering more than one property; use in, for example, subdivision development and cooperative apartment ownership.

Bond, Loan. A written instrument, under seal, evidencing a participating interest in an obligation of a borrower and containing a formal promise to pay a sum certain (the par or face value) at a fixed future date (the date of maturity), with interest payable periodically at a fixed rate. *Note: This is the type of bond ordinarily referred to in the term "stocks and bonds." There are few exceptional bonds outstanding that have no date of maturity or that bear interest at a rate varying with the issuer's income or with the general price level.*

Breach of Contract. The failure to perform a contract, in whole or in part.

Bullet Loan. Gap financing offered with a construction loan has expired but permanent financing has not yet been found.

Bundle of Rights. The six basic rights associated with the private ownership of property: use; sell; rent or lease; enter or leave; give away; and refuse to do any of these.

Business Assets. Business assets are tangible and intangible resources employed by a business enterprise in its operation.

Business Enterprise. The commercial, industrial, or service organization pursuing an economic activity.

Business Enterprise Value. A term applied to the concept of an intangible, nonrealty component of a property's value probably ascribable to supramarginal management competence. This is different from goodwill and going-concern value.

Business Equity. The interests, benefits, and rights inherent in the ownership of a business enterprise or a part thereof in any form (including but not necessarily limited to capital stock, partnership interests, cooperatives, sole proprietorships, options, and warrants).

Buyer. (1) One who purchases property. (2) In real property sales, the grantee to whom property is transferred by deed or to whom property rights are granted by a trust instrument or other document.

Buyer's Market. A market in which the supply is greater than the demand.

Cash-Equivalent Sale Price. An indicator of market value that is a refinement over the raw sale price, in that the effects of unusual financing arrangements and extraneous transfers of personal property have been removed.

Cash Lease. A written document transferring from one owner to another party the right to live in or to use property for a specified period of time for a specified amount of money.

Certificate of Redemption. The evidence of buying back or redeeming a property by the owner after loss through a judicial sale.

Certificate of Sale. A certificate, issued to the buyer at a judicial sale, that entitles the buyer to a deed upon confirmation of the sale by the court or if the property is not redeemed within a specified time.

Certificate of Title. A document that states that the title to a property is believed to be clear based on the examination of the abstract of title for the property.

Cestui Que Trust. A beneficiary of property held in trust.

Chattel. Tangible personal property.

Closing. The act of finalizing a real estate transaction that executes and delivers mortgage or property title documents.

Closing Costs. Settlement fees and expenses incurred in transferring property ownership that are paid at the real estate closing.

Closing Statements. A listing of incurred closing costs of the buyer and seller in closing a real estate transaction.

Cloud on Title. Any valid claim, encumbrance, or lien that may impair the title to real property.

Coding. The act of reducing a description of a unique object, such as a parcel of real estate, to a set of one or more measures or counts of certain of its characteristics, such as square footage, number of bathrooms, and the like.

Color of Title. An appearance of legal ownership that arises from irregular conveyances. If, for example, an owner's claim to property depended on a deed that had never been recorded, that owner would have color of title but would not have full legal title. Color of title cannot arise from fraudulent documents, such as forgeries.

Commercial Property. Generally any nonindustrial, nonresidential realty of a commercial enterprise. It includes realty used as retail or wholesale establishment, retail establishment with living quarters, office building, hotel or motel, gasoline service station, commercial garage, parking lot, warehouse, theater, bank, clinic, nursing home, proprietary school, and the like.

Common Area. The total area within a property that is not designed for rental or sale, which is available for common use by all tenants and owners. See also Undivided Interests.

Comparable Sales; Comparables. (1) Recently sold properties similar in important respects to a property being appraised. The sale price and the physical, functional, and locational characteristics of each of the properties are compared to those of the property being appraised in order to arrive at an estimate of value. (2) By extension, the term *comparables* is sometimes used to refer to properties with rent or income patterns comparable to those of a property being appraised.

Computer-Assisted Mass Appraisal System (CAMA). A system of appraising property, usually only certain types of real property, that incorporates computer-supported statistical analyses, such as multiple regression analysis and adaptive estimation procedures, to assist the appraiser in estimating value.

Condominium/Condominium Unit. A separately owned unit of real property in the same structure with other such units; the unit owners hold an undivided interest in common elements of the property, such as a lobby, swimming pool, and grounds. See also Cooperative.

Consideration. The amount of money and other valuable goods or services on which a buyer and a seller agree, to consummate a sale.

Contract, Land. Defined under Land Contract.

Contract for Deed. A contract for sale in which the seller retains title until the buyer completes the contracted payments for the property. The sale is not recorded until title passes to the buyer. See also Land Contract.

Contract Rent. The actual amount of rent, per unit of time, which is specified in the contract (lease). For very old contracts, the contract rent may be substantially less than the rent the property would bring today. Compare Market Rent.

Conveyances. Legal documents that transfer ownership of property. Deeds and wills are examples of conveyances. Compare Real Estate Transfer Documents.

Cooperative. A business entity, usually a corporation, that holds title to realty and that grants rights of occupancy to its shareholders by means of proprietary leases or similar devises. A cooperatively owned apartment building is legally different from a building consisting of condominium units. See also Condominium and Blanket Mortgage.

Copyrights. The exclusive right granted by a government for a limited period to an author, composer, designer, or such, or his or her heirs, legatees, or assigns, to reproduce, publish, and sell copies of an original literary or artistic work.

Corporation. A legal entity (business organization form) operating under a grant of authority from a state in the form of a charter and articles of incorporation.

Covenant. A promise written into a legal agreement (such as a deed) that binds the parties to abide by or refrain from certain acts. A deed restriction is a special kind of covenant.

Date of Sale (Date of Transfer). The date on which the sale is agreed, considered to be the date the deed or other instrument is signed. The date of recording can be used as a proxy if it is not unduly delayed as in a land contract.

Declaration of Restrictions. A set of recorded restrictions that apply to a specific area or subdivision.

Declaration of Trust. A written acknowledgment by the legal title holder to property specifying the property is held in trust for the benefit of another party.

Deed. A document (or written legal instrument) that, when executed and delivered, conveys an interest in or legal title to a property.

Deed, Bargain and Sale. Implicitly or explicitly asserts the grantor's ownership of the property conveyed, but makes no guarantees to defend the title. It provides the grantee more protection than a quitclaim deed but less than a special warranty deed. The words of conveyance *bargain and sale* distinguish a bargain and sale deed.

Deed, Quitclaim. A deed in which the grantor conveys or relinquishes all interests that he or she may have in a property, without warrant as to the extent or validity of such interest.

Deed, Special Warranty. A deed in which the grantor only covenants to warrant and defend the title against claims and demands of the grantor and all persons claiming by, through, and under him or her.

Deed, Tax. A deed by which title to real property, sold to discharge delinquent taxes, is transferred by a tax collector or other authorized officer of the law to the purchaser at a tax sale.

Deed, Trust. (1) Broadly, a deed by which title to property is transferred to a trustee to be held in trust. (2) Specifically, a deed by which title to property is transferred, conditionally or unconditionally, to a trustee to be held for the benefit of creditors or obligors of the grantor. (3) Loosely, the agreement made between an issuer of bonds and the holders of such bonds that is deposited with the trustee, whether or not such agreement involves the transfer of property to the trustee. A trust deed is also known as *deed of trust*.

Deed, Warranty. A deed containing a covenant of warranty whereby the grantor of an estate of freehold guarantees that the title that he or she undertakes to transfer is free from defects and that the property is unencumbered except as stated, and whereby the grantor, for himself or herself and his or her heirs, undertakes to defend and protect the grantee against any loss that may be suffered by reason of the existence of any other title or interest in the property existing at the time the deed was executed and not excepted therein. Compare to Deed, Quitclaim.

Deed Recordation. The process of registering a sale of real property with the appropriate public body, usually the county recorder's office.

Deed Restriction. A limitation to property rights that transfers with the property regardless of the owner.

Delinquent Taxes. Past due and unpaid taxes.

Disclosure. (1) Act of disclosing. (2) Revelation. (3) To make known or public. (4) In real estate, a seller of real property must disclose facts that affect the value or desirability of the property. Unless exempt, the seller completes and signs specific disclosure forms, including the Real Estate Transfer Disclosure Statement, to disclose those material facts.

Discounted Cash Flow Analysis. (1) A yield capitalization method used to calculate the present value of anticipated future cash flows and (2) analysis of the present value of an income-producing property by isolating differences in the timing of cash flows. Net cash flows from all time intervals involved in the analysis are discounted to present value by an appropriate discount rate.

Discounting. Discounting is the process of estimating the present worth of an anticipated item of income or expense by determining the amount of money that, if presently invested and allowed to accumulate at compound interest, will exactly equal the expected item of income or expense at the time when it becomes due.

Discount Rate. (1) The rate of return on investment; the rate an investor requires discounting future income to its present worth. The discount rate comprises an interest rate and an equity yield rate. Theoretical factors considered in setting a discount rate are the safe rate earned from a completely riskless investment (this rate may reflect anticipated loss of purchasing power due to inflation) and compensation for risk, lack of liquidity, and investment management expenses. The discount rate is most often estimated by band-of-investment analysis or sales comparison analysis, which estimates typical internal rates of return. (2) In monetary policy, the rate that the Federal Reserve Bank charges member banks to borrow. Compare to Recapture Rate.

Divided Rights. Rights to property that have been divided among several owners in partnerships, joint tenancy, tenancy in common, and time-share units.

Encumbrance. Any limitation that affects property rights and value.

Equitable Ownership. The interest or estate of a person who has beneficial right in property legally owned by another; for example, the beneficiary of a trust has equitable ownership in the trust property.

Equity. (1) In assessment, equity is the degree to which assessments bear a consistent relationship to market value. Measures include the coefficient of dispersion, coefficient of variation, and price-related differential. (2) In popular usage, a synonym for equity is a synonym for tax fairness. (3) In ownership, the net value of property after liens and other charges have been subtracted.

Equity of Redemption. A right recognized by courts of equity whereby a person who has transferred legal title to property as security for an obligation is permitted, after defaulting on the obligation, to retain possession of the property for such period as may be prescribed by law or by the court and to reacquire legal title to the property upon fulfillment of the obligation within such period.

Estate. (1) The interest that a person possesses in a single concrete article of property; (2) the aggregate interests of any person in articles of property of all descriptions; and (3) the aggregate property of all descriptions left by a decedent. See also Tenancy; Real Estate.

Estate, Leasehold. Any possessory interest in land less than estate of freehold, that is, an estate for years, an estate from year to year (periodic estate), an estate at will, or an estate at sufferance. See Leasehold.

Estate for Years. A possessory interest in land that cannot endure beyond a date specified in the conveyance or a date precisely determinable at the time the interest becomes possessory.

Estate in Fee Simple. An inheritable, possessory interest in land that may endure until the extinction of all lineal and collateral heirs of the first owner and that may be freely conveyed by its owner; the largest possible estate in land.

Estate of Freehold. Any one of the three types of possessory Interest in land—fee simple, fee tail, and estate for life—that in feudal time were granted only to freemen.*Note: Estates of freehold are said to be estates of indefinite duration and any other estate is said to be "less than freehold."*

Exchange. Internal Revenue Code Section 1031 enables a taxpayer to defer gain on the sale of a business use or investment property, provided that the seller reinvests in another businesses use or investment property. *Note: The seller has 45 days from closing of their current property to identify a replacement property. Although there are requirements, an exchange is much like a typical sale and purchase transaction. To defer all capital gains, one must acquire a replacement property with equal or greater property value to that of the sold property. The seller must also reinvest all net equity.*

Fannie Mae. Defined under Federal National Mortgage Association.

Federal Home Loan Mortgage Corporation (FHLMC) (Freddie Mac). An organization that facilitates secondary residential mortgages for savings and loan associations, to increase availability of residential mortgage financing.

Federal National Mortgage Association (FNMA) (Fannie Mae). A quasi-governmental agency that purchases mortgages from originators, to increase liquidity in the home mortgage market.

Fee Simple. Complete interest in a property, subject only to governmental powers such as eminent domain. Also known as fee simple absolute. See also Estate in Fee Simple and Absolute Ownership.

Fee Simple Condition Subsequent. This gives an owner fee simple title to property so long as a specified event (usually a change in use) does not occur. The person granting fee simple condition subsequent title must file suit to recover ownership if the condition is not met.

Fee Simple Determinable. Identical to fee simple condition subsequent except that the grantor (the original owner) does not need to file suit to regain title.

Fee Simple Title. Ownership that is absolute and subject to no limitation other than eminent domain, police power, escheat, and taxation.

Fiduciary. Any person who occupies a position of special trust in certain of his or her relationships to another person or persons, for example, an administrator, executor, guardian, receiver, or trustee.

Foreclosure. The legal process by which a lien on a property is enforced.

Foreclosure-Related Sale. These sales were formerly foreclosed on by the financial institution. The seller will be the financial institution. These sales typically are on the low side of the value range because the financial institution is highly motivated to sell and may be required by banking regulations to remove the property from its books.

Franchise. A privilege or right that is conferred by grant of government or an individual or a group of individuals; usually an exclusive right to furnish public services or to sell a particular product in a certain geographical area.

Freddie Mac. Defined under Federal Home Loan Mortgage Corporation.

Free and Clear. Property unencumbered by any liens or mortgages.

Freehold. Defined under Estate of Freehold.

Future Worth of 1. Also called the compound amount of 1 or the amount of 1 at compound interest; the amount to which one dollar will grow at compound interest over a specified number of years and at a specified interest rate.

Future Worth of 1 per Period. Also called the compound amount or accumulation of 1 per period; the amount to which a series of equal periodic payments will accumulate at compound interest for a specified number of years and at a specified interest rate.

General Warranty Deed. The most common type of deed. This deed implicitly promises that (1) the grantor owns the property and may convey title; (2) there are no hidden liens against the property; (3) no one else has better title to the property; (4) the grantor will obtain and deliver any documents needed to make good the transfer; and (5) the grantor will be liable for damages if future competing claims to the property prove valid.

Ginnie Mae. Defined under Government National Mortgage Association.

Going-Concern Value. The enhanced or synergistic value of assets due to their existence within, or assemblage into, an operating and economically viable business that is expected to continue its operation in the future with no intention or necessity of liquidation or the material alteration of the scale of operation.

Goodwill. The economic advantage over competitors that a business has acquired by virtue of habitual patronage of customers.

Government National Mortgage Association (GNMA) (Ginnie Mae). A government-owned and government-financed agency that subsidizes mortgages through its secondary mortgage market and issues federally insured mortgage-backed securities. This agency falls within the U.S. Department of Housing and Urban Development.

Grantee Index. Lists alphabetically the name of every grantee whose name appears on a deed recorded for the year the index covers.

Grantee. One who acquires property by voluntary conveyance.

Grantor. One who voluntarily conveys property, whether by sale, gift, lease, or otherwise.

Grantor Index. Lists alphabetically the name of every grantor whose name appears on a deed recorded for the year the index covers.

Industrial Property. Any property used in a manufacturing activity, including a factory, wholesale bakery, dairy plant, food-processing plant, mill, mine, quarry, all locally assessed utility property, and the like.

Installment Contract. A purchase contract in which payment is made in prescribed installments that are usually forfeited if default occurs.

Instrument. A formal legal document such as a deed, contract, will, or lease.

Intangible Personal Property. Property that has no physical existence beyond neither merely representational, nor any extrinsic value; includes rights over tangible real and personal property but not rights of use and possession. Its value lies chiefly in what it represents. Examples include corporate stock, bonds, money on deposit, goodwill, restrictions on activities (e.g., patents and trademarks), and franchises. *Note: Thus, in taxation, the rights evidenced by outstanding corporation stocks and bonds constitute intangible property of the security holders because they are claims against the assets owned and income received by the corporation rather than by the stockholders and bondholders; interests in partnerships, deeds, and the like are not ordinarily considered intangible property for tax purposes because they're owned by the same persons who own the assets and receive the income to which they attach.*

Integrity. The quality of a data element or program being what it says it is; usually distinguished from validity; the quality of its being what it should be in terms of some ultimate purpose. After data are edited and encoded and programs are prepared, their integrity is ensured by safeguards that prevent accidental or unauthorized tampering with them. Compare to Accuracy; Precision.

Interest (Interest Rate). The premium paid for the use of money; a (rate of) return on capital; the equilibrium price in money markets. The interest rate usually incorporates factors for risk, illiquidity, time preference, inflation, and potentially other factors. See also see Discount Rate**.**

Interest (Interest Transferred, Interest Acquired). The ownership rights of a person in a property. Complete ownership is called *fee simple* interest. It is possible to sell (transfer) and to own separately the component interests, such as mineral rights and air rights, which make up the fee interest. See also Bundle of Rights.

Interest, Possessory. Defined under Possessory Interest.

Interest, Undivided. Defined under Undivided Interest.

Intestate. The state of having died without leaving a valid last will and testament.

Inventory. (1) The group of personal property items whose value is exhibited by value in exchange; that is, ownership is solely for the purpose of sale rather than use; (2) in general, any detail list showing quantities and descriptions, and usually values or prices of property; (3) frequently used in the plural form to designate all types of current, physical assets that are customarily listed by quantities, descriptions, and values or prices for regular accounting purposes (for example, raw materials, goods in process, finished goods, office supplies, stores; and (4) occasionally (e.g., in Vermont), a tax list.

Inwood Coefficient. A factor used to obtain the present worth of a level stream of income; also known as the present worth of 1 per period factor.

Joint Tenancy. Defined under Tenancy, Joint.

Land Contract. An executory contract for the purchase of real property under the terms of which legal title to the property is retained by the vendor until such time as all conditions stated in the contract have been fulfilled; commonly used for installment purchase of real property. See also Contract for deed.

Legal Description. A delineation of dimensions, boundaries, and relevant attributes of a real property parcel that serve to identify the parcel for all purposes of law. The description may be in words or codes, such as metes and bounds or coordinates. For a subdivided lot, the legal description would probably include lot and block numbers and subdivision names.

Lease. A written contract by which the lessor (owner) transfers the rights to occupy and use real or personal property to another (lessee) for a specified time in return for a specified payment (rent).

Leaseback. The transfer of building, land, or personal property to a buyer under a special arrangement to simultaneously lease it back to the original builder/seller, usually involving a long-term triple net arrangement with options to renew the lease.

Leasehold. Defined under Leasehold Estate.

Leasehold Estate. Interests in real property under the terms of a lease or contract for a specified period of time, in return for rent or other compensation; the interest in a property associated with the lessee (the tenant) rather than the lessor (the property owner). The lease may have value when market rent exceeds contract rent.

Leasehold Improvements. Items of personal property such as furniture and fixtures associated with a lessee (the tenant) that has been affixed to the real property owned by a lessor.

Lessee. The person receiving a possessory interests in property by a lease, that is, the owner of a leasehold estate.

Lessor. Person granting a possessory interest in property by a lease, that is, the conveyor of a leasehold estate, the holder of a leased fee estate.

Lien. (1) The legal right to take or hold property of a debtor as payment or security for a debt; (2) any legal hold or claim, whether created voluntarily or by operation of law, that a creditor has on all or specified portions of the property owned by a person indebted to him. Compare to Mortgage.

Life Estate. An interest in property that lasts only for a specified person's lifetime; thus, the owner of a life estate is unable to leave the property to heirs.

Life Tenant. The recipient of a life estate.

Market. (1) The topical area of common interests in which buyers and sellers interact; (2) the collective body of buyers and sellers for a particular product.

Market Analysis. A study of real estate market conditions for a specific type of property.

Market Area. A geographic area, typically encompassing a group of neighborhoods, defined on the basis that the properties within its boundaries are more or less equally subject to a set of one or more economic forces that largely determine the value of the properties in question.

Market Analysis. A study of real estate market conditions for a specific type of property.

Market Adjustment Factors. Market adjustment factors, reflecting supply and demand preferences, are often required to adjust values obtained from the cost approach to the market. These adjustments should be applied by type of property and area and are based on sales ratio studies and other market analyses. Accurate cost schedules, condition ratings, and depreciation schedules minimize the need for market adjustment factors.

Market Approach. A valuation term with several meanings. In its broadest use, it might denote any valuation procedure intended to produce an estimate of market value, or any valuation procedure that incorporates market-derived data, such as the stock and debt technique, gross rent multiplier method, and allocation by ratio. In its narrowest use, it might denote the sales comparison approach.

Market Modeling. Defined under Model.

Market-Related Adjustment. These adjustments account for changes in market conditions between the time a comparable sold and the effective date of the appraisal. See also Market Adjustment Factors.

Market Rent. The rent currently prevailing in the market for properties comparable to the subject property. Market rent is capitalized into an estimate of value in the income approach.

Market Value. Market value is the major focus of most real property appraisal assignments. Both economic and legal definitions of market value have been developed and refined. A current economic definition agreed upon by agencies that regulate federal financial institutions in the United States is as follows:

The most probable price (in terms of money) that a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeable, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby

- The buyer and seller are typically motivated;
- Both parties are well informed or well advised, and acting in what they consider their best interest;
- A reasonable time is allowed for exposure in the open market;
- Payment is made in terms of cash in United States dollars or in terms of financial arrangements comparable thereto; and
- The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

Model. (1) A representation of how something works. (2) For purposes of appraisal, a representation (in words or an equation) that explains the relationship between value or estimated sale price and variables representing factors of supply and demand.

Mortgage. A mortgage is a contract under the terms of which the legal, but not the equitable, title to a specific property of one person (the mortgagor) is conditionally conveyed to a second person (the mortgagee) as security for the payment of a debt or performance of some other act. *Note: In some states, legal title to mortgaged property passes to the mortgagee on execution of the mortgage; in others, legal title passes when the debt secured by the mortgage is in default;*

in still others, the mortgage is simply a lien, and the legal title does not pass until foreclosure proceedings have been completed.

Multiple Listing Service (MLS). A local or regional service that compiles available real estate for sale by member brokers. Detailed information about properties is provided to brokers, agents, and the public, generally online. Local MLS organizations have their own rules and systems for providing listing information.

Neighborhood. (1) The environment of a subject property that has a direct and immediate effect on value; (2) a geographic area (in which there are typically fewer than several thousand properties) defined for some useful purposes, such as to ensure for later multiple regression modeling that the properties are homogeneous and share important locational characteristics.

Objective. The quality of being definable by specific criteria without the need for judgment. Quantitative variables are objective.

Open Market. A freely competitive market in which any buyer or seller may trade and in which prices are determined by competition.

Origination Fee. A fee charged by a lender (called the loan *originator* for making a real estate loan.

Outliers. Observations that have unusual values; that is, they differ markedly from a measure of central tendency. Some outliers occur naturally; others are due to data errors.

Owner, Equitable. One who, under rules of equity, has rights to some or all of the benefits deriving from property, although legal ownership and actual possession may be vested in another person.

Owner, Legal. One who has dominion over property under the rules of law, as distinguished from rules of equity.

Ownership. The rights to the use of property, to the exclusion of others.

Parcel. A continuous area of land described in a single legal description or as one of a number of lots on a plat; separately owned, either publicly or privately; and capable of being separately conveyed.

Parcel Identification Number. A numeric or alphanumeric description of a parcel that identifies it uniquely. Assessors use various systems, many with common features. A growing number of these systems include geocoding, in the 30 states where it exists, the Public Land Survey System, authorized by the United States Government in 1785, is often a basis for parcel identification.

Parcel Identifier. A code, usually numerical, representing a specific land parcel's legal description. The purpose of parcel identifiers is to permit reference to legal descriptions by using a code of uniform and manageable size, thereby facilitating recordkeeping and handling. Also called parcel identification number.

Parcel of Land. A contiguous urban or rural land area that is considered as a unit, is subject to single ownership, and is legally recorded as a single piece.

Partial Interest. An interest (in property) that is less complete than a fee simple interest.

Partial Payment Factor. Also known as the *amortization* or *periodic repayment* factor. The equal periodic payment that has a present worth of $1, for a specified number of periods and at a specified discount rate.

Patent. (1) The exclusive right granted by a government for a limited period to an inventor, his or her heirs, legatees, or assigns, to make, use, and vend an article or process invented by him or her. (2) The instrument by which government lands are granted to private persons under the proceedings set forth in the general statutes.

Personal Property. Every kind of property that is not real property, movable without damage to itself or the real estate; subdivided into tangible and intangible. Personal property is also known as *personalty*.

Personalty. A synonym for personal property.

Plot. (1) A relatively small area of land, generally used for a specific purpose; (2) a measured area of land (lot).

Plottage. (1) Those factors of size, shape, and location with reference to other plots that add or detract from the value of a plot by a given purpose (preferred). (2) The assembling of adjacent parcels of land into a single unit. (3) The excess cost of assembling adjacent parcels of land into a single unit under single ownership over the estimated cost at which such parcels might be acquired individually by independent purchasers. (4) Plottage value. *Note: Because of the variety of meanings attached to this term and its derivatives, it is suggested that the more descriptive term* assemblage *and its derivatives be used to convey all of the above meanings except the first.* Compare Assemblage.

Plottage Value. (1) The increment of value ascribed to a plot because of its suitability in size, shape, and/or location with reference to other plots (preferred). (2) The excess of the value of a large parcel of land formed by assemblage over the sum of the values of the unassembled parcels.

Points. Prepaid interest on a loan; one point is equal to 1 percent of the amount of the loan. It is common to deduct points in advance of the loan, so that an individual pays interest on 100 percent of the loan, but gets cash on, say, only 99 percent.

Possession. Physical control of personal or real property.

Possessory Interest. (1) An interest of a person in an article of property arising from a physical relationship to the article of such nature as to confer on him or her degree of physical control over it, coupled with the intent so to exercise such control as to exclude the general public from use of it. (2) The right to occupy and use any benefit in a transferred property, granted under lease, license, permit, concession, or other contract. (3) A private taxable interest in public tax-exempt property, for example, a private service station in a federal military base. Assessment of this interest permits complex valuation problems. Among the issues are whether the ownership or the use is exempt, whether the parcel should be split, and whether market rent differs from contract rent.

Precision. The degree of refinement in the performance of an operation, or the degree of perfection in the instruments and methods used when making the measurements. Precision relates to the quality of the operation by which a result is obtained and is distinguished from accuracy, which relates to the quality of the results. Compare to Integrity; Validity.

Present Worth. (1) The value of something after discounting future payments and receipts. (2) The present value of income that is expected to be received at some future date or dates, as ascertained by the process of discounting both the income and the anticipated expenses incident to its receipt, that is, the amount of money that if presently invested and allowed to accumulate at compound interest, would yield net income in the same amounts and at the same intervals as is anticipated of a given property. It is synonymous with *capital value* and *present value*.

Present Worth of 1. (Also called the reversion factor.) The lump-sum amount that would have to be set aside to accumulate with compound interest to $1 at the end of a specified number of years and at a specified rate of interest. Alternatively, it can be viewed as the present value of $1 receivable at the end of a specified number of years and discounted at a specified rate.

Present Worth of 1 per Period. (Also called the annuity factor or Inwood Coefficient.) The present worth of 1 per period is the present worth of a series of payments of $1, receivable at the end of each year, for a specified number of years and at a specified interest rate.

Price, Adjusted Sale. The sale price that results from adjustments made to the stated sale price to account for the effects of time, personal property, atypical financing, and the like.

Price, Market. The value of a unit of goods or service, expressed in terms of money, as established in a free and open market. *Note: This term is sometimes distinguished from* market value *on the ground that the latter term assumes that buyers and sellers are informed, but this presumption is also implied by the term* free and open market. Compare to Price, Sale.

Price, Sale. (1) The actual amount of money exchanged for a unit of goods or services, whether or not established in a free and open market (an indicator of market value); (2) loosely used synonymously with *offering* or *asking price*. *Note: The sale price is the* selling price *to the vendor and the* cost price *to the vendee.*

Private Encumbrances. Private hindrances that affect value and sale price such as easements, condominium controls, and deed or subdivision restrictions.

Private Restrictions. Private parties, such as a group of homeowners, may establish private restrictions on ownership rights. Deed restrictions are a common form of private restriction.

Property. (1) An aggregate of things or rights to things. Property rights are protected by law. There are two basic types of property: real and personal. (2) The legal interest of an owner in a parcel or thing. See also Bundle of Rights.

Property Split. The result of the sale of property held by a single owner such that different pieces of the property are owned by different owners. Splits may or may not occur along plat lines. Assessors need to monitor splits not only to ensure the correctness of the property listing, but also to monitor the land and its adequacy as a lien against past and present tax liabilities.

Quitclaim Deed. See Deed.

Ratio, Assessment. See Assessment Ratio.

Ratio Study. A study of the relationship between appraised or assessed values and market values. Indicators of market values may be either sales (sales ratio study) or independent *expert* appraisals (appraisal ratio study). Of common interest in ratio studies are the level and uniformity of appraisals or assessments.

Real Estate. The physical parcel of land and all improvements permanently attached. Compare to Real Property.

Real Estate Transfer Documents. The various kinds of deeds whereby real property is conveyed. Compare to Conveyances.

Real Estate Transfer Affidavits. In written or electronic format, these documents are an affirmed or sworn statement regarding particulars to a sale of real property, such as personal property, financing, and so on. Typically, these forms are required in states and provinces in which sales disclosure statutes have been enacted and are filed prior to recording the deed. Comprehensive affidavits may limit the number of follow-up verifications required during the sales verification process. These questionnaires are also known as sales verification questionnaires.

Real Property. Real property consists of the interests, benefits, and rights inherent in the ownership of land plus anything permanently attached to the land or legally defined as immovable; the bundle of rights with which ownership of real estate is endowed. To the extent that *real estate* commonly includes land and any improvements, the two terms can be understood to have the same meaning. Real property is also called *realty*.

Realty. (1) Any tangible thing whose fee ownership constitutes real property, that is, land or improvements; (2) a synonym for real property.

Receiver. One who is appointed by a court of equity as its representative to manage property owned by an insolvent debtor until the claims of creditors have been met or to manage property that is the subject of a lawsuit pending its outcome.

Recordation/Recording. The filing of documents affecting real property for public record, which usually requires the witnessing and notarizing of the document.

Redemption. The process by which the owner of real property sold at a tax sale buys back the property from the purchaser at an enhanced price within a specified redemption period.

Reject Code. A flag applied to a record (such as a sale) indicating that it should not be used for certain purposes.

Representative Sample. A sample of observations from a larger population of observations, such that statistics calculated from the sample can be expected to represent the characteristics of the population being studied.

Residential (Nonfarm) Single-Family. Includes each detached, semidetached, or attached house. If separately assessed and not on a farm, that is a residence for one family only. For detached houses, this would include one-family rural properties or suburban estates not used primarily for farming and mobile homes assessed as real property. This category includes each condominium unit in a multiunit dwelling structure, plus each condominium's share of the common area, unless the common area is separately assessed.

Restriction. A described limitation on the use of a property.

Reversion. The rights of possession commencing on the termination of a particular estate.

Reversion Factor. Defined under Present Worth of 1.

Royalty. (1) A payment made periodically or at irregular intervals to the owner of a patent or copyright for the privilege of exploring for, and/or mining and disposing of, mineral deposits.

Sale, Arm's-Length. A sale in the open market between two unrelated parties, each of whom is reasonably knowledgeable of market conditions and under no undue pressure to buy or sell.

Sale, Conditional. A sale, especially of chattels, in which the transfer of title is made to depend on the performance of a condition subsequent to the making of the sale contract and delivery of goods. *Note: The most common condition is that the remainder of the purchase price be paid. Property held under a conditional sales contract may be repossessed without foreclosure proceeding, and the former holder has no equity or redemption.* Compare to Mortgage, Chattel.

Sale, Distressed. A sale made to meet the immediate and pressing needs of the seller at whatever price the property will bring.

Sale, Fraudulent. A sale to defraud the creditors of the owner of the property, by covering up or removing from their reach and converting into cash property which would be subject to the satisfaction of their claims. Such sales may be voided by bankruptcy court.

Sale, Forced. A sale made pursuant to law; usually an auction sale that is involuntary on the part of the owner.

Sale, Judicial. (1) A sale made under the process of a court having competent authority to order it, by an officer duly appointed and commissioned to sell, as distinguished from a sale by an owner in virtue of his right of property. (2) A court action that enforces a judgment lien by selling property to pay a debt.

Sale-Leaseback. A sale and subsequent lease given by the buyer back to the seller as part of the same transaction.

Sale, Normal. A sale in which neither the buyer nor the seller acts under legal or economic compulsion, in which both parties are reasonably well informed, and in which both are primarily actuated by economic motives. Compare to Market Value and Sale, Arm's-Length.

Sale of Convenience. A sale designed to correct defects in the title, create a joint or common tenancy, or serve some similar purpose (not an actual sale). Such sales generally retransacted at only a nominal price.

Sale Price. Defined under Price, Sale; Price, Adjusted Sale.

Sale, Private. A sale negotiated and concluded privately between buyer and seller, and not offered on the open market.

Sales Comparison Approach. One of three approaches to value, the sales comparison approach estimates a property's value (or some other characteristic, such as its depreciation) by reference to comparable sales.

Sales Data. (1) Information gathered about the nature of the transaction, the sale price, and the characteristics of a property as of the date of sale. (2) The elements of information needed from each property for some purpose, such as appraising properties by the direct sales comparison approach.

Sales File. A physical or electronic file of sales data.

Sales Ratio Study. A ratio study that uses sale prices as proxies for market value.

Sales Verification Questionnaire. In written or electronic format, these documents are an affirmed or sworn statement regarding particulars to a sale of real property, such as personal property, financing, and the like. Typically, these forms are required in states and provinces in which sales disclosure statutes have been enacted and are filed prior to recording the deed.

Sale Terms. The amount of down payment, the interest on the mortgage, and information on points and other fees involved in a real estate sale. Sales terms are also called *terms of financing* or *financing terms*.

Seller. (1) The seller is the vendor. (2) A person who sells or contracts to sell goods. (3) In real property sales the seller is the grantor who transfers property by deed or grants property rights through a trust instrument or other document.

Screening Codes. Used to identify the source of the sales information or how the sale was verified; they are separate from the validity code.

Sealed Bid. A method of marketing property in which each bidder (buyer) is given just one chance to submit a bid in a sealed envelope, without knowing other bid amounts. All such bids are opened at one time. The seller may set a minimum bid.

Seller Financing. (1) A sale in which the seller provides financing to the buyer typically with a higher rate of interest than market and a lower sale price or a lower rate of interest than market with a higher sale price. Sales should be adjusted to market. See also Contract for Deed.

Settlor. One who transfers to a trustee title to property that constitutes the trust estate. Compare to Trustee.

Short Sale. The bank or mortgage lender agrees to discount a loan balance because of an economic or financial hardship on the part of the mortgagor.

Split. Defined under Property Split.

Stratify. To divide, for purposes of analysis, a sample of observations into two or more subsets according to some criterion or set of criteria.

Tangible Personal Property. Personal property that has a substantial physical presence beyond merely representational. It differs from real property in its capacity to be relocated. Common examples of tangible personal property are automobiles, boats, and jewelry.

Tax Sale. A sale of a taxpayer's property by a public authority so that delinquent taxes may be collected from the proceeds; usually preceded by a period during which the taxpayer can pay delinquent taxes, and followed by a period during which the taxpayer can redeem the property from the purchaser. See also Certificate of Redemption; Redemption.

Tenancy. The act of using or occupying property, especially real property whose fee title is vested in someone other than the occupant.

Tenancy, Joint. A state of tenancy involving two or more persons owing undivided possessory interests that have arisen out of a single conveyance, no one of the tenants being free to create interests in the estate without the consent of the others, and the surviving tenants acquiring the interests of any tenant who may die. Compare to Tenancy in Common.

Tenancy in Common. A state of tenancy involving two or more persons owning undivided possessory interests that have arisen out of separate and distinct conveyances, any one of the tenants being free to create interest in his or her portion of the estate and the heirs or devisees acquiring the interest of any tenant who may die. Compare to Tenancy.

Tenancy in Severalty. A state of tenancy involving one person who owns a divided possessory interest.

Tenant. One who holds or possesses a property.

Tenement. (1) Real property and the rights to ownership, especially those of a permanent nature that relate to and pass with the land; (2) a building intended for rental residence.

Time-Adjusted Sale Price. The price at which a property sold, adjusted for the effects of price changes reflected in the market between the date of sale and the date of analysis.

Title. The union of all elements constituting proof of property ownership and the instrument that is evidence of ownership.

Title Search. An examination of public records to ensure the quality of the seller's title to a property. Preparation of an abstract of title requires a complete title search, as does foreclose on a property in a delinquent tax suit.

Trust. An agreement whereby the owner of property (the settlor) transfers legal title to a second party (the trustee), such property to be held, managed, or disposed of for the benefit of a third party (the beneficiary) or the settlor, or both, as set forth in the trust agreement.

Trustee. A trustee is one who holds legal title on property under a trust agreement. Compare to Settlor; Beneficiary.

Undivided Interest. An interest in a property that is not distinct from the interest or interests of one or more other persons as to the time during which the interest is possessory or as to the portion of the property to which the interest attaches, for example, the interest of a joint tenant or a tenant in common.

Unit. The property being appraised and everything used or useful to the ongoing economic operation of the business (property). Tangible and intangible personal property is included.

Validity. The quality of a data element or procedure being what it should be in terms of some ultimate purpose or use. See also Integrity. Compare to Accuracy, Precision.

Value. (1) The relationship between an object desired and a potential owner; the characteristics of scarcity, utility, desirability, and transferability must be present for value to exist. (2) Value may also be described as the present worth of future benefits arising from the ownership of real or personal property. (3) Value is the estimate sought in a valuation. (4) Any number between positive infinity and negative infinity. See also Market Value.

Verify. To check the accuracy of something. For example, sales data may be verified by interviewing the seller or purchaser of the property, and data entries may be verified by check digits.

Word-of-Mouth. A method of marketing property without a realtor and/or broker involved. Typically, used for selling real property by *for sale by owner* and is more prevalent in rural areas.

Zoning. The exercise of the police power to restrict landowners as to the use of their land and/or the type, size, and location of structures to be erected thereon.

APPENDIX

APPENDIX A. SALES VERIFICATION QUESTIONNAIRE

DEED BOOK PAGE | COV # | CO. NO. | MAP | SEC | SHEET | QTR. | BLOCK | PARCEL | OWN

RECORDING DATE ____/____/____ | TYPE OF INSTRUMENT CR RA DE | SPLIT ☐ MULTI ☐ | MO | YR | TY | AMOUNT | S | V

SELLER (Grantor)
NAME
MAILING
CITY/ST/ZIP
PHONE NO. (____)
email (optional)

BUYER (Grantee)
NAME
MAILING
CITY/ST/ZIP
PHONE NO. (____)
email (optional)

IF AN AGENT SIGNS THIS FORM, BOTH BUYER AND SELLER TELEPHONE NUMBERS MUST BE ENTERED.

BRIEF LEGAL DESCRIPTION

Property / Situs Address:
Name and Mailing Address for Tax Statements

1. Check any special factors that apply:
   - ☐ Sale between immediate family members: Specify the relationship
   - ☐ Sale involved corporate affiliates or related entities
   - ☐ Auction sale (absolute auction ☐ Yes ☐ No)
   - ☐ Short sale (amount of lien(s) exceeds sale proceeds)
   - ☐ Transfer in lieu of foreclosure or repossession
   - ☐ Sale involved a build-to-suit or leaseback arrangement
   - ☐ Sale by judicial order (by a guardian, executor, conservator, administrator, or trustee of an estate)
   - ☐ Sale involved a government agency or public utility
   - ☐ Buyer (new owner) is a religious, charitable, or benevolent organization, school or educational association
   - ☐ Buyer (new owner) is a financial institution, insurance company, pension fund, or mortgage corporation
   - ☐ Sale of only a partial interest in the real estate
   - ☐ Sale involved a trade or exchange of properties
   - ☐ **None of the above**
2. Check use of property at the time of sale:
   - ☐ Single family residence ☐ Agricultural land
   - ☐ Farm/Ranch with residence Mineral rights included? ☐ Yes ☐ No
   - ☐ Condominium unit
   - ☐ Vacant land ☐ Apartment building
   - ☐ Other: (Specify) ☐ Commercial/Industrial bldg.
3. Was the property rented or leased at the time of sale?
   - ☐ Yes (number of years remaining on lease ____)
   - ☐ Tenant is buyer ☐ No
4. Did the sale price include an operating business?
   - ☐ Yes (estimated value $) ☐ No
5. Was any personal property included in the sale price (such as furniture, equipment, inventory, machinery, crops, etc.)?
   - ☐ Yes ☐ No If yes, please describe

   Estimated value of all personal property items included in the sale price $

   If **Mobile Home:** Year Model
6. Were any changes made to the property since January 1st?
   - ☐ Yes ☐ No
   - ☐ Demolition ☐ New construction ☐ Remodeling ☐ Additions
   - Date completed Amount $
7. Were any **delinquent** property taxes paid by the buyer? Amt.$
   - ☐ Yes **AND** the amount was included in the total sale price
   - ☐ Yes but the amount was **not** included in the total sale price
   - ☐ No delinquent property taxes were included in the sale
8. Method of financing (check all that apply):
   - ☐ New loan(s) from a financial institution ☐ IRS 1031Exchange
   - ☐ Seller financing ☐ Assumption of an existing loan(s)
   - ☐ All cash ☐ Trade of property ☐ Not applicable
9. Was the property offered to other potential buyers?
   - ☐ Yes: Advertised (listed, Internet, yard sign, word-of-mouth, etc.)
   - ☐ No: Private purchase (not offered on the open market)
10. Does the buyer hold title to any adjoining property?
    - ☐ Yes ☐ No
11. Are there any additional facts that would cause this sale to be a distressed, forced, or non-arm's length exchange?
    - ☐ Yes ☐ No If yes, please describe
12. **TOTAL SALE PRICE $**

    DEED DATE / /
13. I have read the instructions for completing this form and certify that the above information is true and accurate.

Print name

Signature

☐ Grantor (Seller) ☐ Grantee (Buyer)
☐ Agent Daytime phone number ( )

APPENDIX B.1. LEASE VERIFICATION QUESTIONNAIRE (UNIT LEVEL)

For Commercial properties, this form supplements the Sales Verification Questionnaire.

Current Date

_____

Property Address

_____

Sale Information

Sale Date: _____ **Sale Price:**

_____

Did the sale price reflect an intended use change of the property? Yes _____ No _____

Building Information

Building # _____ of _____
Gross Square Feet _____

Total Number of Units:	_____	**Total Unit Size (Net Rentable Sqft):**	_____
# Residential Units:	_____	**Residential Sq ft:**	_____
# Commercial Units:	_____	**Commercial Sq ft:**	_____
# Vacant Units:	_____	**Vacant Sq ft:**	_____
# Owner Occupied Space:	_____	**Owner Occupied Sq ft:**	_____

Lease Information

A rent roll and operating expense statement may be submitted as an alternative to completing this section.

Unit No.	Floor or Range of Floors	Use (Include vacant and owner occupied)	Unit Size or Net Rentable Sq ft	# Bedroom / # Bath (Residential use)	Lease Term Remaining (# years)	Rent at Time of Sale ($/ sq ft/ year)	Expenses paid by Tenant (Tax, Ins., Mtc,, Other - specify)	CAM and Other Pass-Throughs ($/sq ft/year)

Building Operating Expense ($/sq ft/year) _____
(sq ft based on Gross Square Feet)

APPENDIX B.2. LEASE VERIFICATION QUESTIONNAIRE (BY USE)

For commercial properties, this form supplements the Sales Verification Questionnaire.

Current Date _____

Property Address _____

Sale Information

Sale Date: _____ ___ **Sale Price:** _____ _____ _____

Did the sale price reflect an intended use change of the property? Yes____ No _____

Building Information

Building # _____of _____

Gross Square Feet _____

Lease Information

A rent roll and operating expense statement may be submitted as an alternative to completing this section.

			Vacancy		Owner Occupancy		Leased Space			Leased Income					
USE	Total Number of Units	Total Rentable Square Feet	Vacant Number of Units	Vacant Rentable Sqft	Owner Occupied Number of Units	Owner Occupied Rentable Sqft	Number of Units Leased (Tot - Vac-Owner Occ)	Total Rentable Sqft Under Gross Leases	Total Rentable Sqft Under NET Leases	Income under Gross Leases ($ Annualized)	Average Lease Term Remaining under Gross Leases	Income under Net Leases ($ Annualized)	Average Lease Term Remaining under NET Leases	Additional Income from Pass Throughs under Gross Leases ($ Annualized)	Additional Income from Pass Throughs under NET Leases ($ Annualized)
Residential:															
Office:															
Retail Tenants:															
Loft:															
Factory:															
Warehouse:															
Storage:															
Garage/Parking:															
Other:															
Other:															
Other:															

Building Operating Expense ($/sq ft/year) _____

(sq ft based on Gross Square Feet)

APPENDIX C. QUESTIONS FOR SPECIFIC SITUATIONS

Basic questions—for all follow-up verifications made

- How was the property marketed (realtor [name of realtor], word-of-mouth, newspaper ad, for sale by owner, internet, etc.)?
- How long was the property exposed to the open market?
- What was the asking price?
- What was the selling price (or verify the amount on the sales verification questionnaire)?
- What was the condition of the property at the time of sale?
- Is there an intended change in use of the property?
- Was a "fee appraisal" made on the property (if so, in what amount)?
- Was any personal property of significant value included in the sale price (if so, was the amount specified in the purchase or contract agreement)?
- What is your estimate of the value of personal property included in the sale price (if the personal property is not specified in the contract)?
- Are you aware of any changes to property characteristics that have recently occurred (if so, when)?
- Was there any undue compulsion to buy or sell?
- Were there any circumstances that might cause the sale to be considered a non-arm's-length transaction?

The following questions should be asked in addition to the basic questions listed above for the various situations.

Adjoining property owners

- Was the seller aware of the buyer's need for or interest in the property?
- Was the property exposed to the open market?
- Could the property have been sold for an approximately similar price to another party?

Auction sales

(Auctioneer and seller are the best source of information.)

- Was the auction well-advertised?
- Was the auction well-attended?
- Did the seller have the right-of-refusal (a low bid clause or bid with reserve)?
- How many parties were bidding on the property?

Internal Revenue Code Section 1031 Exchange

- Was the reinvestment time nearing an end (possible duress)?

Internet marketing *(See questions relating to uninformed buyers and sellers.)*

- Were both parties well-informed?

Leaseback (commercial/industrial properties)

- Was a leaseback involved in the sale transaction?
- If so, did the leaseback influence the sale price?

Lease Contracts

If the Sales Verification Questionnaire indicates that a sale transferred with lease contracts, a supplemental lease verification questionnaire similar to those in Appendix B.1 or B.2 could be sent as a follow-up in lieu of a phone call.

Personal property

All relevant questions are included in the set of basic questions.

Property characteristic changes

- What types of changes were made (repair, remodeling, addition, or demolition)?
- Was the work performed by a professional?

Related party sales

- What is the specific nature of the relationship?
- Was the sale price influenced by the relationship?

Uninformed buyers

- Did you look at other property in the area?
- How long did you search for property in the area?
- Did you talk to local realtors?

Uninformed sellers

- How did you determine your asking price for the property?
- Were there any other offers?

APPENDIX D. PARTIAL LISTING OF GOVERNMENTAL AGENCIES

• HUD	Department of Housing and Urban Development
• FCA	Farm Credit Administration
• FCB	Farm Credit Bank
• FSAUSDA	Farm Service Agency
• FAMC	Federal Agricultural Mortgage Corporation (Farmer Mac)
• FDIC	Federal Deposit Insurance Corporation
• FHLMA	Federal Home Loan Mortgage Corporation (Freddie Mac)
• FHA	Federal Housing Administration
• FLB	Federal Land Bank
• FLCA	Federal Land CreditAssociation
• FNMA	Federal National Mortgage Corporation (Fannie Mae)
• FSLIC	Federal Savings &I Loan Insurance Corporation
• GSA	General Service Administration
• GNMA	Government National Mortgage Association (Ginnie Mae)
• HAP	Homeowners Assistance Program (US Army Corps of Engineers)
• MGIC	Mortgage Guarantee Insurance Group
• RTC	Resolution Trust Corporation
• RFTHP	Rural First-Time Homebuyer Program (Federal Home Loan Bank)
—	Habitat for Humanity
• USDA	Rural Housing & Development Administration
• SBA	Small Business Administration
• USMS	United States Marshal's Service
• VA	Veteran's Administration
—	• American Housing Trust 1 through 10 (VA holding companies)
—	• VinnieMac—VendeeMortgageTrust (VMT 1,2,3,4 VAholdingcompanies)

APPENDIX E. MULTIPLE-PARCEL FORM

MULTIPLE PARCEL FORM

JURISDICTION: _____ **SALES NO.:** _____

SALE DATE: _____

SALE PRICE: _____

CLASS: _____

TYPE: _____

SOURCE: _____ **VALIDITY:** _____

Type = Improved or Unimproved SC = Source Code VC = Validity Code

Parcel ID Number	Class	Type	SC	VC	Appraised Value
				Total Appraised Value	

COMMENTS: _____

_____

_____

RESEARCH ANALYST: _____ **APPRAISER:** _____

APPENDIX F. SALE VERIFICATION FORM

Sale Verification Form

PARCEL NUMBER

JURISDICTION: _____
SALE NO: _____

Person Contacted: _____

☐ Buyer ☐ Seller (Phone) _____
☐ Other (Phone) _____

Attempt	Date	Time	Result
1st			
2nd			
3rd			

Person Contacted: _____

☐ Buyer ☐ Seller (Phone) _____
☐ Other (Phone) _____

Attempt	Date	Time	Result
1st			
2nd			
3rd			

Sale Price: $ _____ Adjusted Sale Price: $ _____ Sale Date: _____ (MO YR)

Reason For Adjustment: _____

COMM / IND PROPERTY ONLY

☐	N	To Be Owner Occupied
☐	F F	Fully Rented When Sold
☐	P	At Least Partially Rented
☐	V	Vacant, but for rent or will be
☐	D	To Be Demolished
☐	T	Extensive Remodeling Req.

Was the Price paid for the property a fair indication of Market Value? ☐ Yes ☐ No ☐ Don't Know
Was the property exposed to the Open Market? ☐ Yes ☐ No
If yes, how was the property marketed? _____
If through realtor, name of Realtor? _____
Was a fee appraisal prepared for Buyer? ☐ Yes ☐ No
Was a fee appraisal prepared for Seller? ☐ Yes ☐ No
Use at time of sale? _____

0 Residential Sampling Only
1 Partial Interest
3 Sales Questionnaire
4 Interview Unsuccessful
7 Appeal Documentation
8 Buyer/Seller/Agent
9 Multiple Parcel

Source Code _____

CONCLUSIONS / COMMENTS:

(Additional Space on Back - Continued on Back) ☐

0 Valid
X Adj. Sale Price (Valid)
1 Multiple Parcel
2 Not Open Market
3 Property Changed Ater 1/1
4 Split
5 (not used)
6 Suspect Conditions
7 Technical Criteria
8 Date Outside Range
9 Discounted Vacant Lot
B Bank/Financial InstitutionSale
G Government Sale
T Target Achieved (Residential Sampling)
U Unqualified

Validity Code _____

RESEARCH ANALYST SIGNATURE _____ *APPRAISER SIGNATURE* _____ *DATE FORM COMPLETED* _____

APPENDIX G.1. LEASE VERIFICATION FORM (UNIT LEVEL)

Current Date: _____

Subject Property Address: _____

Sale Information

Sold Price: $ _____ Sold Date: _____

Total Adjusted Price: $ _____

Adjustment for long term leases (use worksheet below): $ _____

Sale Verification & Price Adjustment

	USE TYPE 1	USE TYPE 2	USE TYPE 3
Market (Gross) Rental Rate ($psf/year):	$	$	$

SALE VERIFICATION

Tenant or Unit No.	Use	Total Rent with CAM and Pass Throughs ($psf/year)	% Change to Market Rent	Sale Verification

ADJUSTMENT CALCULATION

Difference Between Market and Contract Rent ($psf/year)	Unit Size or Net Rentable Sqft	Difference ($ year)	Lease Term Remaining	Discount Rate	Present Value of Rent Difference
				Adjustment for Leases:	

Documentation Codes

Lease Verification Code: _____ Remarks: _____

1 - Price Adjusted for Leases

0 - No Lease Adjustments Required

- 1 - Filing Insufficient for Adjustment Calculation

- 2 - No Filing Submitted

Appraiser Name: _____ Appraiser Signature: _____

APPENDIX G.2. LEASE VERIFICATION FORM (BY USE)

Current Date: _____

Subject Property Address: _____

Sale Information

Sold Price: $ _____ Sold Date: _____

Total Adjusted Price: $ _____

Adjustment for long term leases (use worksheet below): $ _____

Sale Verification & Price Adjustment

	USE TYPE 1	USE TYPE 2	USE TYPE 3
Market (Gross) Rental Rate ($psf/year):	$	$	$

SALE VERIFICATION

Use	Lease Type	Total Rent with CAM and Pass Throughs ($psf/year)	% Change to Market Rent	Sale Verification

ADJUSTMENT CALCULATION

Difference Between Market and Contract Rent ($psf/year)	Unit Size or Net Rentable Sqft	Difference ($ year)	Lease Term Remaining	Discount Rate	Present Value of Rent Difference

Adjustment for Leases: _____

Documentation Codes

Lease Verification Code: _____

1 - Price Adjusted for Leases

0 - No Lease Adjustments Required

- 1 - Filing Insufficient for Adjustment Calculation

- 2 - No Filing Submitted

Remarks: _____

Appraiser Name: _____ Appraiser Signature: _____

APPENDIX H. INTANGIBLE PERSONAL PROPERTY IN OPERATING PROPERTIES

An operating business is often referred to as going concern. These properties may include a component of intangible personal property in the form of business enterprise value or goodwill.

Going-concern value is derived from a proven business operation. It implies that the total enterprise value that may be greater than the sum of its real and tangible personal property parts but does not imply that the business must be profitable. Typically, going-concern value will fall into one of two groups.

Goodwill is the intangible value of a business enterprise that can be measured by some excess profit by virtue of some advantageous position in the marketplace with little or no completion. Income beyond that required, providing an economic return on the assets of the business, is a component of goodwill.

Business enterprise value in general, can be a product of any endeavor where the primary motive is profit and not mere employment for oneself and others. It may also include the capitalized value of above market rents for malls and super-regional shopping centers (Appraisal Institute, 2001).

Intangible personal property can fall into three general groups:

Nonseverable enterprise assets

- Assemblage of land, building, tangible personal property into a productive operation
- Image and reputation of the business (service, value, dependability
- Established customer base, customer acceptance, and public patronage
- Trained staff of employees
- Operating procedures, control methods, and socio-technical values
- Corporate or business values
- Credit rating and investor confidence

Nonseverable personal assets

- Reputation of owner/manager and staff with customers, suppliers, and the public
- Skill of support staff (technical know-how, sales ability, specialized talent)
- General leadership, administration, customer relations, and skills of management

Assets severable from the enterprise

- Trademarks, trade names, brand names, trade secrets (formulas, recipes, methods, etc.)
- Copyrights, patents, and technical libraries
- Licenses, franchises, and rights (film, recording, publishing, air, water, etc.)
- Covenants not to compete and operating agreements
- Contracts (purchase, advertising, employment, sales)
- Favorable leases below market rate
- Mailing lists, subscription lists, prescription accounts, customer lists

APPENDIX I. NONREALTY VERIFICATION FORM

Non-Reality Items Addendu

TO CONTRACT CONCERNING THE PROPERTY AT

(Address of Property)

A. For an additional sum of $_____and other and good valuable consideration, Seller shall convey to Buyer at closing the following personal property (specify each item carefully, include description, model numbers, serial numbers, location, and other information):

B. Seller represents and warrants that Seller owns the personal property described in Paragraph A free and clear of all encumbrances.

C. Seller does not warrant or guarantee the condition or future performance of the personal property conveyed by this document.

Buyer

Seller

Buyer

Seller

ASSESSMENT STANDARDS OF THE INTERNATIONAL ASSOCIATION OF ASSESSING OFFICERS

Guide to Assessment Standards

Standard on Assessment Appeal

Standard on Automated Valuation Models

Standard on Contracting for Assessment Services

Standard on Digital Cadastral Maps and Parcel Identifiers

Standard on Manual Cadastral Maps and Parcel Identifiers

Standard on Mass Appraisal of Real Property

Standard on Oversight Agency Responsibilities

Standard on Professional Development

Standard on Property Tax Policy

Standard on Public Relations

Standard on Ratio Studies

Standard on Valuation of Personal Property

Standard on Valuation of Property Affected by Environmental Contamination

Standard on Verification and Adjustment of Sales

TO DOWNLOAD THE CURRENT APPROVED VERSION OF ANY OF THE STANDARDS LISTED ABOVE, VISIT IAAO.ORG

STANDARD ON
Ratio Studies

A criterion for measuring fairness, quality, equity and accuracy

(Approved April 2013)

IAAO

INTERNATIONAL ASSOCIATION of ASSESSING OFFICERS

Standard on Ratio Studies

Approved April 2013

International Association of Assessing Officers

IAAO assessment standards represent a consensus in the assessing profession and have been adopted by the Board of Directors of IAAO. The objective of IAAO standards is to provide a systematic means for assessing officers to improve and standardize the operation of their offices. IAAO standards are advisory in nature and the use of, or compliance with, such standards is voluntary. If any portion of these standards is found to be in conflict with national, state, or provincial laws, such laws shall govern. Ethical and/or professional requirements within the jurisdiction may also take precedence over technical standards. – February 2022

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Contents Standard on Ratio Studies

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Standard on Ratio Studies

Part 1. Guidance for Local Jurisdictions

This standard comprises two major parts. Part 1 focuses on the needs of local assessors. Part 2 presents guidelines for oversight agencies that use ratio studies for equalization and appraisal performance monitoring. The Definitions section explains the terms used in this standard. The appendixes present many technical issues in greater detail. More information on many topics addressed in this standard can be found in Property Appraisal and Assessment Administration (IAAO 1990, chapter 20) and in Gloudemans (1999, chapter 5).

1. Scope

This part of the standard provides recommendations on the design, preparation, interpretation, and use of ratio studies for the real property quality assurance operations of an assessor's office. Quality assurance/control measures include data integrity review, assessment level and uniformity analysis, and computer-assisted mass appraisal (CAMA) system performance testing, among others.

Assessors may have the opportunity to utilize ratio study information at a greater depth than oversight agencies. These internal studies can help improve appraisal methods or identify areas within the jurisdiction that need attention. External ratio studies conducted by oversight agencies (Part 2) focus more upon testing the assessor's past performance in a few broad property categories.

2. Overview

For local jurisdictions, *ratio study* is used as a generic term for sales-based studies designed to evaluate appraisal performance. The term is used in preference to the term *assessment ratio study* because use of assessments can mask the true level of appraisal and confuse the measurement of appraisal uniformity when the legal assessment level is other than 100 percent of fair market value.

2.1 The Concepts of Market Value and Appraisal Accuracy

Market value is the major focus of most mass appraisal assignments. The major responsibility of assessing officers is estimating the market value of properties based on legal requirements or accepted appraisal definitions. The viability of the property tax depends largely on the accuracy of such value estimates. The accuracy of appraisals made for assessment purposes is therefore of concern, not only to assessors but also to taxing authorities, property taxpayers, and elected representatives. Appraisal accuracy refers to the degree to which properties are appraised at market value, as defined by professional standards (see *Glossary for Property Appraisal and Assessment* [IAAO 1997]) and legal requirements. While a single sale may provide an indication of the market value of the property in question, it cannot form the basis for a ratio study, which provides information about the market values of groups of properties. Dividing the appraised value by the sale price forms the ratios. The ratio can be multiplied by 100 and expressed as a percentage.

Market value is a concept in economic theory and cannot be observed directly. However, market values can be represented in ratio studies by sales prices (market prices) that have been confirmed, screened, and adjusted as necessary (see Appendix A, "Sales Validation Guidelines"). Sales prices provide the most objective estimates of market values and under normal circumstances should provide good indicators of market value.

2.2 Aspects of Appraisal Performance

There are two major aspects of appraisal accuracy: level and uniformity. Appraisal level refers to the overall ratio of appraised values to market values. Level measurements provide information about the degree to which goals or certain legal requirements are met. Uniformity refers to the degree to which properties are appraised at equal percentages of market value.

2.3 Uses of Ratio Studies

Key uses of ratio studies are as follows:

- measurement and evaluation of the level and uniformity of mass appraisal models
- internal quality assurance and identification of appraisal priorities
- determination of whether administrative or statutory standards have been met
- determination of time trends
- adjustment of appraised values between reappraisals

Assessors, appeal boards, taxpayers, and taxing authorities can use ratio studies to evaluate the fairness of funding distributions, the merits of class action claims, or the degree of discrimination (see Appendix G). However, ratio study statistics cannot be used to judge the level of appraisal of an *individual* parcel. Such statistics can be used to adjust assessed values on appealed properties to the common level.

2.4 Applicability

Local jurisdictions should use ratio studies as a primary mass appraisal testing procedure and their most important performance analysis tool. The ratio study can assist such jurisdictions in providing fair and equitable assessment of all property. Ratio studies provide a means for testing and evaluating mass appraisal valuation models to ensure that value estimates meet attainable standards of accuracy; see *Uniform Standards of Professional Appraisal Practice* (USPAP) *Standard Rule 6-6* (Appraisal Foundation 2010-2011). Ratio study reports are typically included as part of the written documentation used to communicate results of a mass appraisal and to comply with *Standard Rule 6-7(b)*. Ratio studies also play an important role in judging whether constitutional uniformity requirements are met. Compliance with state or provincial performance standards should be verified by the local jurisdiction before value notices are sent to property owners.

3. Steps in Ratio Studies

Ratio studies generally involve the seven basic steps listed below.

1. define the purpose, scope and objectives
2. design
3. stratification
4. collection and preparation of market data
5. matching of appraisal and market data
6. statistical analysis
7. evaluation and use of results

3.1 Definition of the Purpose, Scope, and Objectives

The first step in any ratio study is to determine and state clearly the reasons for the study. This crucial step of identifying the purpose of the study determines the specific goals, scope, content, depth, and required flexibility.

3.2 Design

In the design of the study the assessor must consider the quantity of sale data and the resources available for conducting the ratio study. Although absolute accuracy cannot be ensured, all reasonable, cost-effective steps should be taken to maximize reliability.

The assessor should identify the following factors:

- the groups or classes of properties to be included in the study
- important legal, physical, and economic characteristics of the properties selected for study
- the quantity and quality of data available
- the values being tested and sales period being used
- available resources, such as the number and expertise of staff, computer hardware and software applications, and additional limiting conditions

3.2.1 Level of Sophistication and Detail

A basic design principle is to keep the study as simple as possible while consistent with its purpose. Ratio studies are not all alike and should be tailored to an intended use.

Data analysis has been made easier through computerization. Although every study does not require the same level of statistical detail, each ratio study should include measures of appraisal level, appraisal uniformity, and statistical reliability. Graphs, charts, or other pictorial representations can be useful tools for showing distributions and patterns in the data. There is no model ratio study design that can serve all jurisdictions or all situations equally well. Informed, reasoned judgment and common sense are required in the design of ratio studies.

3.2.2 Sampling

A ratio study is a form of applied statistics, because the analyst draws conclusions about the appraisal of the population (the entire jurisdiction) of properties based only on those that have sold during a given time period. The sales ratios constitute the sample that will be used to draw conclusions or inferences about the population.

To determine the accuracy of appraisals with absolute certainty, it would be necessary for all properties in the population to have been sold in arm's-length, open-market transfers near the appraisal date. Since this is not possible, ratio studies must use samples and draw inferences or conclusions about the population from these samples.

The number of parcels in the population (the jurisdiction or stratum) is not an important determinant of a statistically valid and reliable sample.

3.2.2.1 Limitations of Sale Samples

Users of sales ratio studies should be aware of the following cautions associated with use of sale samples:

- Depending on the circumstances, sales prices can provide either useful or poor indications of market values. Sales must be screened to eliminate those that don't meet the requirements of arm's-length, open-market sales (see *Standard on Verification and Adjustment of Sales* [IAAO 2010]).
- Sales are not "randomly selected" from the population, in the strict technical sense (see section 4.5, Sample Representativeness).
- Value-related characteristics of a sale sample may not represent all the value-related characteristics of the population.

- Adjustments to sale prices may be difficult to support or may be subjective.

3.2.2.2 Data Accuracy and Integrity

The findings of a ratio study can only be as accurate as the data used in the study. Personnel involved in collecting, screening, and adjusting sales data or making appraisals should be familiar with real estate conveyance practices in their region. They also should be proficient in the principles and practices of real estate appraisal and understand local market conditions.

Accuracy and integrity of data entered into or transferred through computer systems must be ensured. Design of computer programs should make it easy to verify data accuracy. Query tools should be accessible to users, so that data can be verified easily. Methods for checking the accuracy of assigned strata (such as school district, city, neighborhood, and category) as well as of assessed or appraised value, sale price, parcel identifier, and other fields must be established to reduce these and other nonsampling errors.

3.3 Stratification

Stratification divides all the properties within the scope of the study into two or more groups or strata. Stratification facilitates a more complete and detailed picture of appraisal performance and can enhance sample representativeness.

Each type of property subject to a distinct level of assessment could constitute a stratum. Other property groups, such as neighborhoods and age and size ranges, could constitute additional strata.

When the purpose of the study is to evaluate appraisal quality, flexibility in stratification is essential. The general goal is to identify areas in which the assessment levels are too low or lack uniformity and property groups for which additional reappraisal work may be required. In such cases, it also is highly desirable to stratify on the basis of more than one characteristic simultaneously.

Stratification can help identify differences in level of appraisal between property groups. In large jurisdictions, stratification by geographic areas is generally more appropriate for residential properties, while stratification of commercial properties by either geographic area or property subtypes (e.g., office, retail, and warehouse/industrial) can be more effective.

3.4 Collection and Preparation of Market Data

The reliability of a ratio study depends in part on how well the sales used in the study reflect market values. The underlying principle for review of sales data is to optimize the sample size, but at the same time to exclude sales that provide invalid indicators of market value. A ratio study sample with fewer than five sales tends to have exceptionally poor reliability and is not very useful.

3.5 Matching of Appraisal and Market Data

The physical and legal characteristics of each property used in the ratio study must be the same as when sold. This implies two essential steps. First, the appraiser must ascertain whether the property descriptions match. If a parcel is split between the appraisal date and the sale date, a sale of any of its parts should not be used in the ratio study.

Second, the appraiser must ascertain whether the property rights transferred, the permitted use, and the physical characteristics of the property on the date of assessment are the same as those on the date of sale. If the physical characteristics of the property have changed since the last appraisal, adjustments may be necessary before including the property in a ratio study. Properties with significant differences in these factors should be excluded from the ratio study.

When statutory constraints are imposed on appraisal methods, the resulting assessment may be less than market value. In such cases a sales ratio study may not provide useful performance information. Constraints typically apply to land that qualifies for agricultural use value, subsidized housing, mineral land, and timberland.

Sales may include property of a type other than the type for which the ratio study analysis is intended. However, sales including more than minimal values of secondary categories are unlikely to be representative, even with adjustment.

For example, a property that is predominantly commercial may include residential components. This sale can be included as representative of the commercial category. In this case, the numerator in the ratio calculation would be the total appraised value including the value of both the commercial and residential components.

In a second example, for a ratio study of vacant land, the numerator in the ratio should reflect only the appraised value of the land. The sale price should be adjusted for the contributory value of the improvements or the sample should be excluded from further analysis.

3.6 Statistical Analysis

After sales have been screened and matched against assessed values, ratios computed, and outliers identified and removed if appropriate, measures of appraisal level, uniformity, and reliability for the entire jurisdiction and each group or stratum should be computed. The sample also could undergo exploratory data analysis to reveal patterns or features of the data (Hoaglin, Mosteller, and Tukey 1983).

3.7 Evaluation and Use of Results

A properly designed ratio study is a powerful tool for analyzing appraisal performance, evaluating CAMA system models, and suggesting strategies for improvement. A ratio study also can identify weaknesses in appraisal system performance. Unexpected study results may indicate a need to respecify or recalibrate an appraisal model or to reevaluate the data elements used in the valuation process. However, users of ratio studies should recognize the inherent limitations of this tool, as follows:

1. A ratio study cannot provide perfect information about appraisal performance. Lack of sufficient sales, outliers, or overrepresentation of one geographic area or type of property can distort results.
2. Ratio study validity requires that sold and unsold parcels be appraised at the same level and in the same manner. Violation of this condition seriously undermines the validity of the study.
3. Findings should be used only in ways that are consistent with the intended use(s) for which the study was designed.
4. Ratio study data are subject to statistical sampling errors and other processing (nonsampling) errors (see Lessler and Kalsbeek), but these limitations do not invalidate their use for informed decision-making.

4. Timing and Sample Selection

4.1 Data Requirements and Availability

The availability of data influences the design of the study and can call for revisions in the objectives of the study, limit the usefulness of the calculated statistics, or both.

4.1.1 Nature of the Population

The type of properties, market conditions, and composition of the population in terms of age, size, and value range are essential to the proper design of the study and interpretation of the results. Very large properties that rarely sell (e.g., a large power plant) can be ignored in a ratio study designed to evaluate local appraisal performance.

4.1.2 Assessment Information

Appraised values are the numerators in the ratios used in a ratio study. Information about appraisal dates, legal requirements concerning reappraisals, the dates on which the appraisals were originally set, and the period they remained in effect is required for establishing the date of analysis.

4.1.3 Indicators of Market Value

Sale price, as an indicator of market value, is the denominator in the calculation of the ratio. Specific information about the date, amount, terms, and conditions of a sale is required for proper analysis.

4.1.4 Property Characteristics

Information on property characteristics is crucial for determining whether property that was assessed is essentially the same as what was sold. Data for both sold and unsold properties should be current, relevant, and collected in a consistent manner.

4.2 Frequency of Ratio Studies

The purpose of a ratio study dictates how often it should be conducted. Regardless of the reappraisal cycle, ratio studies made by assessors should be conducted at least annually. This frequency enables potential problems to be recognized and corrected before they become serious.

When there is a revaluation, assessors should conduct at least four ratio studies to establish the following:

1. a baseline of current appraisal performance
2. preliminary values so that any major deficiency can be corrected
3. values used in assessment notices sent to taxpayers
4. final values after completion of the first, informal phase of the appeals process

The final study can be used in planning for the following year. In addition, ratio studies can be conducted as needed to evaluate appraisal procedures, investigate a discrimination complaint, or answer a specific question.

4.3 Date of Analysis

The date of analysis depends on the purpose of the study, but generally is the assessment date of the tax year being studied, which can be the current, the next, or a past year. The assessment date of the next tax year should be used when the purpose of the study is to evaluate preliminary values in a reappraisal.

4.4 Period from Which Sales Are Drawn

This period depends on the purpose of the study and on sales activity. In general, the period should be as short as possible and, ideally, no more than one year. A longer period may be required to produce a representative sample for some strata within a jurisdiction.

To develop an adequate sample size, the sales used in ratio studies can span a period of as long as five years provided there have been no significant economic shifts or changes to property characteristics and sales prices have been adjusted for time as necessary.

4.5 Sample Representativeness

In general, a ratio study is valid to the extent that the sample is sufficiently *representative* of the population.

The distribution of ratios in the population cannot be ascertained directly and appraisal accuracy can vary from property to property. By definition, a ratio study sample would be representative when the distribution of ratios of properties in the sample reflects the distribution of ratios of properties in the population. Representativeness is improved when the sample proportionately reflects major property characteristics present in the population of sold and unsold properties. As long as sold and unsold parcels are appraised in the same manner and the sample is otherwise representative, statistics calculated in a sales ratio study can be used to infer appraisal performance for unsold parcels.

However, if parcels that sell are selectively reappraised based on their sale prices and if such parcels are in the ratio study, uniformity inferences will not be accurate (appraisals appear more uniform than they are). In this situation, measures of appraisal level also will not be supportable unless similar unsold parcels are appraised by a model that produces the same overall percentage of market value (appraisal level) as on the parcels that sold (see Appendix E, "Sales Chasing Detection Techniques"). Assessing officials must incorporate a quality control program; including checks and audits of the data, to ensure that sold and unsold parcels are appraised at the same level.

Operationally, representativeness is improved when the following occur:

1. Appraisal procedures used to value the sample parcels are similar to procedures used to value the corresponding population
2. Accuracy of recorded property characteristics data for sold property does not differ substantially from that of unsold property,
3. Sample properties are not unduly concentrated in certain areas or types of property whose appraisal levels differ from the general level of appraisal in the population
4. Sales have been appropriately screened and validated (see Appendix A).

The first requirement generally is met unless sampled parcels are valued or updated differently from nonsampled parcels, or unless appraisals of sample parcels were done at a different time than appraisals of nonsampled parcels. For example, it is unlikely that the sample is representative of unsold parcels when the sample consists mostly of new construction, first-time sales of improved properties, condominium conversions, or newly platted lots.

The second requirement is met only if value-related property characteristics are updated uniformly for all property in a class as opposed to being updated only upon sale.

The third requirement relates to the extent to which appraisal performance for the sample reflects appraisal performance for the population.

The fourth requirement generally is met when the sales to be used in the sample are properly screened, adjusted if necessary, and validated.

4.6 Acquisition and Validation of Sales Data

Sales data are important in ratio studies and play a crucial role in any credible and efficient mass appraisal system. In some instances, it may be necessary to make adjustments to sales prices so they are more representative of the market. When there is more than one sale of the same property during a study period, only one of the transactions should be used in the ratio study. For guidelines on sales validation see Appendix A.

5. Ratio Study Statistics and Analyses

Once data have been properly collected, reviewed, assembled, and adjusted, outlier handling and statistical analysis can begin. This process involves the following steps.

1. A ratio should be calculated for each observation in the sample by dividing the appraised (or assessed) value by the sale price.
2. Graphs and exhibits can be developed that show the distribution of the ratios.
3. Exploratory data analysis, including outlier identification and screening, and tests of the hypotheses of normality may be conducted.
4. Ratio study statistics of both appraisal level and uniformity should be calculated.
5. Reliability measures should be calculated.

An example of a ratio study statistical analysis report is given in table 1-1.

5.1 Data Displays

Displays or exhibits that provide a profile or picture of ratio study data are useful for illustrating general patterns and trends, particularly to nonstatisticians. The particular form of the displays, as well as the data used (e.g., sales prices, sales ratios, and property characteristics) depends on the purposes of the particular display. Types of displays useful in ratio studies are arrays, frequency distributions, histograms, plots, and maps (Gloudemans 1999).

Graphic displays can be used to

- indicate whether a sample is sufficiently representative of the properties in a stratum
- indicate the degree of nonnormality in the distribution of ratios
- depict the overall level of appraisal

Table 1-1. Example of Ratio Study Statistical Analysis Data Analyzed

Rank of ratio of observation	Appraised value ($)	Sale Price ($)	Ratio (AV/SP)
1	48,000	138,000	0.348
2	28,800	59,250	0.486
3	78,400	157,500	0.498
4	39,840	74,400	0.535
5	68,160	114,900	0.593
6	94,400	159,000	0.594
7	67,200	111,900	0.601
8	56,960	93,000	0.612
9	87,200	138,720	0.629
10	38,240	59,700	0.641
11	96,320	146,400	0.658
12	67,680	99,000	0.684
13	32,960	47,400	0.695
14	50,560	70,500	0.717
15	61,360	78,000	0.787
16	47,360	60,000	0.789
17	58,080	69,000	0.842
18	47,040	55,500	0.848
19	136,000	154,500	0.880
20	103,200	109,500	0.942
21	59,040	60,000	0.984
22	168,000	168,000	1.000
23	128,000	124,500	1.028
24	132,000	127,500	1.035
25	160,000	150,000	1.067
26	160,000	141,000	1.135
27	200,000	171,900	1.163
28	184,000	157,500	1.168
29	160,000	129,600	1.235
30	157,200	126,000	1.248
31	99,200	77,700	1.277
32	200,000	153,000	1.307
33	64,000	48,750	1.313
34	192,000	144,000	1.333
35	190,400	141,000	1.350
36	65,440	48,000	1.363

Note: Due to rounding, totals may not add to match those on following table, which reports results of statistical analysis of above data.

Results of statistical analysis

Statistic	Result
Number of observations in sample	36
Total appraised value	$3,627,040
Total sale price	$3,964,620
Average appraised value	$100,751
Average sale price	$110,128
Mean ratio	0.900
Median ratio	0.864
Weighted mean ratio	0.915
Coefficient of dispersion (COD)	29.8%
Price-related differential (PRD)	0.98
Price-related bias (PRB) coefficient (*t*-value)	.232 (3.01)
95% median two-tailed confidence interval	(0.684, 1.067)
95% weighted mean two-tailed confidence interval	(0.806, 1.024)
Normal distribution of ratios (0.05 level of significance)	Reject—D'Agostino, Pearson K^2, and Shapiro-Wilk *W*
Date of analysis	9/99/9999
Category or class being analyzed	Residential

- depict the degree of uniformity
- depict the degree of value bias (regressivity or progressivity)
- compare the level of appraisal or degree of uniformity among strata
- detect outlier ratios
- identify specific opportunities to improve mass appraisal performance
- track performance measures over time

5.2 Outlier Ratios

Outlier ratios are very low or high ratios as compared with other ratios in the sample. The validity of ratio study statistics used to make inferences about population parameters could be compromised by the presence of outliers that distort the statistics computed from the sample. One extreme outlier can have a controlling influence over some statistical measures. However, some statistical measures, such as the median ratio, are resistant to the influence of outliers and trimming would not be required. Although the coefficient of dispersion (COD) is affected by extreme ratios, it is affected to a lesser extent than the coefficient of variation (COV) and the mean. The weighted mean and price-related differential (PRD) are sensitive to sales with high prices even if the ratios on higher priced sales do not appear unusual relative to other sales. Regression analysis, sometimes used in assessment ratio analyses (e.g., when ratios are regressed on sales prices or property characteristics, such as lot size or living area), is also affected by outliers: both ratio outliers and outliers based on the comparison characteristics (an excellent treatment of the assumptions made in regression and deviations from can be found in Cook, R.D. and Weisberg, S. 1982).

Outlier ratios can result from any of the following:

1. an erroneous sale price
2. a nonmarket sale
3. unusual market variability
4. a mismatch between the property sold and the property appraised
5. an error in the appraisal of an individual parcel
6. an error in the appraisal of a subgroup of parcels
7. any of a variety of transcription or data handling errors

In preparing any ratio study, outliers should be

1. identified
2. scrutinized to validate the information and correct errors
3. trimmed if necessary to improve sample representativeness

For guidelines on outlier identification and trimming, see Appendix B, "Outlier Trimming Guidelines."

5.3 Measures of Appraisal Level

Estimates of appraisal level are based on measures of central tendency. They should be calculated for each stratum and for such aggregations of strata as may be appropriate. Several common measures of appraisal level (central tendency) should be calculated in ratio studies, including the median ratio, mean ratio, and weighted mean ratio. When one of these measures is calculated on the data in a sample, the result is a point estimate, which is accurate for the sample but is only one indicator of the level of appraisal in the population. Confidence intervals around the measures of level provide indicators of the reliability of the sample statistics as predictors of the overall level of appraisal of the population. Note that noncompliance with appraisal level standards cannot be determined without the use of confidence intervals or hypothesis tests.

5.3.1 Median

The median ratio is the middle ratio when the ratios are arrayed in order of magnitude. If there is an even number of ratios, the median is the average of the two middle ratios.

The median always divides the data into two equal parts and is less affected by extreme ratios than the other measures of central tendency. Because of these properties, the median is the generally preferred measure of central tendency for evaluating overall appraisal level, determining reappraisal priorities, or evaluating the need for a reappraisal.

5.3.2 Arithmetic Mean

The arithmetic mean (aka mean or average) ratio is the average of the ratios. It is calculated by summing the ratios and dividing by the number of ratios. In a normal distribution the mean equals the median. In a distribution skewed to the right (typical of ratio study data), the mean is greater than the median. The mean is affected more by extreme ratios than the median.

5.3.3 Weighted Mean

The weighted mean ratio is the value-weighted average of the ratios in which the weights are proportional to the sales prices. The weighted mean also is the ratio of the average assessed value to the average sales price value. The weighted mean gives equal weight to each dollar of value in the sample, whereas the median and mean give equal weight to each parcel. The weighted mean is an important statistic in its own right and also is used in computing the PRD, a measure of uniformity between high- and low-value properties

The weighted mean also can be calculated by (1) summing the appraised values, (2) summing the sales prices, and (3) dividing the first result by the second. The weighted mean also is called the *aggregate ratio*.

5.3.4 Contrasting Measures of Appraisal Level

Because it gives equal weight to each ratio and is unaffected by extreme ratios, the median is the preferred measure of central tendency for evaluating appraisal performance. Although the mean ratio is also a parcel-based measure, it can be affected appreciably by extreme ratios and can be relied upon only if the sample is of adequate size and contains few outliers.

5.4 Measures of Variability

Measures of dispersion or variability relate to the uniformity of the ratios and should be calculated for each stratum in the study. In general, the smaller the measure, the better the uniformity, but extremely low measures can signal one of the following:

acceptable causes

- extremely homogeneous properties
- very stable markets

unacceptable causes

- lack of quality control
- calculation errors
- poor sample representativeness
- sales chasing

Note that as market activity changes or as the complexity of properties increases, the measures of variability usually increase, even though appraisal procedures may be equally valid.

5.4.1 Coefficient of Dispersion

The most generally useful measure of variability or uniformity is the COD. The COD measures the average percentage deviation of the ratios from the median ratio and is calculated by the following steps:

1. subtract the median from each ratio
2. take the absolute value of the calculated differences
3. sum the absolute differences
4. divide by the number of ratios to obtain *the average absolute deviation*
5. divide by the median
6. multiply by 100

The COD has the desirable feature that its interpretation does *not* depend on the assumption that the ratios are normally distributed. In general, more than half the ratios

fall within one COD of the median. The COD should not be calculated about the mean ratio.

5.4.2 Other Measures of Variability

Other useful measures of variability or the distribution of ratio study data are as follows:

- range
- percentiles
- quartiles
- interquartile range
- median absolute deviation (MAD)
- median percent deviation
- coefficient of concentration
- standard deviation
- coefficient of variation (COV)
- weighted coefficient of dispersion
- weighted coefficient of variation

See *Property Appraisal and Assessment Administration* (IAAO 1990, chapter 20) and Gloudemans (1999, chapter 5) for further discussion on these statistical measures.

Note that the typical percentage error is not the COD, but is expressed by the median percentage deviation statistic. Also, it is the interquartile range, not the COD, that brackets the middle 50 percent of the assessment ratios.

5.5 Measures of Reliability

Reliability, in a statistical sense, concerns the degree of confidence that can be placed in a calculated statistic for a sample. (For example, how precisely does the sample median ratio approximate the population median appraisal ratio?) The primary measure of importance to the local assessor is the confidence interval. A confidence interval consists of two numbers (upper and lower limits) that bracket a calculated measure of central tendency for the sample; there is a specified degree of confidence that the calculated upper and lower limits bracket the true measure of central tendency for the population. See Appendix 20-4 in *Property Appraisal and Assessment Administration* (IAAO 1990) and Appendix C for guidelines on calculating small-sample confidence intervals.

New computer-intensive statistical methods, such as the "bootstrap" (Efron and Tibshirani 1993), now enable the development of confidence interval estimates for any statistic of interest, including measures of level and uniformity.

Measures of reliability explicitly take into account the errors inherent in a sampling process. In general, these measures are tighter (better) when samples are relatively large and the uniformity of ratios is relatively good.

Measures of reliability indicate whether there is a desired degree of confidence that a given level of appraisal has *not* been achieved. This does not mean that an appraiser should tolerate measures of central tendency that fail to meet goals whenever measures of reliability are wide due to small samples, poor uniformity, or both. Such cases require either additional data for proper analysis or alternative action, such as a reappraisal, if poor uniformity is the cause. Such correction might include reappraisal, trending of strata, and respecifying or recalibrating mass appraisal models (see section 9 in this part for a discussion of ratio study standards).

5.6 Vertical Inequities

The measures of variability discussed in section 5.4 relate to "horizontal," or random, dispersion among the ratios in a stratum, regardless of the value of individual parcels. Another form of inequity can be systematic differences in the appraisal of low- and high-value properties, termed "vertical" inequities. When low-value properties are appraised at greater percentages of market value than high-value properties, assessment *regressivity* is indicated. When low-value properties are appraised at smaller percentages of market value than high-value properties, assessment *progressivity* is the result. Appraisals made for tax purposes of course should be neither regressive nor progressive.

An index statistic for measuring vertical equity is the PRD, which is calculated by dividing the mean ratio by the weighted mean ratio. This statistic should be close to 1.00. Measures considerably above 1.00 tend to indicate assessment regressivity; measures below 1.00 suggest assessment progressivity. When samples are small or the weighted mean is heavily influenced by several extreme sales prices, the PRD may not be a sufficiently reliable measure of vertical inequities. A scatter plot of ratios versus appraised values or sale prices is a useful diagnostic tool. A downward (or upward) trend to the data indicates systematic regressivity (or progressivity). Assuming representativeness, high PRDs generally indicate low appraisals on high-priced properties. If not sufficiently representative, extreme sales prices can be excluded in calculation of the PRD. Similarly, when samples are very large, the PRD may be too insensitive to show small pockets in which there is significant vertical inequity. Standards for evaluating the PRD are given in section 9.2.7 in this part. In addition, more powerful statistical tests for vertical inequities are available and should be employed to determine the significance of the indication provided by the PRD (see section 5.7 in this part and Twark, Everly and Downing [1989]).

The coefficient of price-related bias (PRB) provides a more meaningful and easily interpreted index of price-related bias than the PRD. It is obtained by regressing percentage difference from the median ratio on percentage differences in value (see Appendix D). A PRB of −.045

indicates, for example, that assessment ratios fall by 4.5% when values double and increase by 4.5% when values are halved. Like all regression coefficients, the statistical reliability of the PRB can be gauged by noting its *t*-value and related significance level, and by computing confidence intervals. In table 1-4 the PRB is -0.035 and is not statistically significant.

Unacceptable vertical inequities should be addressed through reappraisal or other corrective actions. In some cases, additional stratification can help isolate the problem. Measures of level computed for value strata should not be compared as a way of determining vertical inequity because of a boundary effect that is most pronounced in the highest and lowest strata (Schultz 1996).

5.7 Tests of Hypotheses

An appropriate test should be used whenever the purpose of a ratio study is implicitly or explicitly to test a hypothesis. A hypothesis is essentially a tentative answer to a question, such as, Are residential and commercial properties appraised at equal percentages of market value? A test is a statistical means of deciding whether the answer "yes" to such a question can be rejected at a given level of confidence. In this case, if the test leads to the conclusion that residential and commercial properties are not appraised at equal percentages of market value, some sort of corrective action on the part of assessing officials is clearly indicated.

Tests are available to determine whether the

- level of appraisal of a stratum fails to meet an established standard
- meaningful differences exist in the level of appraisal between two or more strata
- high-value properties are appraised at a different percentage of market value than low-value properties

Appropriate tests are listed in table 1-2 and discussed in Gloudemans (1999), *Property Appraisal and Assessment Administration* (IAAO 1990), and *Improving Real Property Assessment* (IAAO 1978, 137–54).

5.8 The Normal Distribution

Many conventional statistical methods assume the sample data conform to the shape of a bell curve, known as the normal (or Gaussian) distribution. Performance measures based on the mean or standard deviation can be misleading if the study sample does not meet the assumption of normality. As a first step in the analysis, the distribution of sample ratios should be examined to reveal the shape of the data and uncover any unusual features. Although ratio study samples typically do not conform to the normal distribution, graphical techniques and numerical tests can be used to explore the data thoroughly. Traditional choices are the binomial, chi-square, and Lilliefors tests. Newer and more powerful procedures are the Shapiro-Wilk W, the D'Agostino-Pearson K^2, and the Anderson-Darling A^2 tests (D'Agostino and Stephens 1986).

5.9 Parametric and Distribution-Free (Nonparametric) Statistics

For every problem that might be solved by using statistics, there is usually more than one measure or test. These measures and tests can be divided into two broad categories: parametric and distribution-free (nonparametric). Parametric statistics assume the population data conform to a known family of probability distributions (such as the normal distribution). When the mean, weighted mean, and standard deviation are used in this context, they tend to be more meaningful. Distribution-free statistics make less restrictive assumptions and do not require knowledge about the shape of the underlying population distribution. Given similar distribution of ratios in the underlying populations, distribution free tests, such as the Mann-Whitney test, can determine the likelihood that the level of assessment

Table 1-2. Tests of Hypotheses

Null Hypothesis	Nonparametric Test	Parametric Test
1. Ratios are normally distributed.	Shapiro-Wilk W test D'Agostino-Pearson K^2 test Anderson-Darling A^2 test Lillifores Test	N/A
2. The level of appraisal meets legal requirements.	Binomial test	*t*-test
3. Two property groups are appraised at equal percentages of market value.	Mann-Whitney test	*t*-test
4. Three or more property groups are appraised at equal percentages of market value.	Kruskal-Wallis test	Analysis of Variance
5. Low- or high-value properties are appraised at equal percentages of market value.	Spearman Rank test	PRB, correlation or regression analysis
6. Sold and unsold parcels are treated equally.	Mann-Whitney test	*t*-test

of property groups differ (Hart 2001). Distribution-free statistics are the median and the COD.

6. Sample Size

6.1 Importance of Sample Size

There is a general relationship between statistical reliability and the number of observations in a sample. The larger the sample size, the greater the reliability.

6.2 Adequacy of a Given Sample Size

The adequacy of a given sample size can be evaluated by computing measures of reliability. If the confidence interval is sufficiently narrow, the sample is large enough. If the confidence interval is too wide, the assessor must either accept less precision or enlarge the sample, if possible.

6.3 Required Sample Size

Formulas are available to compute the minimum sample size necessary to produce selected margins of error at a specified level of confidence. Such formulas depend crucially on the estimated variability of the ratios (Cochran 1977).

6.4 Remedies for Inadequate Samples

Small samples should be enlarged if the assessor desires to increase the reliability of statistical measures. Inadequate sample sizes are typically indicated by unacceptably wide confidence intervals. The following alternatives should be considered:

1. ***Restratification.*** If levels of appraisal are similar or properties are homogenous, broader strata containing larger samples can be created by combining existing strata or by stratifying on a different basis.
2. ***Extending the period from which sales are drawn.*** This is often the most practical and effective approach. Sales from prior years can be used; however, adjusting the sale price for time may be necessary and significant property characteristics must not change.
3. ***Enlarging the sample by validating previously rejected sales.*** Sales previously excluded from the analysis, because it was not administratively expedient to confirm them or to make adjustments, can be reevaluated.
4. ***Imputing appraisal performance.*** Ratio study statistics for strata with no or few sales can sometimes be imputed from the results obtained for other strata. These strata should be as similar as possible. Procedures and techniques used to appraise properties in the strata also should be similar.

6.5 Other Sample Size-Related Representativeness Problems

Sales from areas or substrata in which the number of sales is disproportionately large can distort ratio study results by weighting level and uniformity indicators toward whatever conditions exist in the overrepresented area. To alleviate this problem and create better representativeness, large samples can be further stratified by

- randomly selecting sales to be removed
- isolating the overrepresented groups into substrata
- redefining the time period for the overrepresented groups
- weighting the data

7. Reconciliation of Ratio Study Performance Measures

An important objective of a ratio study conducted by a local jurisdiction is the evaluation of model performance. This is a USPAP requirement in the reconciliation of a mass appraisal. Assessing officials must incorporate a quality control program, including checks and audits of the data, to ensure that sold and unsold parcels are appraised at the same level. This also requires characteristic data for both sold and unsold properties to be current, appropriate, relevant, and collected in a consistent manner.

8. Presentation of Findings, Documentation, and Training

The findings of a ratio study should be sufficiently detailed and documented to meet the needs of the users of the study. Documentation for internal ratio studies can be less detailed than for reports prepared for external uses. The following documentation should be provided in conjunction with any published ratio study.

8.1 Text

A brief text describing the purpose and the methods used should accompany a ratio study. This information can be incorporated in the report of the findings or be contained in a separate memorandum. The text should contain the statistics presented and outline the major procedural steps in completing the study. The text also should describe any rules for eliminating sales or extreme ratios and acknowledge any significant limitations in the data.

8.2 Exhibits

The body of the ratio study report should include for each stratum the statistical results intended to be used for decision-making purposes. All reports should contain the following information:

- date and tax year of the appraisals being evaluated
- number of parcels in each stratum
- number of sales
- number of sales trimmed from the study
- measures of central tendency (appraisal level)
- measures of uniformity (variability) and price-related biases
- confidence interval (measures of reliability) about the measures of central tendency
- summary of adjustments made to sales prices

In addition, there should be a description of the steps taken to ensure that sold and unsold properties were valued and described consistently. If the sold and unsold properties were not treated identically, the documentation should characterize the differences discovered between them.

8.3 Analyses and Conclusions

An objective statement of the results of the ratio study should be prepared. If the study is one in a series, a comparison of the results with those of previous studies can be helpful.

8.4 Documentation

Ratio study procedures should be documented thoroughly. This documentation should take three forms. First, a general guideline should explain the design of the study. This guideline should be updated whenever procedures are changed. Second, all software applications should be documented so that the program logic can be reviewed and modified as needed. Third, a user's manual should explain how to execute the study or run the software.

8.5 Training and Education

The effectiveness of ratio studies can be improved through education and training. Assessment supervisors should conduct seminars or workshops for the appraisal staff to explain how to interpret reports, how ratio studies can be used to improve appraisal performance, and how the results will be used in-house.

9. Ratio Study Standards

Each local jurisdiction should have ratio study performance standards. Local standards should be consistent with state or provincial standards. The standards summarized in table 1-3 are suggested for jurisdictions in which current market value is the legal basis for assessment. In general, when these standards or other local standards are not met, reappraisal or other corrective measures should be taken.

All standards recommended in this section are predicated on the assumption that steps have been taken to maximize representativeness and validity in the underlying ratio study.

9.1 Level of Appraisal

In analyzing appraisal level, ratio studies attempt to measure statistically how close appraisals are to market value (or to a required statutory constraint that can be expressed as a percentage of market value) on an overall basis. While the theoretically desired level of appraisal is 1.00, an appraisal level between 0.90 and 1.10 is considered acceptable for any class of property. However, each class of property must be within 5 percent of the overall level of appraisal of the jurisdiction (see Section 9.2.1 in this part). Both criteria must be met. By themselves, the calculated measures of central tendency provide only an indication, not proof, of whether the level meets the appropriate goal. Confidence intervals and statistical tests should be used

Table 1-3. Ratio Study Uniformity Standards indicating acceptable general quality*

Type of property—General	Type of property—Specific	COD Range**
Single-family residential (including residential condominiums)	Newer or more homogeneous areas	5.0 to 10.0
Single-family residential	Older or more heterogeneous areas	5.0 to 15.0
Other residential	Rural, seasonal, recreational, manufactured housing, 2–4 unit family housing	5.0 to 20.0
Income-producing properties	Larger areas represented by large samples	5.0 to 15.0
Income-producing properties	Smaller areas represented by smaller samples	5.0 to 20.0
Vacant land		5.0 to 25.0
Other real and personal property		Varies with local conditions

These types of property are provided for guidance only and may not represent jurisdictional requirements.

** Appraisal level for each type of property shown should be between 0.90 and 1.10, unless stricter local standards are required.*

PRD's for each type of property should be between 0.98 and 1.03 to demonstrate vertical equity.

PRD standards are not absolute and may be less meaningful when samples are small or when wide variation in prices exist. In such cases, statistical tests of vertical equity hypotheses should be substituted (see table 1-2).

*** CODs lower than 5.0 may indicate sales chasing or non-representative samples.*

to determine whether it can be reasonably concluded that appraisal level differs from the established goal in a particular instance. Additionally, when uniformity measures show considerable variation between ratios, level measurements may be less meaningful.

9.1.1 Purpose of Level-of-Appraisal Standard

Jurisdictions that follow the IAAO recommendation of annual revaluations *(Standard on Property Tax Policy* [IAAO 2010] and *Standard on Mass Appraisal of Real Property* [IAAO 2013]) and comply with USPAP standard rules should be able to develop mass appraisal models that maintain an overall ratio level of 100 percent (or very near thereto). However, the local assessor may be compelled to follow reappraisal cycles defined by a legal authority or public policy that can extend beyond one year. During extended cycles the influence of inflation or deflation can shift the overall ratio.

The purpose of a performance standard that allows reasonable variation from 100 percent of market value is to recognize uncontrollable sampling error and the limiting conditions that may constrain the degree of accuracy that is possible and cost-effective within an assessment jurisdiction. Further, the effect of performance standards on local assessors must be considered in light of public policy and resources available.

9.1.2 Confidence Intervals in Conjunction with Performance Standards

The purpose of confidence intervals and similar statistical tests is to determine whether it can be reasonably concluded that the appraisal level differs from the established performance standard in a particular instance. A conclusion of noncompliance requires a high degree of confidence; thus, a 90 percent (two-tailed) or 95 percent (one-tailed) confidence level should be used, except for small or highly variable samples. The demonstration ratio study report in table 1-4 presents 95% two-tailed confidence interval estimates for the mean, median, and weighted mean ratio.

9.2 Appraisal Uniformity

Assuming the existence of an adequate and sufficiently representative sample, if the uniformity of appraisal is unacceptable, model recalibration and/or reappraisal should be undertaken. It is important to recognize that the COD is a point estimate and, especially for small samples, should not be accepted as proof of assessment uniformity problems. Proof can be provided by recognized statistical tests, including bootstrap confidence intervals.

In unusually homogeneous strata, low CODs can be anticipated. In all other cases, CODs less than 5 percent should be considered suspect and possibly indicative of nonrepresentative samples or selective reappraisal of selling parcels.

9.2.1 Uniformity among Strata

Although the goal is to achieve an overall level of appraisal equal to 100 percent of the legal requirement, ensuring uniformity in appraisal levels among strata also is important. The level of appraisal of each stratum (class, neighborhood, age group, market areas, and the like) should be within 5 percent of the overall level of appraisal of the jurisdiction. For example, if the overall level of appraisal of the jurisdiction is 1.00, but the appraisal

Table 1-4. Demonstration Ratio Study Report

Rank	Parcel #	Appraised value	Sale price*	Ratio	Statistic	Result
1	9	$87,200	138,720	0.629	Number (n)	17
2	10	38,240	59,700	0.641	Total appraised value	$1,455,330
3	11	96,320	146,400	0.658	Total sale price	$1,718,220
4	12	68,610	99,000	0.693	Avg appraised value	$85,608
5	13	32,960	47,400	0.695	Avg sale price	$101,072
6	14	50,560	70,500	0.717		
7	15	61,360	78,000	0.787	Mean ratio	0.827
8	16	47,360	60,000	0.789	Median ratio	0.820
9	17	56,580	69,000	0.820	Weighted mean ratio	0.847
10	18	47,040	55,500	0.848		
11	19	136,000	154,500	0.880	Coefficient of dispersion	14.5
12	20	98,000	109,500	0.895	Price-related differential	0.98
13	21	56,000	60,000	0.933	PRB	–0.035
14	22	159,100	168,000	0.947	PRB coefficient (*t*-value)	0.135 (2.4)
15	23	128,000	124,500	1.028		
16	24	132,000	127,500	1.035	95% conf. int. mean (two-tailed)	0.754 to 0.901
17	25	160,000	150,000	1.067	95% conf. int. median (two-tailed)	0.695 to 0.933
					95% conf. int. wtd. mean (two-tailed)	0.759 to 0.935

Date: 0/0/00. *No outlier trimming*

** or adjusted sale price*

level for residential property is 0.93 and the appraisal level for commercial property is 1.06, the jurisdiction is not in compliance with this requirement. This test should be applied only to strata subject to compliance testing. It can be concluded that this standard has been met if 95 percent (two-tailed) confidence intervals about the chosen measures of central tendency for each of the strata fall within 5 percent of the overall level of appraisal calculated for the jurisdiction. Using the above example, if the upper confidence limit for the level of residential property is 0.97 and the lower confidence limit for commercial property is 1.01, the two strata are within the acceptable range.

9.2.2 Uniformity among Single-Family Residential Properties

The COD for single-family homes and condominiums in older or more heterogeneous areas should be between 5.0 and 15.0. In areas of newer or fairly similar residences, it should be between 5.0 and 10.0.

9.2.3 Uniformity among Income-Producing Properties

The COD should be between 5.0 and 20.0. In larger, urban market areas, it should be between 5.0 and 15.0.

9.2.4 Uniformity among Unimproved Properties

The COD for vacant land should be between 5.0 and 20.0. The upper limit for an acceptable COD for vacant rural residential or seasonal land may be 25.0.

9.2.5 Uniformity among Rural Residential and Seasonal Properties, Manufactured Housing, and Multifamily Dwellings

The COD for heterogeneous rural residential property, recreational or seasonal homes, manufactured housing, and multifamily dwellings (2-4 units) should be between 5.0 and 20.0.

9.2.6 Uniformity among Other Properties

Target CODs for special-purpose real property and personal property should reflect the nature of the properties involved, market conditions, and the availability of reliable market indicators.

9.2.7 Vertical Equity

PRDs should be between 0.98 and 1.03. The reason this range is not centered on 1.00 relates to an inherent upward bias in the arithmetic mean (numerator in the PRD) that does not equally affect the weighted mean (denominator in the PRD). When samples are small, have high dispersion, or include properties with extreme values, the PRD may not provide an accurate indication of assessment regressivity or progressivity. When relying on the PRD to measure vertical equity, it is good practice to perform an appropriate statistical test for price-related biases before concluding that they exist (see table 1-2).

The PRB provides a measure of price-related bias that is more meaningful and less sensitive to extreme prices or ratios. As a general matter, the PRB coefficient should fall between –0.05 and 0.05. PRBs for which 95% confidence intervals fall outside of this range indicate that one can reasonably conclude that assessment levels change by more than 5% when values are halved or doubled. PRBs for which 95% confidence intervals fall outside the range of –0.10 to 0.10 indicate unacceptable vertical inequities.

As an illustration of the above, assume that the PRB is –.115 with a standard error of 0.02 and corresponding 95% confidence interval of –0.075 to –0.155 (–0.115 ± 0.04 approximately). One can conclude with 95% confidence that assessment levels change by at least 7.5% when values double or are halved but not that assessment levels change by at least 10%. This result would not be out of compliance with the ± 0.10 standard.

9.2.8 Alternative Uniformity Standards

The above standards may not be applicable to properties in unique, depressed, or rapidly changing markets. In such cases, assessment administrators may be able to develop target standards based on an analysis of past performance or results in similar markets elsewhere. Such an analysis can be based on ratio study results for the past five years or more.

9.3 Natural Disasters and Ratio Study Standards

Natural disasters such as earthquakes, floods, and hurricanes can have a substantial impact on the interpretation and use of ratio studies. In particular, they

- increase the difficulty of accurately identifying the physical and economic characteristics of property on the dates of sale and appraisal
- increase the difficulty of producing sufficiently reliable appraised values
- decrease the availability of usable sales and other market data
- disrupt the supply and demand equilibrium in the neighborhood community or region

As a result of these potential problems, a number of unreliable sample properties may need to be excluded and sample sizes may be unavoidably reduced. All these factors should be considered when ratio study standards are being

applied to study results from areas substantially affected by disasters. Such consideration must not result in unwarranted relaxation of applicable standards. When faced with such situations, assessors must use informed, reasoned judgment and common sense to produce a sufficiently reliable ratio study, based upon the best information available.

10. Personal Property Ratio Studies

Studies can be done by local assessors to determine the quality of assessments of personal property in their jurisdictions. For guidelines on conducting personal property ratio studies, see section 12 in Part 2.

Standard on Ratio Studies

Part 2. Equalization and Performance Monitoring

1. Scope

This part of the standard provides guidance and supplementary information to oversight agencies that perform ratio studies. Oversight or equalization ratio studies are designed to examine the overall degree of accuracy of assessments within or among categories of property, market areas, assessment jurisdictions or political subdivisions, such as school districts, municipalities, counties, states or provinces.

2. Oversight Ratio Studies

Oversight agencies are often required to monitor appraisal performance and take corrective actions when necessary. Equalization is a common tool used by oversight agencies to address problems associated with appraisal level. Reappraisal orders can be used to correct uniformity problems.

2.1 Monitoring of Appraisal Performance

Oversight agencies usually perform sales ratio studies, which can include independent appraisals, to monitor local assessment performance. The findings can serve as the basis for enforcement actions, such as reappraisal or equalization orders. State/provincial agencies also often perform ratio studies to advise assessors and the public about local appraisal conditions. Many state or provincial oversight agencies have a dual role. One role is to advise and assist local appraisal offices, and the other role is to measure local appraisal performance. These two roles can create a conflict of interest, which should be minimized.

2.2 Equalization

Oversight agencies can use the results of ratio studies to equalize, directly or indirectly, appraisals or assessments in taxing jurisdictions. Direct equalization is accomplished by an oversight agency which alters locally determined assessments by ordering appraisals within jurisdictions or property classes to be adjusted to market value or to the legally required level of assessment. Direct equalization can also involve adjusting appraisals of centrally assessed properties. When indirect equalization is used, appraisals are not adjusted. Instead, indirect equalization involves an oversight agency estimating total taxable value, given the legally required level of assessment or market value. Indirect equalization allows proper distribution of intergovernmental transfer payments between state or provincial and local governments despite different levels of appraisal among jurisdictions or property classes. Equalization is not an appraisal or a substitute for reappraisal.

When equalization is based on ratio study samples, sampling error must be taken into account. When confidence intervals include an acceptable range, equalization cannot be supported statistically. When confidence intervals *fail* to bracket official requirements, equalization actions are supported (see section 6.5, "Measures of Reliability," and section 11.1, "Level of Appraisal").

Legal aspects of ratio studies, many of which relate to equalization, are discussed in Appendix G.

2.2.1 Direct Equalization

Many states and provinces have authority and specific procedures for direct equalization. The advantage of direct equalization is that it can be applied to specified strata, such as property classes, geographic areas, and political subdivisions that fail to meet appraisal level performance standards (Dornfest [Journal of Property Tax Assessment and Administration, 2004]). Direct equalization also produces results that are generally more visible to the taxpayer and more clearly reduces perceived inequities between classes *(Standard on Property Tax Policy* [IAAO 2010]). For example, direct equalization allows proper and equal application of debt and tax rate limits and equitable partial exemptions.

Direct equalization involves use of adjustment factors, which produce effects mathematically identical to those derived through the application of "trending" or "index" factors, which are commonly used for value updating by local assessing jurisdictions. The most significant differences typically are the level of the jurisdiction originating the adjustments and the stratification of property to which the factors are applied. Local jurisdictions with primary assessment responsibility can develop value adjustment factors as an interim step between complete reappraisals. Such factors commonly are applied to properties by property type, location, size, age and other characteristics (see *Property Appraisal and Assessment Administration* [IAAO 1990, p. 310]). It is rare for equalization factors developed by oversight agencies to be applied to strata more specific than property class or broad geographic area. Often such factors are applied jurisdiction-wide.

States and provinces that employ direct equalization techniques should understand that such equalization is not a substitute for appraisal or reappraisal. Direct equalization

applied at the stratum level improves equality in effective tax rates between strata and lessens the effect of assessment practices that improperly favor one stratum over another. For example, assuming that all classes of property are to be assessed at 100% of market value, without such equalization, in a case where residential property is assessed at a median of 80% of market value, while commercial property is assessed at a median of 90% of market value, residential property will pay 80% of its proper tax share and commercial property will pay 90% of its proper tax share. Other classes that may be assessed at 100% will pay more than their proper tax shares. Direct equalization mitigates this problem. However, such equalization cannot improve uniformity between properties within a given stratum. So, in the previous example, the median level of assessment for residential property can be adjusted from 80% to 100% of market value, assessment disparities between individual residential properties will not be addressed. For this reason, reappraisal orders should be considered as the primary corrective tool for uniformity problems, and direct equalization should be considered appropriate only if time or other constraints preclude such an approach.

2.2.2 Indirect Equalization

The most common use of indirect equalization is to enable proper funding distribution, particularly for school districts. Such equalization provides an estimation of the proper tax base (acknowledging statutory constraints such as agricultural use value) despite appraisals that are higher or lower than legally required levels in certain jurisdictions. For example, if the assessed value of residential property in a jurisdiction is $750 million, but a residential ratio study shows an assessment level of 75 percent, while the legally required level of assessment is 100 percent, an equalized value of $1,000 million could be computed ($750 million/0.75). This adjusted or equalized value would then be used to apportion payments or requisitions between the state or province and associated local governments.

Indirect equalization results in fairer funding apportionment because the overall appraisal levels of the taxing jurisdictions tend to vary. If there were no equalization, the extent that a jurisdiction under- or overestimated its total tax base would result in over- or under-apportionment of funds. Indirect equalization does not correct under- or overvaluation between classes of property within a jurisdiction. It adjusts only a portion of the tax or sometimes only intergovernmental payments, is less visible to taxpayers, and often lacks checks and balances associated with direct equalization (see *Standard on Property Tax Policy* [IAAO 2010]). By adjusting governmental payments, tax rates, or partial exemptions, indirect equalization encourages taxing jurisdictions to keep their overall tax bases close to the required level.

Whether used to equalize shared funding or tax rates, the degree of equalization of the property tax is more limited than with direct equalization. Indirect equalization generally is applied to or affects only a portion of the funding or property tax levy (perhaps the school general levy or city levy). Indirect equalization usually is applied to the jurisdiction, rather than to a stratum, and therefore resolves interjurisdictional discrepancies in assessment level. In addition, properties in strata with poor uniformity are affected disproportionately. For this reason, indirect equalization also is not a substitute for reappraisal.

3. Steps in Ratio Studies

Ratio studies conducted by oversight agencies generally follow the basic steps described for the assessor's office in Part 1, except that it is more important to adopt uniform procedures and be consistent in their application.

3.1 Definition of the Purpose, Scope, and Objectives

The first step in any ratio study is to determine and state clearly the reasons for the study. This crucial step of identifying the purpose of the study determines the specific goals, scope, content, depth, and required flexibility.

3.2 Design of Study

The most important design consideration is that the study sample be sufficiently representative of the population of properties or the distribution of values in the jurisdiction under review. For direct equalization the level of appraisal for property classes or strata subject to such equalization is the primary area of interest and the sample must be designed accordingly. Indirect equalization seeks to estimate the overall dollar value of the population, so the sample must be representative of that overall value and must reflect the disproportionate influences of high value properties. Performance monitoring is concerned with both level and uniformity, but typically involves sample design similar to that required in direct equalization.

3.2.1 Level of Sophistication and Detail

A basic design principle is to keep the study as simple as possible consistent with its purpose. Ratio studies are not all alike and should be tailored to an intended use.

Data analysis has been made easier through computerization. Although every study does not require the same level of statistical detail, each ratio study should include measures of appraisal level, appraisal uniformity, and statistical reliability. Graphs, charts, or other pictorial representations can be useful tools for showing distributions and patterns in the data. There is no model ratio study design that can serve all jurisdictions or all situations equally well. Informed, reasoned judgment and common sense are required in the design of ratio studies.

3.2.2 Sampling

A ratio study is a form of applied statistics, because the analyst draws conclusions about the appraisal of the universe (the entire jurisdiction) of properties based only on those that have sold during a given time period or appraisals selected for a random sample. The ratios constitute the sample that will be used to draw conclusions or inferences about the population.

To determine the accuracy of appraisals within a jurisdiction with absolute certainty, it would be necessary for all properties in the population to have been sold in arm's-length, open-market transfers near the appraisal date or all properties would need to be appraised independently by the oversight agency. Since this is not possible, ratio studies must use samples and draw inferences or conclusions about the population from these samples.

The number of parcels in the population (the jurisdiction or stratum) is not an important determinant of a statistically valid and reliable sample.

3.2.3 Determining the Composition of Samples

In the design stage, the oversight agency must decide whether the ratio study sample should comprise sales (or asking prices when appropriate), independent appraisals, or a combination of the two. Each sample type has its advantages and disadvantages, as described below.

3.2.3.1 Sale Samples

The advantages of using sale samples include the following:

- Properly validated sales provide more objective indicators of market value than independent appraisals.
- Using sales is much less expensive than producing independent appraisals.

The disadvantages include the following:

- Difficulty in collecting sales data in jurisdictions without disclosure documents
- The oversight authority may not have control over the sales data collection and validation process
- Influence of sales chasing can be difficult to detect or prevent
- Samples of sales may not adequately represent the population of properties
- An adequate sample size may not be achieved if sales data are scarce
- Time adjustments are more critical when supplemental sales are included

3.2.3.2 Independent Appraisal Samples

Independent appraisals also can be used instead of or in addition to sales for ratio study samples. (See section 8, "Appraisal Ratio Studies," in this part.)

3.2.3.3 Samples Combining Sales and Independent Appraisals

The oversight agency can design and conduct ratio studies using samples comprised of sales and independent appraisals. In this approach, the combined advantages of sale samples and appraisal samples are realized. However, the disadvantage of combining sales and independent appraisals is the possible existence of some of the disadvantages of sale samples and/or appraisal samples (see Section 8.7).

3.3 Collection and Preparation of Market Data

The reliability of a ratio study depends in part on how accurately the sales or independent appraisals used in the study reflect market values. For sales-based studies, oversight agencies should conduct an independent sales verification and screening program if resources permit. Alternatively, oversight agencies should develop audit criteria to review data submitted to qualify sales, corroborate representativeness and confirm adequate sample size. Audit decisions should accommodate needs of the agency and resources available. Independent appraisals used in ratio studies must comply with the appropriate sections of the *Uniform Standards of Professional Appraisal Practice* (USPAP; Appraisal Foundation 2010–2011), and reflect market values as of the date being studied. Most oversight agencies use property data collected by the local jurisdiction to develop their independent appraisals. In order to produce credible appraisals, the oversight agency must be certain that the local jurisdiction accurately recorded the appropriate value-related property characteristics for each property it is independently appraising. Steps must be taken to ensure that errors in the database made by the local jurisdiction do not materially or significantly affect the conclusions or opinions of value developed by the oversight agency.

3.4 Stratification

Stratification divides all the properties within the scope of the study into two or more groups or strata. Stratification facilitates a more complete and detailed picture of appraisal performance and can enhance sample representativeness

Each type of property subject to a distinct level of assessment could constitute a stratum. Other property groups, such as market areas, school districts and tax units, could constitute additional strata.

Strata should be chosen to be consistent with factors in the mass appraisal model. When the purpose of the study is to evaluate appraisal quality, flexibility in stratification

is essential. The general goal is to identify areas in which the assessment levels are too low or lack uniformity and property groups for which additional reappraisal work may be required. In such cases, it also is highly desirable to stratify on the basis of more than one characteristic simultaneously.

Stratification can help identify differences in level of appraisal between property groups. In large jurisdictions, stratification by market areas is generally more appropriate for residential properties, while stratification of commercial properties by either geographic area or property subtypes (e.g., office, retail, and warehouse/industrial) can be more effective.

3.5 Matching Appraisal Data and Market Data

The physical and legal characteristics of each property used in the ratio study must be the same when appraised for tax purposes and when sold. This implies two essential steps. First, the property description for the sold parcel must match the appraised parcel. If a parcel is split between the appraisal date and the sale date, a sale of any of its parts should not be used in the ratio study.

Second, the property rights transferred, permitted use, and physical characteristics of the property on the date of assessment must be the same as those on the date of sale. Properties with significant differences in these factors should be excluded from the ratio study.

When statutory constraints are imposed on appraisal methods, the resulting assessment may be less than market value. In such cases a sales ratio study may not provide useful performance information. Constraints typically apply to land that qualifies for agricultural-use value, subsidized housing, mineral land, and timberland.

Sales may include property of a type other than the type for which the ratio study analyses is intended. However, sales including more than minimal values of secondary categories are unlikely to be representative, even with adjustment.

For example, a property that is predominantly commercial may include residential components. This sale can be included as representative of the commercial category. In this case, the numerator in the ratio calculation would be the total appraised value including the value of both the commercial and residential components.

In a second example, for a ratio study of vacant land, the numerator in the ratio should reflect only the appraised value of the land. The sale price should be adjusted for the contributory value of the improvements or the sample should be excluded from further analysis.

3.5.1 Stratification for Equalization Studies

Oversight agencies generally should define the strata prior to acquiring and compiling data for the ratio study. Predefined stratification is more transparent and enhances cooperation between the oversight agency and the jurisdiction appraising the property subject to equalization. In general, oversight agencies should not redefine the strata once they have been defined for equalization purposes, especially in the case of direct equalization. It is appropriate, however, to collapse strata to compensate for otherwise inadequate samples sizes. In addition, a reappraisal or equalization order can be targeted for specific problem areas that cause noncompliance at a broader level of aggregation. If value stratification is necessary, predefined strata may not be practical.

3.5.2 Stratification for Direct Equalization

Strata should be chosen consistent with operational requirements for the required level of equalization. Statistical issues in the determination of strata include the size of the population and resulting strata and the likely variability of the ratios in each stratum. Care must be taken not to over-stratify, that is, to create strata that are too small to achieve statistical reliability (see section 6, Sample Size" in part 1 and Sherrill and Whorton [1991]). No conclusion about stratum level or uniformity should be made from stratum samples that are unreliably small (resulting in unacceptably large margins of error). Ultimately, the degree of stratification is determined largely by available sales data, unless it is cost-effective and practical to add sufficient independent appraisals. If sufficient sales or appraisals are not available for a given stratum, it should be combined with similar strata. When strata are combined, provided there is no reason to suspect dissimilar ratios as evidenced by different level or uniformity measures, such combinations permit broader applicability of ratio study results and prevent ratio study analysis from becoming too focused on substrata with few sales or appraisals. When jurisdiction or category wide equalization actions are required, reliability of component strata is not an issue.

3.5.3 Stratification for Indirect Equalization

Indirect equalization develops an estimate of full market value, but assessed values of individual properties are not altered. Such studies can use a substantially different approach to stratification than ratio studies intended for performance evaluation or direct equalization. The purpose of stratification in this case is to minimize distortions due to different assessment levels, which can vary by property type, value range, geographic area, and other factors. If stratification creates a more representative sample, equalization decisions may be based on results from individual stratum. . If the overall sample is representative of the population then equalization decisions should be based on overall sample results. A reasonable number of strata with small samples and larger margins of error can increase overall representativeness and may reduce the margin of error for the overall jurisdiction-wide sample.

The primary level of stratification should ordinarily be by major property type (e.g., residential, commercial, and vacant land). If circumstances permit, a secondary level of stratification also is recommended. When relying on the weighted mean, the secondary level of stratification (substrata) should normally be value range. Higher-value properties can sell with a different frequency than low-value properties, and appraisal levels can vary between high and low-value properties. As a result, high-value properties can be oversampled (or undersampled) and, because of their high value, can exert a disproportionate influence on the weighted mean and resulting estimated value. Value stratification reduces distortion of the weighted mean caused by over or under-representation of value strata with different levels of appraisal. To properly develop and use value strata, the oversight agency needs each individual assessment in the study universe. If detailed value information is not available, the oversight agency should work with local taxing jurisdictions to obtain sufficient information. At a minimum, a questionnaire can be used to request the total value and number of parcels in predetermined value categories or quantiles (each range contains the same amount of value).

In situations in which value stratification information is not available, or where property ratios are not significantly value-influenced, substrata can be created based on property subtype, geographic area, or other appropriate criteria. Stratification by these criteria corrects for differences in level of appraisal between substrata. In large jurisdictions, substratification by geographic areas generally is more appropriate for residential properties while sub-stratification by either geographic area or property subtypes (e.g., office, retail, and warehouse/industrial) can be appropriate for income-producing properties.

When relying on the median and when sample sizes permit, it is appropriate to stratify within property class by whichever property characteristic is most likely to capture differences in appraisal levels. This characteristic can be geographic area, property subtype, or value range. Substratification by value range helps capture value-related differences in assessment levels, which (unlike the weighted mean) are not reflected in the median.

3.6 Statistical Analysis

When ratio studies are conducted for equalization purposes, confidence intervals and statistical tests can be used to determine whether it should be concluded at a given confidence level that appraisal performance or level requirements in a stratum (or jurisdiction) being tested meets or falls outside of mandated standards. Statistical tests can be used for comparisons among strata, provided the sample sizes are large enough that meaningful differences are not missed (see section 6, "Ratio Study Statistics and Analyses").

3.7 Evaluation and Use of Results

Lack of independence between locally determined values and sale prices (sales chasing) or independent appraisals can subvert attempts to improve equity (direct equalization) and result in incorrect distribution of funds between states or provinces and local jurisdictions (indirect equalization). To guard against these possibilities, oversight agencies should ensure that sold and unsold properties are appraised similarly. Also, appraisals used as substitutes for sales must reflect market value, and the oversight agency must take remedial measures in instances in which they do not (see section 9, "Estimating Performance of Unsold Properties", and Appendix E, "Sales Chasing Detection Techniques").

4. Timing and Sample Selection

Ratio studies made by oversight and equalization agencies should be conducted at least annually. Where possible, ratio studies conducted by equalization agencies should use final values established at the local level, inclusive of changes made by local appeal boards up to that time. However, if local appraisers or boards "chase sales" or set values in a manner that is dissimilar to the way other property values have been set, the sample may not be sufficiently representative and should not be used without careful investigation and necessary adjustment.

4.1 Date of Analysis

The date of analysis is a past year when appraisals from past years are being evaluated to avoid the effects of sales chasing. When prior-year assessments are used to gauge current performance (to avoid sales chasing), the results should be adjusted for any reappraisal activity or assessment changes that occurred in the population (net of new construction) between the prior and current years. Sale prices also should be adjusted to the assessment date to account for time trending.

If the purpose of the study is equalization, using sales after the appraisal date (adjusted for time as necessary) helps ensure the independence of appraisals and sales prices. A sales period spanning the appraisal date can be used if measures are taken to ensure the independence of appraisals made after the earlier sales. This approach has the advantage of reducing the importance of time adjustments.

4.2 Representativeness of Samples

The design and conduct of ratio studies requires decisions that maximize representativeness within the constraints of available resources.

In many kinds of statistical studies, samples are selected randomly from the population and from within each stratum to maximize representativeness. Ratio study samples based on independent appraisals can be randomly selected. Because sales are convenience samples and do not repre-

sent true random samples, care must be taken to maximize the representativeness of sales samples.

A ratio study sample is considered sufficiently representative for direct equalization and mass appraisal performance evaluation when the distribution of ratios of properties in the sample reflects the distribution of ratios of properties in the population. A ratio study is considered sufficiently representative for indirect equalization when the distribution of ratios of dollars of property value in the samples reflects the distribution of ratios of dollars of property value in the population.

Sales from areas or substrata in which the number of sales is disproportionately large can distort ratio study results by weighting level and uniformity indicators toward whatever conditions exist in the overrepresented area. To alleviate this problem and create better representativeness, large samples can be further stratified by

- randomly selecting sales to be removed
- isolating the overrepresented groups into substrata
- redefining the time period for the overrepresented groups
- weighting the data

4.2.1 Maximizing Representativeness with Independent Appraisals

For independent appraisal-based ratio studies, the application of random sampling techniques can help ensure that appraisal procedures used for the sampled properties are similar to the corresponding population. A well-designed random sampling plan also can help ensure that properties selected for independent appraisals are not concentrated in areas of high sales activity or associated with property types with higher turnover rates in the market.

The USPAP competency rule requires appraisers to have both knowledge and experience required to perform specific appraisals. Independent single-property appraisals must be developed in compliance with Standard 1, must be reported in compliance with Standard 2, and must be reviewed in compliance with Standard 3 of USPAP. Most importantly, care must be taken to ensure that independent appraisals reflect market value as of the appraisal date. Independent mass appraisals must be developed and reported in compliance with Standard 6 of *USPAP.*

4.2.2 Very High-Value Properties

Assessment jurisdictions often contain unique, very-high-value properties (for example, properties that constitute more than 10 percent of the value of a property class) that cannot reasonably be combined with other properties for purposes of the ratio study. For indirect equalization, high-value parcels are especially important to maximize representativeness. For instance, consider a population consisting of 1,000 properties, 999 of which range in value from $20,000 to $750,000, and one that is valued at $1 billion (e.g., a power plant). If the intended use of the ratio study is to estimate the general level and uniformity of appraisal in regard to the typical property, the stratified population of parcels need not include the $1 billion property. If the intended use of the ratio study is to estimate the total market value in the jurisdiction, however, exclusion of the power plant can distort the study.

Very high-value properties should not be ignored or assumed to be appraised at the legal or general level for indirect equalization studies. An equalization agency should place very high-value property in a separate stratum to prevent distortion of the overall weighted mean or total estimated value. To value the property for ratio study purposes the equalization agency should use a recent properly adjusted sales price if available. If a recent sale is not available the agency should conduct an appraisal of such properties (this is the preferred option) or audit and adjust as necessary the values developed by the local jurisdiction.

5. Acquisition and Analysis of Sales Data

The highest level of independence and objectivity in an equalization or performance monitoring ratio study requires independent sales validation. If resources are not available to achieve this level of sophistication, then a comprehensive audit program should be developed to review the validation and screening work of the local jurisdiction (see Appendix A, "Sales validation Guidelines").

5.1 Sale Adjustments for Statutorily Imposed Value Constraints

Most states and provinces require appraisal of certain classes of property using statutorily prescribed methods of appraisal that are intended to produce a constrained value that is less than market value. The most common class of property to which such constraints apply is farmland and rangeland that qualifies for agricultural-use valuation. However, constraints may also apply to subsidized housing, mineral land, and other classes. When the purpose of the ratio study is direct or indirect equalization, sales prices must be adjusted as if the selling parcel were subject to the same constraints. If this cannot be done, independent appraisals, which employ the required constraints, should be used to determine the level of appraisal in a manner consistent with the statutory constraints. For example, assume that statutory restrictions require a fixed or artificially high capitalization rate to be used in determining farmland value. If unadjusted farmland sales were to be used, the resulting ratios would be low and could lead to improper equalization decisions. Instead, independent appraisals using the required capitalization rate should be done. These appraisals would lead to ratios that would correctly allow for the statutory constraint.

Use of constrained values produces ratio study results that do not provide information on the true level of appraisal in relation to market value. Use of constrained values is appropriate for equalization. However, when the purpose of the ratio study is to determine the overall quality of assessments or the amount of benefit being awarded by a given statutory constraint on appraised value, the unadjusted sale price or independent market value appraisal must be used. Often, procedural audits can be used as adjuncts to more traditional ratio studies. These audits can be particularly effective when the purpose is to judge overall appraisal quality and when precise, quantitative statistical measures are not obtainable.

5.2 Outlier Ratios

Oversight agencies should consider the extent of sales verification when developing guidelines for trimming limits. In practice, this means that if an oversight agency derives sales data from assessing jurisdictions that may have already removed outliers from the sample, additional trimming may not be necessary (see Appendix B, "Outlier Trimming Guidelines").

5.2.1 Value Outliers

When the weighted mean is used for indirect equalization, a method that identifies high-value *influential* sales is recommended. Since an influential sale may not have an unusually low or high ratio relative to the rest of the sample, the definition of distortion is based on the principle that the point estimate calculated from the sample should not be statistically significantly different whether the suspect observation is in the sample or not.

To test for an influential sale, one approach is to remove it from the sample and compute the weighted mean and associated confidence interval. If the weighted mean of the sample lies outside the confidence interval calculated without the influential sale, then the sale is truly influential and is a candidate for further scrutiny, isolation in a separate stratum, or possible trimming.

This procedure is intended to test the presence of individual influential sales and is not intended to be used successively after deletion of a sale, but can be applied to more than one apparent outlier at a time by leaving all other sales in the comparison group. Note, however, that the presence of multiple influential sales can indicate the start of a trend. Presence of influential sales is often associated with high price-related differential (PRD) values, which could be the result of systematic regressivity or progressivity. In contrast, the coefficient of price-related bias (PRB) is much less influenced by value outliers and should not be relied on to help identify these outliers.

5.2.2 Outlier Trimming

Statistics calculated from trimmed distributions, obviously, cannot be compared to those from untrimmed distributions or interpreted in the same way. This is especially problematic when making interjurisdictional comparisons. For this reason, oversight agencies may wish to promulgate uniform trimming procedures, based on sound statistical principles. Regardless of the chosen procedure, trimming of outliers must not occur more than once for any sample.

6. Ratio Study Statistics and Analyses

Ratio study measures covered in Part 1 are equally applicable to equalization ratio studies based upon sales or independent appraisals. See section 5.3, "Measures of Appraisal Level," and section 5.4, "Measures of Variability," in Part 1.

6.1 Measures of Appraisal Level

The median is the generally preferred measure of central tendency for direct equalization, monitoring of appraisal performance, or evaluation of the need for a reappraisal. The mean should not be used for indirect equalization if there are measurable differences in appraisal level of high- and low-value properties (see table 2-2). In data commonly containing outliers, the trimmed mean can be substituted for the mean (Gloudemans 1999, chapter 3). See Appendix B for outlier-trimming procedures. Because of its dollar-weighting feature, the weighted mean is most appropriately used in indirect equalization, when estimating the total dollar value of the jurisdiction. When relying on the measure, however, outliers should be carefully reviewed (and deleted if appropriate), since they can strongly affect the weighted mean, particularly when they occur for high-value properties and in small samples.

6.2 Overall Ratio for Combined Strata

For purposes of oversight monitoring of overall appraisal performance and direct equalization, the generally preferred approach is to weight the median ratio of each stratum on the basis of the relative number of properties in the stratum. For indirect equalization, the weight assigned to a measure of central tendency of a stratum should be proportional to the share of that stratum's total estimated market value. Because the number of parcels bears only a loose relationship to dollar value, weighting by number of parcels is not appropriate for indirect equalization.

For indirect equalization, the preferred method of calculating the overall market value of a jurisdiction is as follows:

1. Divide the total appraised (or assessed) value of each stratum by the stratum sample's measure of

Table 2-1. Illustration of Combining Measures of Central Tendency (Example shown is for indirect equalization)

Data for properties in the study					
Stratum (1)	Total sample assessed value (2)	Total sample sale price (3)	Weighted mean (2)/(3) (4)	Total assessed value of stratum (5)	Indicated market value of stratum (6)
Residential	$3,000,000	$4,000,000	0.750	$600,000,000	$800,000,000
All other	950,000	1,000,000	0.950	400,000,000	421,000,000
Total				**$1,000,000,000**	**$1,221,000,000**

Overall ratio = $1,000,000,000/$1,221,000,000 = 0.819

Table 2-2. Preferred Estimators

	Indirect Equalization	Direct Equalization	Monitoring Performance
Median	—	X	X
Mean	—	—	—
Weighted Mean	X*	—	—

* Caution should be exercised when the sample contains value outliers or indicates value bias based on the PRD

central tendency (see section 6.3, "Contrasting Measures of Appraisal Level," in this part) to obtain an estimate of the total market value of taxable property in the stratum.

2. Sum the estimates of total stratum market value to obtain an estimate of the total market value of taxable property in the jurisdiction or class of property.
3. To obtain an overall weighted level of assessment (or ratio), divide the total appraised (or assessed) value of the jurisdiction or class of property by the estimated total market value (table 2-1 contains a simplified example).

6.3 Contrasting Measures of Appraisal Level

Table 2-2 summarizes the preferred measures of central tendency for the three broad purposes of indirect equalization, direct equalization, and the general monitoring of appraisal performance.

For indirect equalization, the preferred measure is the weighted mean (the measure used in table 2-1), because it gives equal weight to each dollar. This helps achieve an accurate estimate of total dollar value, the goal of indirect equalization. However, there are implicit difficulties in obtaining sales samples that are representative of all significant groups of properties with different ratios. The weighted mean can be disproportionately influenced by high-value properties, particularly in a small sales sample. A disproportionate influence of high-value properties can be reduced through value stratification within the property class. Such value stratification helps capture value-related ratio differences, as well as improve representativeness, regardless of which measure of central tendency is used. If there are provable value-related ratio differences within strata, the weighted mean must be used since the median is incapable of capturing value-related differences. In cases in which value stratification is not practicable, equalization agencies may stratify by some proxy for value, such as neighborhood or property sub-class. If results appear distorted by non-representative high-value sales, outlier identification methods described in Appendix B should be employed.

While not conceptually preferred, the median can be used to prevent the disproportionate influence of high-value properties with outlier ratios. To be clear, although the median is not the conceptually appropriate measure, it nonetheless has the desirable property of smaller sampling variance and, in cases in which assessment regressivity/progressivity has not been found to be a significant concern, can provide an acceptable substitute for the weighted mean.

If samples are known to be reasonably representative through outlier trimming, the use of stratification or selection of random appraisals, the weighted mean would be the (only) correct measure. In cases which sample representativeness is a concern due to small samples or outliers, the median can reasonably be used as long as the equalization agency has checked to ensure that there are no significant price-related biases within the strata used in the study.

6.4 Measures of Variability

Measures of dispersion or variability relate to the uniformity of the ratios and should be calculated for each stratum in the study. In general, the smaller the measure, the better the uniformity, but extremely low measures can signal one of the following:

acceptable causes

- extremely homogeneous properties
- very stable markets

unacceptable causes

- lack of quality control
- calculation errors
- poor sample representativeness
- sales chasing

Note that as market activity changes or as the complexity of properties increases, the measures of variability usually increase, even though appraisal procedures may be equally valid.

6.5 Measures of Reliability

It is good practice to calculate measures of reliability whenever the results of a ratio study are used for equalization. Measures of reliability will indicate whether there is a desired degree of confidence that a given level of appraisal has not been achieved. The most commonly used measure of ratio study sample reliability is the confidence interval. This interval brackets the unknown population parameter for any sample statistic with a specified (chosen) degree of confidence. When the interval includes a desired assessment level or a performance standard range around the desired level (see section 11 and Table 2-4), equalization adjustments are not warranted. Similarly, when the interval includes a maximum allowable COD (see Table 2-3), reappraisal or other action to correct poor uniformity is not warranted.

6.6 Vertical Inequities

The measures of variability discussed in section 6.4 relate to "horizontal," or random, dispersion among the ratios in a stratum, regardless of the value of individual parcels. Another form of inequity can be systematic differences in the appraisal of low- and high-value properties, termed "vertical" inequities. When low-value properties are appraised at greater percentages of market value than high-value properties, assessment *regressivity* is indicated. When low-value properties are appraised at smaller percentages of market value than high-value properties, assessment *progressivity* is the result. Appraisals made for tax purposes should be neither regressive nor progressive.

An index statistic for measuring vertical equity is the PRD, which is calculated by dividing the mean ratio by the weighted mean ratio. This statistic should be close to 1.00. Measures considerably above 1.00 tend to indicate assessment regressivity; measures below 1.00 suggest assessment progressivity. When samples are small or the weighted mean is heavily influenced by several extreme sales prices, however, the PRD may not be a sufficiently reliable measure of vertical inequities. A scatter plot of ratios versus appraised values or sale prices is a useful diagnostic tool. A downward (or upward) trend to the data indicates systematic regressivity (or progressivity). If not sufficiently representative, extreme sales prices can be excluded in calculation of the PRD. Similarly, when samples are very large, the PRD may be too insensitive to show small pockets in which there is significant vertical inequity. Standards for evaluating the PRD are given in section 9.2.7 in this part. In addition, more powerful statistical tests for vertical inequities are available and should be employed to determine the significance of the indication provided by the PRD (see section 5.7 in this part and Twark, Everly and Downing [1989]).

The coefficient of price-related bias (PRB) provides a more meaningful measure of price-related bias. It is obtained by regressing percentage difference from the median ratio on percentage differences in value (see Appendix D). A PRB of –.045 indicates, for example, that assessment ratios fall by 4.5% when values double and increase by 4.5% when values are halved. Like all regression coefficients, the statistical reliability of the PRB can be gauged by noting its *t*-value and related significance level. Like all regression coefficients, the statistical reliability of the PRB can be gauged by noting its *t*-value and related significance level, and by computing confidence intervals. In table 1-4 the PRB is 0.035 and is not statistically significant.

Unacceptable vertical inequities should be addressed through reappraisal or other corrective actions. In some cases, additional stratification can help isolate the problem. Measures of level computed for value strata should not be compared as a way of determining vertical inequity because of a boundary effect that is most pronounced in the highest and lowest strata (Schultz 1996).

6.7 Tests of Hypotheses

An appropriate test should be used whenever the purpose of a ratio study is implicitly or explicitly to test a hypothesis. A hypothesis is essentially a tentative answer to a question, such as, Are residential and commercial properties appraised at equal percentages of market value? A test is a statistical means of deciding whether the answer "yes" to such a question can be rejected at a given level of confidence. In this case, if the test leads to the conclusion that residential and commercial properties are not appraised at equal percentages of market value, some sort of corrective action on the part of assessing officials is clearly indicated. Appropriate tests are listed in table 1-2 and discussed in Gloudemans (1999), *Property Appraisal and Assessment Administration* (IAAO 1990), and *Improving Real Property Assessment* (IAAO 1978, 137–54)

6.8 The Normal Distribution

Many conventional statistical methods assume the sample data conform to the shape of a bell curve, known as the normal (or Gaussian) distribution. Performance measures based on the mean or standard deviation can be misleading if the study sample does not meet the assumption of normality. As a first step in the analysis, the distribution of sample ratios should be examined to reveal the shape of the data and uncover any unusual features. Although ratio study samples typically do not conform to the normal distribution, graphical techniques and numerical tests can be used to explore the data thoroughly. Traditional choices are the binomial, chi-square, and Lilliefors tests. Newer and more powerful procedures are the Shapiro-Wilk W, the D'Agostino-Pearson K^2, and the Anderson-Darling A^2 tests (D'Agostino and Stephens 1986).

7. Sample Size

7.1 Importance of Sample Size

If it is desirable to create narrow, uniform margins of error in jurisdictions without sufficient sales, independent appraisals may be added.

7.2 Adequacy of a Given Sample Size

The adequacy of a given sample size can be evaluated by computing measures of reliability. If the confidence interval is sufficiently narrow, the sample is large enough. If the confidence interval is too wide, the oversight authority must either accept less precision or enlarge the sample, if possible.

7.3 Required Sample Size

Because designing for sampling objectives and planning for resource allocation in ratio studies must occur well before final ratio data sets are available and ratio study statistics are calculated, decisions on critical input variables must be made well before their true values are known. For example, the sample size formulas (Cochran 1977; Sherrill and Whorton 1991; and Gloudemans 1999) used to plan for specific margins of error and/or specific levels of confidence theoretically require, as input variables, the actual variation within the final ratio data sets (usually measured by the coefficient of variation). However, the actual variation in final ratio data sets is not known during the design and planning stage and, thus, the desired sample size must be projected based upon the best information available at the time of design and planning. This projection results in unavoidable forecast error and can result in the production of a higher or lower sample size than needed to reach sampling objectives. This issue is an accepted part of conducting ratio studies when it is necessary and important to attain a predetermined or uniform degree of precision. In other cases, it may be acceptable to use all available qualified sales. When predetermination of sample size is important, the variation in the ratio data set from the most recent time period available can provide a reasonable estimate for the time period under analysis.

7.4 Remedies for Inadequate Samples

In addition to recommendations discussed in section 6.4, "Remedies for Inadequate Samples," in Part 1, supplemental independent appraisals can be combined with sales (also see section 8.7, "Combining of Sales and Appraisals," in this part).

7.5 History of Sales Reporting

Oversight agencies that develop ratio studies from sales provided by local assessment jurisdictions should track the number of transfers obtained in different study periods. Quality control techniques can be used to measure market activity or to determine whether an assessor is fully reporting sales information.

8. Appraisal Ratio Studies

Appraisal ratio studies are conducted by using appraised values for a random sample of parcels. Such sampling plans can be designed to be more representative of the population in terms of property characteristics than a sales sample of the same size but require adequately trained appraisers and are comparatively expensive. Few ratio studies are based solely on independently conducted appraisals, which then are compared to values determined by assessing officials. Many equalization or oversight agencies, however, do ratio studies in which both sales and appraisals are combined. Furthermore, it may be possible to develop sales driven models for use in appraising a particular population of properties (excluding those not adequately represented in the underlying model) or randomly selected parcels for ratio study purposes (see *Standard on Automated Valuation Models*, [IAAO 2003]). Estimates of value developed for use in appraisal ratio studies are considered appraisal services and must comply with *USPAP* Standards 1 and 2 or Standard 6.

8.1 Rationale

Independent appraisals can be used as indicators of market value. Independent appraisals are appraisals performed by appraisers who are not employees of the appraisal agency that is the subject of the study. Such appraisal ratio studies are particularly useful for property classes with limited sale data, such as commercial and industrial real property and personal property (see *Property Appraisal and Assessment Administration* IAAO 1990, Appendix 1-1] and Gloudemans [1999, chapter 6]). In addition, appraisal ratio studies can be used for agricultural or other properties not appraised on an ad valorem basis. In this case, the appraisals should reflect the use value or other statutory basis on which the properties are appraised.

8.2 Advantages and Disadvantages

Appraisal ratio studies have both advantages and disadvantages. The advantages of appraisal ratio studies are

- the ability to sample from areas or property types with insufficient sales information
- a high degree of control in sample size that enables the analyst to treat jurisdictions equally, regardless of the availability of market information
- the avoidance of nonrepresentativeness stemming from the use of sales samples that may not represent the property population.
- the size of the sample can be specified and
- the initial sample can be randomly drawn, thus helping to maximize representativeness.

If objectivity can be maintained, the appraisal ratio study avoids potential distortions due to systematic differences

between appraisals of sampled and unsampled properties. In addition, independent appraisals can be used to test for systematic differences between appraisals of sold and unsold properties.

A disadvantage of appraisal ratio studies is the extra time and cost involved with the independent appraisal process. The subject and any comparables should be physically inspected and the appraisals documented according to appropriate standards. Applicable USPAP guidelines should be followed. Independent single-property appraisals should be developed in compliance with *Standard 1*, should be reported in compliance with *Standard 2*, and should be reviewed in compliance with *Standard 3* of USPAP. Independent appraisals done with a mass appraisal model should be developed and reported in compliance with *Standard 6* of USPAP. Another disadvantage is that appraisals are an opinion of value. Accordingly, they should be documented and tested against the market. However, this becomes difficult when sales data are scarce. To reduce this disadvantage, appraisal ratio study analysts should ensure that appraisals are carefully reviewed and allow local appraisers to submit appraisal information that may affect the value conclusion (see *Standard on Oversight Agency Responsibilities* [IAAO 2010]). Where adequate sales are available, independent appraisals should be checked for consistency with sales.

8.3 Sample Selection and Resource Requirements

Sample selection and resource planning in appraisal ratio studies require knowledge of statistical sampling, estimation principles, and available resources. Judgment must be used, because the determination of an adequate sample can require more information than is available during the design and planning phase, such as the actual variation within the final ratio data sets (see section 6.2, "Adequacy of a Given Sample Size," in Part 1). Moreover, the cost of the study increases with the size of the sample. Therefore, the value of more reliable information must be balanced against the costs of obtaining that information.

In determining the size of the sample for each stratum, the following should be taken into consideration:

1. the required precision (typically measured by the margin of error) of the estimate of the appraisal level, for example, ±0.05
2. the required confidence level, for example, 95 percent
3. the amount of dispersion expected in the final ratio data set
4. the wastage associated with properties that cannot be efficiently appraised or appraisals that cannot be used for one reason or another (see Gloudemans [1999, chapter 6] for sample size formulas and required input variables; also see Sherrill and Whorton [1991]).

Once the desired size of an appraisal sample has been determined, the individual properties that will constitute the sample should be selected using a statistically valid sampling plan. Stratified random sampling is preferred.

If value stratification is used, sample properties selected from value groups during resource planning can shift into other value groups before completion of the study, thus reducing the ultimate representativeness of the sample. Some appraisal parcels may need to be removed from the sample when anomalous conditions are discovered such as environmental contamination (sufficiently reliable valuations may be prohibitively difficult or resource intensive) or when the independent appraiser is not allowed access to the property. Any sample parcels that are voided or that shift from a stratum because of value changes should be replaced if possible.

Appraisal ratio studies, as with sales ratio studies, require informed, reasoned judgment to maximize sample representativeness and statistical reliability.

8.4 Data Requirements and Appraisal Techniques

The appraisal techniques selected for an appraisal ratio study should be consistent with accepted appraisal principles and practices. The appraisals should reflect the appraisal date in question and should be well documented. Statistical software should be used as much as possible to expand analytical capabilities and perform calculations.

The appraisals used in appraisal ratio studies can be based on CAMA and automated valuation model (AVM) techniques (see *Standard on Automated Valuation Models*, [IAAO 2003]). The models used must be developed independently from those used for assessment purposes. Adequate market data and property characteristic data are required to develop reliable and defensible model estimates. If available, sales from a later period can be used to expand sample size. However, as in sales-based ratio studies, sales derived from primary assessing jurisdictions should be reviewed to ensure accuracy and validity. CAMA and AVM models have the advantage of reducing costs, permitting the use of larger, more representative samples. CAMA and AVM models developed for equalization must focus on the adequacy of overall, not individual, value or level of assessment estimates.

Because the purpose of the appraisal is to make an *independent* value estimate, not audit the assessor's work, the appraisals should be made without knowledge of the assessor's value. Appraisers should *not* be supplied with copies of the assessor's appraisal work sheets or model information. Supervisors should spot-check and review the work of staff appraisers to ensure that the required independence is maintained. When the purpose of the ratio study is equal-

ization or performance measurement, rather than internal quality assurance, the appraisals should not be revealed to the assessor until the assessor's values are final.

8.5 Appraisal Chasing

Appraisal chasing can take two forms, either of which reduces or destroys the validity of the ratio study. The first occurs when an independent appraiser knows the local appraised value and either consciously or unconsciously biases the independent appraised value towards the local appraised value. Independent appraisers should not have access to the local appraiser's values or appraisal work papers prior to completing their appraisals. Also, independent appraisals should be reviewed and tested against the market.

The second form of appraisal chasing occurs when the local appraisal jurisdiction knows which properties are in the ratio study appraisal sample and adjusts local appraised values on some or all of these properties to achieve better ratios without making similar adjustments to unsampled properties. This form of appraisal chasing is similar to sales chasing and has similar consequences (see Appendix E, "Sales Chasing Detection Techniques"). Ratio study analysts should guard against this form of appraisal chasing by withholding the release of sample information until the local appraisal office's values are final. If this form of appraisal chasing occurs, the oversight agency can use local values prior to adjustment to provide a more accurate representation of the population ratios.

8.6 Reviewing of Appraisals

Appraisal supervisors should review appraisal models or individual single-property appraisals to ensure that USPAP and the agency's standards are met. It also is good practice to include some recently sold properties in the sample being appraised as a check on the validity of the methods being applied. In addition, the assessor must be afforded an opportunity to review the appraisals along with supporting documentation and to submit information supporting different value conclusions. If different value conclusions or factual information would materially affect the outcome of the study, a procedure for resolving conflicts, for example, by an independent review body, should be established.

8.7 Combining of Sales and Appraisals

Appraisals can be combined with valid sales in a ratio study. Using available sales adds objectivity to the study and reduces the required number of appraisals. On the other hand, combining sales and appraisals mixes two market indicators. If sales and appraisals are combined, an analysis should be performed to test the consistency of measures of central tendency derived from the sales ratios compared to the same measures derived from the appraisal ratios. A Mann-Whitney test comparing values per unit or comparing ratios based on sales with those based on appraisals is appropriate for this purpose. Significant differences can result from several of the following conditions:

1. Sales have been chased.
2. Sales and appraisals came from different geographic areas with different markets and different levels of appraisal (maximize representativeness by stratifying).
3. Sales and appraisals have different property characteristics that cause different levels of appraisal.
4. All or some of the sales are invalid.
5. Outlier ratios are causing sale/appraisal ratio differences.
6. All or some of the appraisals are inaccurate.

If none of the first five conditions listed above apply, the appraisals should be tested against the market and revised as necessary (see Wooten, 2003).

Variability measures computed on sales used in the sample should not be expected to be similar to variability measures computed on appraisals. Sales ratios reflect the vagaries of the marketplace. Appraisal ratios, on the other hand, come from comparing the results of one appraisal model (the oversight agency's) to the results of another (the assessing office's). If both parties use mass appraisal procedures, differences in appraisals between the two models should be less than when compared with sales; thus, variability measures based on appraisal ratios can be expected to be lower than those based on sales ratios as long as they represent properties with similar characteristics and similar degrees of appraisal difficulty.

8.8 Average Unit Value Comparisons

In addition to a traditional ratio study, "expert" appraisals can take the form of average unit values and be compared against the assessor's average unit value for the same parcels. In this technique, parcels are stratified into homogeneous groups, as they would be for appraisal purposes. Appropriate units of comparison are identified for each group, and average unit values are determined through an analysis of available sales, cost, and income data. The assessor's average unit values for the same strata are then calculated and the two averages are compared. Average unit value comparisons is well-rooted in mass appraisal theory and offers an alternative to the time and expense associated with the selection and appraisal of individual parcels.

9. Estimating Performance for Unsold Properties

The objective of a ratio study is to determine appraisal performance for the population of properties. As long as sold and unsold parcels are appraised in the same man-

ner and the data describing them are coded consistently, statistics calculated in a sales ratio study can be used to infer appraisal performance for unsold parcels. However, if parcels that sell are selectively reappraised or recoded, based on their sale prices or some other criterion (such as listing price) and if such parcels are in the ratio study, sales ratio study uniformity inferences will not be accurate (appraisals will appear more uniform than they are). In this situation, measures of appraisal level will also be unsupportable unless similar unsold parcels were appraised by a model that produces the same overall percentage of market value (appraisal level) as the parcels that sold.

Oversight agencies must ensure that sold and unsold parcels are appraised at the same level. Several techniques are available for determining whether assessors are selectively appraising sold parcels (see Appendix E, "Sales Chasing Detection Techniques," or *Property Appraisal and Assessment Administration* [IAAO 1990, Appendix 20-2] and Gloudemans [1999, chapter 6] for a more detailed discussion).

If unsold properties within a properly specified group are not appraised consistently with sold properties within the same group and according to applicable guidelines, unadjusted sales ratio results cannot be used. The oversight agency will have to adjust calculated results or conduct an alternative study.

Once it is determined that *sales chasing* probably has occurred and probably is reducing the validity of ratio study statistical measures of level or uniformity, it is necessary to redo the ratio study to establish valid measures before any other recommendations, such as reappraisal or equalization action, can be made. If feasible, probably the best approach is to select a sample period that effectively precludes sales chasing. For example, when the lien or appraisal date is January 1, many jurisdictions use sales occurring before that date to make valuation decisions. To test the resulting valuations, it would be appropriate to use sales occurring after January 1 (or after the last date for changing assessments for the year in question), provided such data are time-adjusted (when necessary) backward to match the appraisal date. As a slight variation on this principle, earlier sales could be used, except when sales chasing is detected, in which case it is appropriate to switch to a later, post-appraisal-date sales period.

Legal or practical constraints can prevent use of optimal sample periods in many cases. In these situations, it is important to determine the exact cause of the sales chasing. For example, if a large proportion of selling properties are appealed and if appeal boards typically adjust to sale price, the result is the same as sales chasing by the assessor. One solution is to use appraised values prior to the action of the appeal board, provided that the appeal adjustment is not merely the result of an atypical clerical or other error. Another approach is to use current sales prices and prior-year values, adjusted for reappraisal activity or assessment value changes in the population. The percentage increase or decrease in the prior-year's appraised values for the population (net of new construction) should be used to adjust the prior-year's values for the sample (Gloudemans 1999).

10. Presentation of Findings, Documentation, and Training

Oversight agencies should produce ratio studies in a manner that is transparent in all stages to all stakeholders.

(See section 8, Part 1.)

11. Ratio Study Standards

Each state and province should have ratio study performance standards. These standards, summarized in table 2-3, are suggested for jurisdictions in which current market value is the legal basis for assessment. In general, when state and provincial standards are not met, reappraisal or other corrective measures should be taken or equalization procedures can be imposed. When an oversight agency orders such actions, the burden of proof should be on the agency to show that the standards have not been achieved.

All standards recommended in this section are predicated on the assumption that all practicable steps necessary to maximize representativeness and validity in the underlying ratio studies have been conducted.

11.1 Level of Appraisal

The calculated measures of central tendency are point estimates and provide only an indication, not proof, of whether the level meets the appropriate goal. Confidence intervals and statistical tests should be used to determine whether the appraisal level differs from the established goal in a particular instance.

A decision by an oversight agency to take some action (direct equalization, indirect equalization, reappraisal) can have profound consequences for taxpayers, taxing jurisdictions, and other affected parties. This decision should not be made without a high degree of certainty that the action is warranted. Conversely, a decision not to take action when action is needed can have equally profound consequences. Oversight agencies should weigh all the options and consider the issues discussed below when developing or revising a level-of-appraisal standard, and when developing equalization or other appraisal oversight procedures.

11.1.1 Purpose of Level-of-Appraisal Standard

Jurisdictions that follow the IAAO recommendation of annual reassessments and comply with USPAP standards should be able to develop mass appraisal models that maintain an overall ratio level of 100 percent (or very near thereto). The local assessor may be required to observe reap-

Table 2-3. Ratio study uniformity standards indicating acceptable general quality*

General Property Class	Jurisdiction Size/Profile/Market Activity	COD Range
Residential improved (single family dwellings, condominiums, manuf. housing, 2-4 family units)	Very large jurisdictions/densely populated/newer properties/active markets	5.0 to 10.0
	Large to mid-sized jurisdictions/older & newer properties/less active markets	5.0 to 15.0
	Rural or small jurisdictions/older properties/depressed market areas	5.0 to 20.0
Income-producing properties (commercial, industrial, apartments,)	Very large jurisdictions/densely populated/newer properties/active markets	5.0 to 15.0
	Large to mid-sized jurisdictions/older & newer properties/less active markets	5.0 to 20.0
	Rural or small jurisdictions/older properties/depressed market areas	5.0 to 25.0
Residential vacant land	Very large jurisdictions/rapid development/active markets	5.0 to 15.0
	Large to mid-sized jurisdictions/slower development/less active markets	5.0 to 20.0
	Rural or small jurisdictions/little development/depressed markets	5.0 to 25.0
Other (non-agricultural) vacant land	Very large jurisdictions/rapid development/active markets	5.0 to 20.0
	Large to mid-sized jurisdictions/slower development/less active markets	5.0 to 25.0
	Rural or small jurisdictions/little development/depressed markets	5.0 to 30.0

These types of property are provided for general guidance only and may not represent jurisdictional requirements.
**The COD performance recommendations are based upon representative and adequate sample sizes, with outliers trimmed and a 95% level of confidence.*

**Appraisal level recommendation for each type of property shown should be between 0.90 and 1.10.*

**PRD's for each type of property should be between 0.98 and 1.03 to demonstrate vertical equity. However, PRD standards are not absolute and may be less meaningful when samples are small or when wide variation in prices exist. In such cases, statistical tests of vertical equity hypotheses should be substituted.*

**Alternatively, assessing officials can rely on the PRB, which is less sensitive to atypical prices and ratios. PRB coefficients should generally fall between –.05 and .05. PRBs that are statistically significant and less than –0.10 or greater than 0.10 indicate unacceptable vertical inequities.*

**CODs lower than 5.0 may indicate sales chasing or non-representative samples.*

praisal cycles defined by a legal authority or public policy that can extend beyond one year. During extended cycles inflation or deflation can influence the overall ratio.

The purpose of a performance standard that allows reasonable variation from 100 percent of market value is to recognize uncontrollable sampling error and the limiting conditions that may constrain the degree of accuracy that is possible and cost-effective within an assessment jurisdiction. Further, the effect of performance standards on local assessors must be considered in light of expectations of public policy and resources available. For these reasons, states or oversight agencies may adopt performance standards for appraisal level that allow some variance from the 100 percent goal of market value.

11.1.2 Recommended Appraisal Level Standards for Direct and Indirect Equalization

The performance standard adopted by an oversight agency should be a range around the legally required level of appraisal in a property class or an overall jurisdiction. This range should be 90 to 110 percent of the legally required level of appraisal for direct equalization or reappraisal, or 95 to 105 percent for indirect equalization. A smaller maximum range for indirect equalization is justified because taxpayers are not as comprehensively affected. Oversight agencies should adopt performance standards that are as close to the legally required level as can be justified given the local situation and taking into account the factors discussed herein.

In addition to the above appraisal level standards, each class of property for which appraisal level standards have been defined must be within 5 percent of the overall level of appraisal of the jurisdiction (see section 11.2.3, "Uniformity among Strata," in this part). Both criteria must be met.

11.1.3 Confidence Intervals in Conjunction with Performance Standards

By themselves, the calculated measures of central tendency provide only an indication, not proof, of whether the appraisal level meets the performance standard. So, the purpose of confidence intervals and similar statistical tests is to determine whether the appraisal level differs from the established performance standard in a particular instance. A conclusion of noncompliance requires a high degree of confidence, thus a 90 percent (two-tailed) or 95 percent (one-tailed) confidence interval should be used, except for small or highly variable samples as described in section 11.1.5, "Adjustment for High Variability and Small Samples," in this part.

11.1.4 Decision Model

The oversight agency should determine whether the estimate is outside the acceptable range around the legal level of appraisal with a specified degree of statistical significance. The chosen interval should overlap the performance standard range of 90 percent to 110 percent

in the case of direct equalization or measuring appraisal performance. For indirect equalization the chosen interval should overlap the performance standard range of 95 percent to 105 percent. If the confidence interval does not overlap any portion of the appropriate range, equalization is performed or reappraisal orders are issued. See table 2-4 for an example of the direct equalization or appraisal performance decision making process.

11.1.5 Adjustments for High Variability and Small Samples

High variability, small sample size, or a combination of these factors often causes confidence intervals to become quite wide. Wide confidence intervals reflect the imprecision of the underlying statistic and can decrease the usefulness of performance measures. Also, wide confidence intervals can cause an inequitable situation in which jurisdictions with small samples and large variability are never subject to equalization or reappraisal orders, while jurisdictions with larger samples and much less variability are more likely to be subject to such orders even though their appraisal performance may be arguably better.

For these reasons, oversight agencies should consider expanding sample sizes by taking steps to increase the number of sales or by making independent appraisals (see section 7.4 part 2). If the sample size cannot be increased, two options may be considered when the point estimate fails to achieve compliance but the confidence interval overlaps the range of compliance:

- If a particular point estimate does not meet the standard for the current study cycle the oversight agency may reduce the level of confidence by 5% the following year. This may be followed by an annual stepwise reduction of 5%. Such a reduction may continue to a 70 percent level of confidence if the point estimate fails to meet the compliance threshold over this period of time. Corrective action would be imposed when a given year's confidence interval fails to include the performance standard range.
- The oversight agency may examine statistical point estimates over several study cycles. A jurisdiction that fails to meet a particular point standard for 5 consecutive years has a probability of less than 5% that compliance has been achieved, even if the confidence interval overlaps the compliance threshold every year. In such cases the oversight agency would impose corrective decisions based upon the point estimate.

11.1.6 Calculating Equalization Adjustments

If noncompliance with either direct or indirect equalization standards is indicated, the appropriate point estimate (statistic) measuring appraisal level should be used to calculate adjustment factors, by dividing it into 100 percent.

11.2 Appraisal Uniformity

Assuming the existence of an adequate and sufficiently representative sample, if the uniformity of appraisal is unacceptable, reappraisal should be undertaken regardless of the level of appraisal. The oversight agency should recognize that the COD is a point estimate and cannot be accepted as proof of assessment uniformity problems without an appropriate degree of statistical confidence. Such proof can be provided by recognized statistical tests, including bootstrap confidence intervals. If the data are normally distributed, the COV and confidence intervals around this measure also can be determined. Then the COV can be mathematically converted into an equivalent COD.

11.2.1 Oversight Uniformity Standards

Oversight agencies should establish uniformity standards for local assessment jurisdictions. Any COD performance standards applied to strata within a particular jurisdiction should be related to the overall size, profile of property characteristics (type, age, condition, and obsolescence) and market activity. In general, tighter uniformity standards can be applied to larger jurisdictions with newer construction and active markets. And generally, less stringent uniformity standards should be applied to older, economically depressed or less densely developed areas with less efficient markets. Standards should also be relaxed in jurisdictions that experience economic instability due to sudden changes in supply or demand factors. In developing uniformity standards, oversight agencies should consider reasonable tolerance ranges in making compliance decisions.

11.2.2 Multi-level Uniformity Standards

The uniformity standards presented in table 2-3 are defined in terms of the COD (point estimate) measure and are

Table 2-4. Ratio Study Standards and Decision Making—Direct Equalization or Appraisal Performance Using Median 90%–110% Standard

Example demonstrating application of standard at a 95% level of confidence

Case	Point Estimate	Confidence Interval (CI) Width (95%)	CI Overlaps Performance Standard Range	Point Estimate in Performance Standard Range	Equalization Action or Reappraisal Order
1	92%	86% to 101%	yes	yes	no
2	88%	81% to 95%	yes	no	no
3	84%	79% to 88%	no	no	yes

intended to apply to ratio studies based on sales, not those based on independent appraisals in which lower CODs often are typically observed. If reliability measures are not employed, sample size will play a critical role in setting the maximum acceptable COD. In addition, in unusually homogeneous or restrictive markets or for properties subject to use-value or similar constrained value assessment, low CODs also can be anticipated. In all other cases, CODs less than 5 percent should be considered unusual and possibly indicative of nonrepresentative samples or the selective reappraisal of sold parcels. The COD standards in table 2-3 may not be applicable to property strata in unique, depressed, or rapidly changing markets. In such cases, assessment administrators may be able to develop target standards based on an analysis of past performance or results in similar markets elsewhere. Such an analysis can be based on ratio study results for the past five years or more.

11.2.3 Uniformity among Strata

Although the goal is to achieve an overall level of appraisal equal to 100 percent of the legal requirement, ensuring uniformity in appraisal levels among strata is also important. The level of appraisal of each stratum (class, neighborhood, age group, market areas, and the like) should be within 5 percent of the overall level of appraisal of the jurisdiction. For example, if the overall level of appraisal of the jurisdiction is 1.00, but the appraisal level for residential property is 0.93 and the appraisal level for commercial property is 1.06 the jurisdiction is not in compliance with this requirement. This test should be applied only to strata subject to compliance testing. The oversight agency can conclude that this standard has been met if 95 percent (two-tailed) confidence intervals about the chosen measures of central tendency for each of the stratum fall within 5 percent of the overall level of appraisal calculated for the jurisdiction. Using the above example, if the upper confidence limit for the level of residential property is 0.97 and the lower confidence limit for commercial property is 1.01, the two strata are within the acceptable range.

11.2.4 Vertical Equity

PRDs should be between 0.98 and 1.03. The reason this range is not centered on 1.00 relates to an inherent upward bias in the arithmetic mean (numerator in the PRD) that does not equally affect the weighted mean (denominator in the PRD). When samples are small, have high dispersion, or include properties with extreme values, the PRD may not provide an accurate indication of assessment regressivity or progressivity. When relying on the PRD to measure vertical equity, it is good practice to perform an appropriate statistical test for price-related biases before concluding that they exist (see table 1-2 in Part 1).

The PRB provides a measure of price-related bias that is more meaningful and less sensitive to extreme prices or ratios. As a general matter, the PRB coefficient should fall between –0.05 and 0.05. PRBs for which 95% confidence intervals fall outside of this range indicate that one can reasonably conclude that assessment levels change by more than 5% when values are halved or doubled. PRBs for which 95% confidence intervals fall outside the range of –0.10 to 0.10 indicate unacceptable vertical inequities.

As an illustration of the above, assume that the PRB is –0.115 with a standard error of 0.02 and corresponding 95% confidence interval of –0.075 to –0.155 (–0.115 ± 0.04 approximately). One can conclude with 95% confidence that assessment levels change by at least 7.5% when values double or are halved but not that assessment levels change by at least 10%. This result would not be out of compliance with the ± 0.10 standard.

11.3 Natural Disasters and Ratio Study Standards

Natural disasters such as earthquakes, floods, and hurricanes can have a substantial impact on the conduct of ratio studies and the interpretation and use of the results, and in general, they:

- increase the difficulty of accurately identifying the physical and economic characteristics of property on the dates of sale/lease and the date of appraisal
- increase the difficulty of producing sufficiently reliable appraised values (numerators)
- decrease the availability of usable sales and other market data
- increase the difficulty of identifying and obtaining such usable data
- increase the difficulty of producing sufficiently reliable independent appraisals
- increase the difficulty of accurately matching the characteristics of numerators with those of denominators

These potential problems can result from extraordinary changes in market conditions and in the physical and economic characteristics of property between the dates of sale/lease and the date of appraisal. As a result of these potential problems, a number of unreliable sample properties may need to be voided and usable sample sizes can be reduced significantly. All of these factors should be considered when ratio study standards are applied to ratio study results from areas substantially affected by natural disasters, but such consideration must not result in unwarranted relaxation of applicable standards. When faced with such situations, oversight agencies must use informed, reasoned judgment and common sense to pro-

duce a sufficiently reliable ratio study, based upon the best information available.

12. Personal Property Studies

Most personal property ratio studies performed by oversight agencies are performed for equalization purposes. Because indirect equalization in particular requires overall estimation of value, it is imperative for these ratio studies to focus on large accounts.

Horizontal equity requires similar levels of appraisal between real and personal property. Sales data for personal property are difficult to obtain and analyze because markets for personal property are generally less visible and more difficult to follow than real property markets. Therefore, performance reviews and appraisal ratio studies should be used in place of sales ratio studies to determine the quality of appraisal of personal property. The performance review does not quantify assessment conditions but can determine general assessment quality. The appraisal ratio study can be used to determine the level and uniformity of assessment for personal property.

12.1. The Performance Review

The performance review is an empirical study that evaluates the assessment method used and the ability of the jurisdiction to meet its legal requirement in the assessment of personal property. This type of study can be used to allocate tax dollars in multijurisdictional funding calculations or equalization by assuming that jurisdictions passing the performance review are assessing personal property at the general level of other classes of property analyzed with ratio studies.

12.1.1. Discovery

The jurisdiction must have the ability to discover the owners or users of taxable personal property within the jurisdiction. This is accomplished using phone books, business/occupational licenses, listings, sales tax rolls, and field reviews (see IAAO Course 500, "The Assessment of Personal Property," and *Standard on Valuation of Personal Property* [IAAO 2005] for a complete list).

12.1.2. Valuation

Personal property is valued by using acceptable schedules and methods including depreciation schedules published by nationally recognized valuation firms, market data from published valuation guides, and other generally accepted valuation methods and acceptable adjustments (see *Standard on Valuation of Personal Property*).

12.1.3. Verification

Inclusiveness of personal property returns and reports should be verified by an audit program. The audit program should focus on larger and complex accounts; however, it also should include randomly selected accounts. The audit program should provide coverage of the entire tax base regardless of the jurisdiction's reappraisal cycle.

12.1.4 Forms and Renditions

Comprehensive forms supplied by the assessment authority should allow the taxpayer to disclose fully all assessable personal property. The tax laws should require mandatory compliance, with meaningful penalties for noncompliance.

12.2. Appraisal Ratio Studies for Personal Property

The appraisal ratio study produces an estimate of the level of assessment of personal property by developing a ratio for property that is on the tax roll through the use of appraisals. The level of assessment determined in this way can be adjusted downward to account for property that has not been assessed.

12.2.1 Assessment Ratio for Personal Property

Personal property market values are usually derived from appraisals using a replacement cost new less depreciation (RCNLD) approach (see IAAO Course 500). A comparison of the depreciation schedules in use to nationally accepted schedules would enable the calculation of a ratio for property on the roll. A statistically sound process should be used to select a sample that is representative of personal property on the tax rolls. Such a sample can be parcel- or value-based depending on the intended use of the ratio study in indirect or direct equalization.

12.2.2 Stratification

Proper stratification of personal property accounts should be done for greater statistical accuracy. Strata should be based on the type and value of personal property accounts.

Stratification by type of account should occur first. Personal property accounts can be divided into residential (motor vehicles, boats, aircraft, and the like), agriculture, and business accounts. Further stratification can occur in residential and agricultural accounts but is necessary in business or commercial accounts. Business accounts are usually stratified by size into a minimum of four groups. Value ranges for these groups should be derived from the value ranges in the local market. One example would be small (less than $250,000), medium ($250,000 to $1 million), moderate ($1–$5 million), and large (greater than

$5 million). Individual size of account can be determined by value on the prior-year personal property roll.

12.2.3 Property Escaping Assessment

Personal property is particularly prone to escaping assessment. Some determination should be made about the portion of taxable personal property not on the assessment roll. However, estimates based on national averages are less meaningful at the local jurisdictional level.

12.2.3.1 Identifying Personal Property Owners and Users Not on the Roll

Discovery tools can be used to determine accounts not on the roll for a sample area or group. Once the extent of the problem is identified, a projection can be made of the percentage of personal property not identified on the assessment roll.

12.2.3.2 Identifying Personal Property Not Included in Taxpayer Returns/Reports

The accepted method of determining the property omitted in taxpayer returns/reports is to audit the account (see IAAO workshops on auditing). The audit results are applied back to the account value. The resulting fraction is property that is escaping taxation within that particular personal property account. If appropriate sampling techniques are used in selecting the accounts for audit, the resulting ratio is applied to the total roll to help determine the percentage of personal property escaping assessment within the jurisdiction.

12.2.4 Computing the Level of Appraisal

The overall ratio is then determined by reducing the valuation ratio by the percent of property wholly or partially escaping taxation. For example, if the appraisal level is found to be 90 percent and it is determined that 5 percent of personal property is escaping assessment, then the corrected level of assessment is the appraisal level times the percentage of personal property assessed: $0.90 \times (1 - 0.05) = 0.855$. For indirect equalization, this calculation would result in a higher equalized value.

Standard on Ratio Studies

Definitions

Absolute value. The value of a number (or variable) regardless of its sign. For example, 3 and –3 (minus 3) both have an absolute value of 3. The mathematical symbol for absolute value is one vertical bar on each side of the number in question, for example, |3|.

Accuracy. The closeness of a measurement, computation, or estimate to the true, exact, or accepted value. Accuracy also can be expressed as a range about the true value. *See also* **precision** *and* **statistical accuracy**.

Adjusted sale price. The sale price that results from adjustments made to the stated sale price to account for the effects of time, personal property, financing, or the like.

Appraisal. "The act or process of developing an opinion of value; an opinion of value" (USPAP 1999). The act of estimating the money value of property. The money value of property as estimated by an appraiser.

Appraisal date. The date as of which a property's value is estimated. *See also* **assessment date**.

Appraisal ratio. (1) The ratio of the appraised value to an indicator of market value. (2) By extension, an estimated fractional relationship between the appraisals and market values of a group of properties. *See also* **level of appraisal**.

Appraisal ratio study. A ratio study using independent expert appraisals as indicators of market value.

Appraisal-sale price ratio. The ratio of the appraised value to the sale price (or adjusted sale price) of a property; a simple indication of appraisal accuracy.

Appraised value. The estimate of the value of a property before application of any fractional assessment ratio, partial exemption, or other adjustments.

Arithmetic mean. A measure of central tendency. The result of adding all the values of a variable and dividing by the number of values. For example, the arithmetic mean of 3, 5, and 10 is 18 divided by 3 or 6.

Array. An ordered arrangement of data, such as a listing of sales ratios, in order of magnitude.

Assessed value. (1) A value set on real estate and personal property by a government as a basis for levying taxes. (2) The monetary amount at which a property is put on the assessment roll for purposes of computing the tax levy. Assessed values differ from the assessor's estimate of actual (market) value for four major reasons: fractional assessment ratios, partial exemptions, preferential assessments, and decisions by assessing officials to override market value.

Assessment. (1) In general, the official acts of determining the amount of the tax base. (2) As applied to property taxes, the official act of discovering, listing, and appraising property, whether performed by an assessor, a board of review, or a court. (3) The value placed on property in the course of such act.

Assessment-appraisal ratio. The ratio of the assessed value of a property to an independent appraisal.

Assessment date. The status date for tax purposes. Appraised values reflect the status of the property and any partially completed construction as of this date.

Assessment progressivity (regressivity). An appraisal bias such that high-value properties are appraised higher (or lower) than low-value properties in relation to market values. *See also* **price-related differential (PRD) and coefficient of price-related bias (PRB).**

Assessment ratio. (1) The fractional relationship of an assessed value to the market value of the property in question. (2) By extension, the fractional relationship of the total of the assessment roll to the total market value of all taxable property in a jurisdiction. *See also* **level of assessment.**

Assessment-sale price ratio. The ratio of the assessed value to the sale price (or adjusted sale price) of a property.

Assessor. (1) The head of an assessment jurisdiction. Assessors can be either elected or appointed. In this standard the term is sometimes used collectively to refer to all assessment officials charged with administering the assessment function. (2) The public officer or member of a public body whose duty it is to make the original assessment.

Average deviation. The arithmetic mean of the absolute deviations of a set of numbers from a measure of central tendency such as the median. Taking absolute values is generally understood without being stated. The average deviation of the numbers 4, 6, and 10 about their median (6) is $(2 + 0 + 4) \div 3 = 2$. The average deviation is used in computing the coefficient of dispersion (COD).

Bias. A type of nonsampling error in which a calculated statistic differs systematically from the population parameter. A process is biased if it produces results that vary systematically with some factor that should be irrelevant. In assessment administration, assessment progressivity (regressivity) is one kind of possible bias.

Bootstrap. A computer-intensive method of statistical inference that is based on a repeated resampling of data to provide more information about the population charac-

teristics. The bootstrap is a data-driven procedure that is particularly useful for confidence interval approximation when no traditional formulas are available or the sample has been drawn from a population that does not conform to the normal distribution.

CAMA. *See* **computer-assisted mass appraisal**

Central tendency. (1) The tendency of most kinds of data to cluster around some typical or central value, such as the mean or median. (2) By extension, any or all such statistics. Some kinds of data, however, such as the weights of cars and trucks, may cluster about two or more values, and in such circumstances the meaning of central tendency becomes unclear. This may happen in ratio studies in which two or more classes of property are combined.

Class. A set of items defined by common characteristics. (1) In property taxation, property classes such as residential, agricultural, and industrial may be defined. (2) In assessment, building classification systems based on type of building design, quality of construction, or structural type are common. (3) In statistics, a predefined category into which data may be put for further analysis. For example, ratios may be grouped into the following classes: less than 0.500, 0.500 to 0.599, 0.600 to 0.699, and so forth.

COD. See **coefficient of dispersion.**

Coefficient of concentration. The percentage of observations falling within a specified percentage (say, 15 percent) of a measure of central tendency.

Coefficient of dispersion (COD). The average deviation of a group of numbers from the median expressed as a percentage of the median. In ratio studies, the average percentage deviation from the median ratio.

Coefficient of price-related bias (PRB). An index of price-related bias obtained by regressing percentage deviations from the median ratio on percentage changes in a value proxy, which is obtained by giving equal weight to assessments and sales prices so as to minimize measurement biases.

Coefficient of variation (COV). A standard statistical measure of the relative dispersion of the sample data about the mean of the data; the standard deviation expressed as a percentage of the mean.

Computer-assisted mass appraisal (CAMA). A process that uses a system of integrated components and software tools necessary to support the appraisal of a universe of properties through the use of mathematical models that represent the relationship between property values and supply/demand factors.

Confidence interval. A range of values, calculated from the sample observations, that are believed, with a particular probability, to contain the true population parameter (mean, median, COD). The confidence interval is not a measure of precision for the sample statistic or point estimate, but a measure of the precision of the sampling process (see **reliability**).

Confidence level. The degree of probability associated with a statistical test or confidence interval, commonly 90, 95, or 99 percent. For example, a 95 percent confidence interval implies that were the estimation process repeated again and again, then 95 percent of the calculated intervals would be expected to contain the true population measure (such as the median, mean, or COD).

Contributory value. The amount a component of a property contributes to the total market value. For improvements, contributory value must be distinguished from costs.

COV. *See* **coefficient of variation**.

Date of sale (date of transfer). The date on which the sale was consummated. This is considered to be the date the deed, or other instrument of transfer, is signed. The date of recording can be used as a proxy if it is not unduly delayed as it would be in a land contract.

Direct equalization. The process of converting ratio study results into adjustment factors (trends) and changing locally determined appraised or assessed values to more nearly reflect market value or the legally required level of assessment. *See also* **equalization** and **indirect equalization**.

Dispersion. The degree to which data are distributed either tightly or loosely around a measure of central tendency. Measures of dispersion include the range, average deviation, standard deviation, coefficient of dispersion, and coefficient of variation.

Distribution-free statistics. A set of robust nonparametric methods whose interpretation or reliability does not depend on stringent assumptions about the distribution of the underlying population from which the sample has been drawn. *See also* **parametric statistics**.

Equalization. The process by which an appropriate governmental body attempts to ensure that property under its jurisdiction is assessed at the same assessment ratio or at the ratio or ratios required by law. Equalization can be undertaken at many different levels. Equalization among use classes (such as agricultural and industrial property) can be undertaken at the local level, among properties in a school district and a transportation district; equalization among counties is usually undertaken by the state to ensure that its aid payments are distributed fairly. *See also* **direct equalization** *and* **indirect equalization**.

Exploratory data analysis. That part of statistical practice concerned with reviewing the data set to isolate structures, uncover patterns, or reveal features that may improve the confirmatory analysis.

Fixture. An asset that has become part of real estate through attachment in such a manner that its removal

would result in a loss in value to either the asset or the real estate to which the asset is affixed.

Fractional assessments. Assessments that by law or by practice have assessment ratios different from 1. Usually the assessment ratio is less than 1, and if assessment biases are present, different classes of property may have different fractional ratios.

Frequency distribution. A table or chart showing the number or percentage of observations falling in the boundaries of a given set of classes. Used in ratio studies to summarize the distribution of the individual ratios. *See also* **class** *and* **histogram**.

Histogram. A bar chart or graph of a frequency distribution in which the frequencies of the various classes are indicated by horizontal or vertical bars whose lengths are proportional to the number or percentage of observations in each class.

Hypothesis. A statement in inferential statistics, the truth of which the analyst is interested in determining.

Independent appraisal. An estimate of value using a model different from that used for assessment purposes. Independent appraisals are used to supplement sales in sales ratio studies or in appraisal ratio studies.

Indirect equalization. The process of computing hypothetical values that represent the oversight agency's best estimate of taxable value, given the legally required level of assessment or market value. Indirect equalization allows proper distribution of intergovernmental transfer payments between state or provincial and local governments despite different levels of appraisal between jurisdictions or property classes. *See also* **equalization** *and* **direct equalization**.

Interquartile range (IQR). The result obtained by subtracting the first quartile from the third quartile. By definition 50 percent of the observations fall within the IQR.

Land contract. An executor's contract for the purchase of real property under the terms of which legal title to the property is retained by the vendor until such time as all conditions stated in the contract have been fulfilled; commonly used for installment purchase of real property.

Level of appraisal. The common, or overall, ratio of appraised values to market values. Three concepts are usually of interest: the level required by law, the true or actual level, and the computed level based on a ratio study.

Level of assessment. The common or overall ratio of assessed values to market values. *See also* **level of appraisal**. *Note:* The two terms are sometimes distinguished, but there is no convention determining their meanings when they are. Three concepts are commonly of interest: what the assessment ratio is legally required to be, what the assessment ratio for the population actually is, and what the assessment ratio for the population seems to be, on the basis of a sample and application of inferential statistics. When level of assessment is distinguished from assessment ratio, *level of assessment* usually means either the legal requirement or the true ratio, and *assessment ratio* usually means the true ratio or the sample statistic.

Margin of error. A measure of the uncertainty associated with statistical estimates of a parameter. It is typically linked to consumer surveys or political poll questions. A margin of error is a key component of a confidence interval. It reports a "plus or minus" percentage or proportion quantity in a confidence interval at a specified level of probability (typically 95 percent). *See also* **confidence interval**.

Market value. The major focus of most real property appraisal assignments. Both economic and legal definitions of market value have been developed and refined. A current economic definition agreed upon by agencies that regulate federal financial institutions in the United States is: The most probable price (in terms of money) which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby: The buyer and seller are typically motivated; Both parties are well informed or well advised, and acting in what they consider their best interests; A reasonable time is allowed for exposure in the open market; Payment is made in terms of cash in United States dollars or in terms of financial arrangements comparable thereto; The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale. (See USPAP for additional comments.)

Mass appraisal. The process of valuing a universe of properties as of a given date using standard methodology, employing common data, and allowing for statistical testing (see *USPAP*)

Mean. *See* **arithmetic mean**.

Median. A measure of central tendency. The value of the middle item in an uneven number of items arranged or arrayed according to size; the arithmetic average of the two central items in an even number of items similarly arranged.

Median absolute deviation. The median of the absolute deviations from the median. In a symmetrical distribution, the measure approximates one-half the IQR.

Median percent deviation. The median of the absolute percent deviations from the median; calculated by dividing the median absolute deviation by one-hundredth of the median.

Nonparametric statistics. *See* **distribution-free statistics**.

Nonsampling error. The error reflected in ratio study statistics from all sources other than sampling error. While nonsampling error is unavoidable due to the inefficiencies inherent in real property markets, the imperfections of the appraisal process, and the imperfections of conducting ratio studies, all practicable steps must be taken to minimize nonsampling error in ratio studies.

Normal distribution. A theoretical distribution often approximated in real world situations. It is symmetrical and bell-shaped; 68 percent of the observations occur within one standard deviation of the mean and 95 percent within two standard deviations of the mean.

Observation. One recording or occurrence of the value of a variable, for example, one sale ratio among a sample of sales ratios.

Outliers. Observations that have unusual values, that is, differ markedly from a measure of central tendency. Some outliers occur naturally; others are due to data errors.

Parameter. Numerical descriptive measure of the population, for example, the arithmetic mean or standard deviation. Parameters are generally unknown and estimated from statistics calculated from a sample of the population.

Parametric statistics. Statistics whose interpretation or reliability depends on the distribution of the underlying data. *See also* **distribution-free statistics**.

Percentile. The values that divide a set of data into specified percentages when the data are arrayed in ascending order. The tenth percentile includes the lowest 10 percent of the values, the twentieth percentile includes the lowest 20 percent of the values, and so forth.

Personal property. *See* **property**.

Plottage value. The excess of the value of a large parcel of land formed by assemblage over the sum of the values of the unassembled parcels.

Point estimate. A single numerical value that can be used to estimate a population parameter. It is calculated on the basis of information collected from a sample. Point estimates are generally constructed to provide the best unbiased estimate of the population parameter consistent with the sample data. However, the point estimate is only an estimate, and is unlikely to have the same value as the population parameter. (See **Confidence interval** and **Reliability** for discussion of precision of the sampling process.)

Points. Prepaid interest on a loan; one point is equal to 1 percent of the amount of the loan. It is common to deduct points in advance of the loan, so that an individual pays interest on 100 percent of the loan but gets cash on, say, only 99 percent.

Population. All the items of interest, for example, all the properties in a jurisdiction or neighborhood; all the observations in a data set from which a sample may be drawn.

Precision. The level of detail in which a quantity or value is expressed or represented. It can be characterized as the number of digits used to record a measurement. A high level of represented precision may be used to imply a greater level of accuracy; however, this relationship may not be true. Precision also relates to the quality of an operation or degree of refinement by which results are obtained. A method of measurement is considered precise if repeated measurements yield the same or nearly the same numeric value. *See also* **accuracy** *and* **statistical precision**.

PRB. *See* **coefficient of price-related bias.**

PRD. *See* **price-related differential**.

Price. The amount asked, offered, or paid for a property. (See USPAP [2004] for additional comments.)

Price-related differential. The mean divided by the weighted mean. The statistic has a slight bias upward. Price-related differentials above 1.03 tend to indicate assessment regressivity; price-related differentials below 0.98 tend to indicate assessment progressivity.

Progressivity. *See* **assessment progressivity (regressivity)**.

Property. An aggregate of things or rights to things. These rights are protected by law. There are two basic types of property: real and personal. Real property consists of the interests, benefits, and rights inherent in the ownership of land plus anything permanently attached to the land or legally defined as immovable; the bundle of rights with which ownership of real estate is endowed. To the extent that "real estate" commonly includes land and any permanent improvements, the two terms can be understood to have the same meaning. Also called *realty*. Personal property is defined as those items that generally are movable or all items not specifically defined as real property. Many states include as personal property the costs associated with placing personal property in service, such as sales tax, freight, and installation. Installation items include, but are not limited to, wiring, foundations, hookups, and attachments. Two commonly used tests for distinguishing real and personal property are (1) the intent of the parties and (2) whether the item may be removed from the real estate without damage to either.

Qualified sale. A property transfer that satisfies the conditions of a valid sale and meets all other technical criteria for inclusion in a ratio study sample**.** If a property has undergone significant changes in physical characteristics, use, or condition in the period between the assessment date and sale date, it would not technically qualify for use in ratio study.

Quartiles. The values that divide a set of data into four equal parts when the data are arrayed in ascending order. The first quartile includes the lowest quarter of the data, the second quartile, the second lowest quarter, and so forth.

Random sample. A sample of *n* items selected from a population in such a way that each sample of the same size is equally likely. This also includes the case in which each element in the sample has an equal chance of being selected.

Range. (1) The maximum value of a sample minus the minimum value. (2) The difference between the maximum and minimum values that a variable may assume.

Ratio study. A study of the relationship between appraised or assessed values and market values. Indicators of market values may be either sales (sales ratio study) or independent "expert" appraisals (appraisal ratio study). Of common interest in ratio studies are the level and uniformity of the appraisals or assessments. *See also* **level of appraisal** *and* **level of assessment.**

Real property. *See* **property.**

Regressivity. *See* **assessment progressivity (regressivity)**.

Regressivity index. *See* **price-related differential**.

Reliability. In a sampling process, the extent to which the process yields consistent population estimates. Ratio studies typically are based on samples. Statistics derived from these samples may be more or less likely to reflect the true condition in the population depending on the reliability of the sample. Representativeness, sample size, and sample uniformity all contribute to reliability. Formally, reliability is measured by sampling error or the width of the confidence interval at a specific confidence level relative to the central tendency measure.

Representative sample. A sample of observations from a larger population of observations, such that statistics calculated from the sample can be expected to represent the characteristics of the population being studied.

Sale price. (1) The actual amount of money exchanged for a unit of goods or services, whether or not established in a free and open market. An indicator of market value. (2) Loosely used synonymously with "offering" or "asking price."

Sale ratio. The ratio of an appraisal (or assessed) value to the sale price or adjusted sale price of a property.

Sales chasing. Sales chasing is the practice of using the sale of a property to trigger a reappraisal of that property at or near the selling price. If sales with such appraisal adjustments are used in a ratio study, the practice causes invalid uniformity results and causes invalid appraisal level results, unless similar unsold parcels are reappraised by a method that produces an appraisal level for unsold properties equal to the appraisal level of sold properties. (2) By extension, any practice that causes the analyzed sample to misrepresent the assessment performance for the entire population as a result of acts by the assessor's office. A subtle, possibly inadvertent, variety of sales chasing occurs when the recorded property characteristics of sold properties are differentially changed relative to unsold properties. Then the application of a uniform valuation model to all properties results in the recently sold properties being more accurately appraised than the unsold ones.

Sales ratio study. A ratio study that uses sales prices as proxies for market values.

Sample. A set of observations selected from a population. If the sample was randomly selected, basic concepts of probability may be applied.

Sampling error. The error reflected in ratio study statistics that results solely from the fact that a sample of the population is used rather than a census of the population.

Scatter diagram or scatter plot. A graphic means of depicting the relationship or correlation between two variables by plotting one variable on the horizontal axis and one variable on the vertical axis. Often in ratio studies it is informative to determine how ratios are related to other variables. A variable of interest is plotted on the horizontal axis and ratios are plotted on the vertical axis.

Significance. A measure of the probability that an event is attributable to a relationship rather than merely the result of chance.

Skewed. The quality of a frequency distribution that makes it asymmetrical. Distributions with longer tails on the right than on the left are said to be skewed to the right or to be positively skewed. Distributions with longer tails to the left are said to be skewed to the left or to be negatively skewed.

Standard deviation. The statistic calculated from a set of numbers by subtracting the mean from each value and squaring the remainders, adding together all the squares, dividing by the size of the sample less one, and taking the square root of the result. When the data are normally distributed, the percentage of observations can be calculated within any number of standard deviations of the mean from normal probability tables. When the data are not normally distributed, the standard deviation is less meaningful and the analyst should proceed cautiously.

Standard error. A measure of the precision of a measure of central tendency; the smaller the standard error, the more reliable the measure of central tendency. Standard errors are used in calculating a confidence interval about the arithmetic mean and the weighted mean. The standard error of the sample mean is the standard deviation divided by the square root of the sample size.

Statistical accuracy. The closeness between the statistical estimate and the true (but unknown) population parameter value it was designed to measure. It is usually characterized in terms of error or the potential significance of error and can be decomposed into sampling error and nonsampling error components. Accuracy can be specified by the level of confidence selected for a statistical test. *See also* **accuracy**.

Statistical precision. A reference to how closely the survey results from a sample can reproduce the results that would be obtained from the entire population (a complete census). The amount by which a sample statistic can vary from the true population parameter is due to error. Even if all the sample data are perfectly accurate, random (sampling) error affects statistical precision (measured by the standard error or standard deviation). The dispersion of ratios in the population and the sample size have a controlling influence over the precision of any statistical estimate. When the reliability of a statistical measure is being evaluated, narrower confidence intervals have greater precision. *See also* **precision**.

Statistics. Numerical descriptive data calculated from a sample, for example, the median, mean, or COD. Statistics are used to estimate corresponding measures, termed parameters, for the population.

Stratify. To divide, for purposes of analysis, a sample of observations into two or more subsets according to some criterion or set of criteria.

Stratum, strata (pl.). A class or subset that results from stratification.

Time-adjusted sale price. The price at which a property sold adjusted for the effects of price changes reflected in the market between the date of sale and the date of analysis.

Trimmed mean. The arithmetic mean of a data set identified by the proportion of the sample that is trimmed from each end of the ordered array. For example, a 10 percent trimmed mean of a sample of size ten is the average of the eight observations remaining after the largest and smallest observations have been removed.

Value. (1) The relationship between an object desired and a potential owner; the characteristics of scarcity, utility, desirability, and transferability must be present for value to exist. (2) Value may also be described as the present worth of future benefits arising from the ownership of real or personal property. (3) The estimate sought in a valuation. (4) Any number between positive infinity and negative infinity.

Variable. An item of observation that can assume various values, for example, square feet, sales prices, or sales ratios. Variables are commonly described by using measures of central tendency and dispersion.

Weighted mean; weighted average. An average in which each value is adjusted by a factor reflecting its relative importance in the whole before the values are summed and divided by their number.

Weighted mean ratio. Sum of the appraised values divided by the sum of the sales prices (or independent estimates of market value), which weights each ratio in proportion to the sale price (or independent estimate of market value).

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Additional readings on ratio studies can be found at LibraryLink, IAAO's online catalog of resources, and http://www.iaao.org. Many Web sites offer good information on statistics. Because Web site addresses change frequently, they are not listed here.

Appendix A. Sales Validation Guidelines

A.1 Sources of Sales Data

The best sources of sales data are copies of deeds or real estate transfer affidavits containing the full consideration and other particulars of the sale. Assessing officers in jurisdictions without laws mandating full disclosure of sales data to assessing officials work under a severe handicap and should seek legislation that provides for such disclosure.

1. *Real estate transfer document*s. These documents are (1) copies of deeds and land contracts, (2) copies of real estate transfer affidavits, and (3) closing statements.
2. *Buyers and seller*s. Buyers and sellers of real property can be contacted directly to secure or confirm sales data. Means of contact include sales questionnaires, telephone interviews, and personal interviews.
3. *Third-party source*s. Third-party sources include multiple listing agencies, real estate brokers and agencies, government and private fee appraisers, attorneys, appraisal organizations, and others. Of particular value are those individuals or agencies that publish lists of sales or provide sales in an electronic format.

A.2 Information Required

The following data are needed to make any necessary adjustments to sales prices, compute sales ratios, and update ownership information.

1. *Full consideration involved.* This is the total amount paid for the property, including the cash down payment and amounts financed. The sale price is the most essential item of information concerning the sale, and its accuracy must be carefully scrutinized. In many jurisdictions it is common practice in deeds of conveyance to state considerations in such terms as "one dollar plus other due and just consideration." These amounts are rarely the actual selling price and should be ignored in favor of information from the buyer and seller or other reliable source.
2. *Names of buyer and seller*. This information permits the assessor to maintain a current record of the owners of all property in the jurisdiction. Transfer documents often refer to the buyer as the grantee or transferee and to the seller as the grantor or transferor.
3. *Addresses, phone numbers, and other contact information of buyer and seller or their legal designe*e. This information helps to identify more positively the parties to the sale. If the buyer will not reside at the property, the buyer's address may be needed for future correspondence. If the seller has established a new address, this information will aid the assessor in contacting the seller regarding the sale.
4. *Relationship of buyer and seller*. It is important to know whether the buyer and seller are related individuals or corporate affiliates because such sales often do not reflect market value.
5. *Legal description, address, and parcel identifie*r. If each parcel is assigned a unique parcel identifier and if this number is noted on the document at the time it is recorded, then the assessor can locate the parcel in the files directly. If not, the legal description or street address is essential to locate the parcel.
6. *Type of transfe*r. It is crucial to identify whether or not a sale is an "arm's-length" transfer. Therefore, if the sources of sales data do not include copies of deeds, the type of deed should be specifically required.
7. *Time on the marke*t. Sales that have been exposed to the open market too long, not long enough, or not at all may not represent market value.
8. *Interest transferre*d. The appraiser must identify whether or not the entire bundle of rights (fee simple) to the property has transferred. For example, in some transactions, only a life tenancy ("life estate") may be conveyed, or the seller may retain mineral or other rights to the property. Similarly, the sale price of a property encumbered by a long-term lease may not reflect the market value of the fee simple estate in the property.
9. *Type of financin*g. In analyzing the sale, it is helpful to know the amount of down payment; the type, remaining amount, and interest rates of notes secured by mortgages or deeds of trust assumed by the buyer; and the value of any stocks, bonds, notes, or other property passed to the seller. It is also important to know whether the sale conveys title to the property or that it is a land contract, in which title is not conveyed until some time in the future, typically several years.
10. *Personal property*. A sales ratio study requires knowledge of the amount paid for the real

property. The sale document ideally would note the type and value of any significant personal property items included in the transaction.

11. *Date of transfe*r. This is the date on which the sale was closed or completed. The date the deed or other transfer document was recorded can be used as a surrogate, provided there was no undue delay in the recording. If there has been a delay in recording, the date of the deed or transfer instrument should be used.
12. *Instrument numbe*r. This number, as well as the record or deed book and page, indicates where the deed is located in the official records and thus can be important in researching sales or leases and identifying duplication.

The data noted above should be maintained in a separate data file or the sale history file component of a CAMA system. In addition, the file should include additional information useful for stratification and other analytical purposes. Sales data files should reflect the physical characteristics of the property when sold. If significant legal, physical, or economic changes have occurred between the sale date and the assessment date, the sale should not be used for ratio studies. (The sale may still be valid for mass appraisal modeling by matching the sale price against the characteristics that existed on the date of sale.)

A.3 Confirmation of Sales

A.3.1 Importance of Confirmation

The usefulness of sales data is directly related to the completeness and accuracy of the data. Sales data should be routinely confirmed or verified by contacting buyers, sellers, or other knowledgeable participants in the transaction. In general, the fewer the sales in a stratum, the less common or more complex the type of property, and the more atypical the sale price, the greater the effort should be to confirm the particulars of the sale. With larger sample sizes, it may be sufficient to confirm single-family residential sales by audit or exception.

A.3.2 Methods of Confirmation

In general, the completeness and accuracy of sales data are best confirmed by requesting the particulars of a sale from parties to the sale. If a transfer document is not required, questionnaires after the sale can be used. A sales questionnaire, which requests the type of information listed in Section A.2, is one practical means of confirming sales. Telephone or personal interviews can be more comprehensive than mailed questionnaires. Forms with space to record the same types of information should be used for such interviews. Appendix H contains a model sale confirmation questionnaire (additional sample sales questionnaires and interview forms can be found in *Improving Real Property Assessment* [IAAO 1978, 95–104]).

Mailed sales questionnaires should be as concise as possible and should include

- a postage-paid return envelope
- official stationery
- purpose of the questionnaire
- contact person
- authorized signature

Forms designed for telephone interviews should include the name and phone number of the contact person. Such forms also should include the date and name of the person conducting the interview along with the number of attempts made to contact a party to the sale.

A.4 Screening Sales

Sales used in a ratio study must be screened to determine whether they reflect the market value of the real property transferred. Specific objectives of sales screening are as follows:

- to ensure that sales prices reflect to the maximum extent possible only the market value of the real property transferred and not the value of personal property, financing, or leases
- to ensure that sales that occurred only during the period of analysis are used
- to ensure that sales are excluded from the ratio study only with good cause (e.g., when they compromise the validity of the study)

Every arm's-length, open-market sale that appears to meet the conditions of a market value transaction should be included in the ratio study unless one of the following occurs:

- Data for the sale are incomplete, unverifiable, or suspect.
- The sale fails to pass one or more specific tests of acceptability.
- A sufficiently representative sample of sales that occurred during the study period can be randomly selected to provide sufficiently reliable statistical measures.

The sales reviewer should take the position that all sales are candidates as valid sales for the ratio study unless sufficient and compelling information can be documented to show otherwise. If sales are excluded without substantiation, the study may appear to be subjective. Reason codes can be established for invalid sales.

No single set of sales screening rules or recommendations can be universally applicable for all uses of sales data or under all conditions. Sales screening guidelines and procedures should be consistent with the provisions of the

value definition applicable to the jurisdiction. Appraisers must use their judgment, but should not be arbitrary. To help analysts make wise and uniform judgments, screening procedures should be in writing. Each sales analyst should be thoroughly familiar with these procedures as well as with underlying real estate principles (Tomberlin 2001).

A.4.1 Sales Generally Invalid for Ratio Studies

The following types of sales are often found to be invalid for ratio studies and can be automatically excluded unless a larger sample size is needed and further research is conducted to determine that sales are open-market transactions.

1. *Sales involving government agencies and public utilities*. Such sales can involve an element of compulsion and often occur at prices higher than would otherwise be expected.
2. *Sales involving charitable, religious, or educational institutions*. A sale to such an organization can involve an element of philanthropy, and a sale by such an organization can involve a nominal consideration or restrictive covenants.
3. *Sales involving financial institutions*. A sale in which the lienholder is the buyer can be in lieu of a foreclosure or a judgment and the sale price can equal the loan balance only.
4. *Sales between relatives or corporate affiliates*. Sales between relatives are usually non-open-market transactions and tend to occur at prices lower than would otherwise be expected.
5. *Sales settling an estate*. A conveyance by an executor or trustee under powers granted in a will may not represent fair market value, particularly if the sale takes place soon after the will has been filed and admitted to probate in order to satisfy the decedent's debts or the wishes of an heir.
6. *Forced sales*. Such sales include those resulting from a judicial order. The seller in such cases is usually a sheriff, receiver, or other court officer.
7. *Sales of doubtful title*. Sales in which title is in doubt tend to be below market value. When a sale is made on other than a warranty deed, there is a question of whether the title is merchantable. Quit claim deeds and trustees' deeds are examples.

A.4.2 Sales with Special Conditions

Sales with special conditions can be open-market sales but must be verified thoroughly and used with caution in ratio studies.

1. *Trades.* In a trade, the buyer gives the seller one or more items of real or personal property as all or part of the full consideration. If the sale is a pure trade with the seller receiving no money or securities, the sale should be excluded from analysis. If the sale involves both money and traded property, it may be possible to include the sale in the analysis if the value of the traded property is stipulated, can be estimated with accuracy, or is small in comparison to the total consideration. However, transactions involving trades should be excluded from the analysis whenever possible, particularly when the value of the traded property appears substantial.
2. *Partial interests*. A sale involving the conveyance of less than the full interest in a property should be excluded from the analysis unless several sales of partial interests in a single property take place at the same time and the sum of the partial interests equals the fee-simple interest. Then the sum of the sales prices of the partial interests can sometimes be assumed to indicate the sale price of the total property. At other times, however, the purchase of such partial interests is analogous to plottage value in which a premium may have been paid.
3. *Land contracts*. Land contracts and other installment purchase arrangements in which title is not transferred until the contract is fulfilled require careful analysis. Deeds in fulfillment of a land contract often reflect market conditions several years in the past, and such dated information should be excluded from analysis. Sales data from land contracts also can reflect the value of the financing arrangements. In such instances, if the transaction is recent, the sale price should be adjusted for financing (see section A.5.2).
4. *Incomplete or unbuilt common property*. Sales of condominium units and of units in planned unit developments or vacation resorts often include an interest in common elements (for example, golf courses, clubhouses, or swimming pools) that may not exist or be usable on the date of sale or on the assessment date. Sales of such properties should be examined to determine whether prices might be influenced by promises to add or complete common elements at some later date. Sales whose prices are influenced by such promises should be excluded from the analysis, or the sales prices should be adjusted to reflect only the value of the improvements or amenities in existence on the assessment date.

5. *Auction*s. In general, auction sales of real property tend to be at the lower end of the price spectrum. Auction sales that have been well-advertised and well-attended may be valid for consideration in ratio studies. The seller also must have the option to set a minimum bid on the property or the right of refusal on all bids *(with reserv*e) in order for the sale to be considered valid.

A.4.3 Multiple-Parcel Sales

A multiple-parcel sale is a transaction involving more than one parcel of real property. These transactions present special considerations and should be researched and analyzed before being used in ratio studies.

If the appraiser needs to include multiple-parcel sales, he or she should first determine whether the parcels are contiguous and whether the sale comprises a single economic unit or multiple economic units. Regardless of whether the parcels are contiguous, any multiple-parcel sale that also involves multiple economic units generally should not be used in ratio studies because of the likelihood that these sales include some plottage value or some discount for economies of scale, unless adequate adjustments for these factors can be made to the sale price.

A.4.4 Acquisitions or Divestments by Large Property Owners

Acquisitions or divestments by large corporations, pension funds, or real estate investment trusts (REITs) that involve multiple parcels typically should be rejected for ratio study purposes.

A.4.5 IRS 1031 Exchanges

Internal Revenue Service (IRS) Regulation 1031 stipulates that investment properties can be sold on a tax-deferred basis if certain requirements are met. Sale transactions that represent Section 1031 exchanges should be analyzed like any other commercial transaction and, absent conditions that would make the sale price unrepresentative of market value, should be regarded as valid.

A.4.6 Internet Marketing

Property that sells on the Internet and meets the criteria of being an open-market, arm's-length transaction should be included as a valid transaction in a ratio study. Brokerage and realty firms are using the Internet as an additional method to advertise and market their inventory of property.

A.4.7 Inaccurate Sale Data

Sale information should never be considered absolutely trustworthy. Jurisdictions can reduce the problem by requiring a sale verification questionnaire (see Appendix H). There should be statutory penalties for persons who falsify information.

A.5 Adjustments to Sale Prices

Sale prices used in ratio studies may need to be adjusted for financing, assumed long-term leases, personal property, gift programs, and date of sale. This is especially true for nonresidential properties. The real property tax is based on the market value of real property alone as of a specific date. This value may not be the same as investment value (that is, the monetary value of a property to a particular investor) and does not include the value of personal property or financing arrangements.

If adjustments for more than one purpose are to be made, they should be made in the following order:

1. adjustments that convert the price to a better representation of the market value as of the date of sale (These include adjustments for financing and assumed long-term leases.)
2. adjustments that develop or isolate the price paid for taxable real property (These include adjustments for personal property received by the buyer, property taken in trade by the seller, the combination of partial interest sales, and incomplete or unbuilt common property.)
3. adjustments for differences in market value levels between the date of sale and the date of analysis

Procedures for adjusting sales prices should be documented and the adjustment factors supported by market data. These requirements imply an ongoing study of local real estate prices, interest rates, and financing practices. Unsubstantiated or blanket adjustments can jeopardize the acceptance accorded a ratio study by making it appear subjective.

A.5.1 Adjustments for Financing

When financing reflects prevailing market practices and interest rates, sales prices require no adjustment for financing. Adjustments should be considered in the following instances:

1. The seller and lender are the same party and financing is not at prevailing market rates.
2. The buyer assumes an existing mortgage at a non-market interest rate. As with personal property, the preferred means of adjusting for financing is by individual parcel. In this instance and no. 1 above, downward adjustments are warranted when (1) the loan appears to be well secured and the contract interest rate is less than the market interest rate, or (2) the loan appears not to be well secured and the contract interest

rate is lower than that required by the market for a loan of equal risk. The amount of adjustment can be computed by capitalizing the difference between monthly payments based on the required market interest rate and those based on the actual interest rate. Market analysis using paired sales (sales of similar properties, some with and some without conventional financing) or statistical techniques can correct for such factors.

3. The seller pays "points" (a percentage of the loan amount). *(Points paid by the borrower are part of the down payment and do not require adjustment.)* When the seller pays points, the sale price should be adjusted downward by the value of the points.

4. The property is sold under a gift program. Gift programs are a type of creative financing for qualified buyers by certain lending institutions that provide the buyer with additional monies to use as part of a down payment or for property improvements. This program is typically associated with low-value properties and can be difficult to discover without a validation questionnaire and/or telephone interview. The gift amount is added to the actual sale price of the property; however, the seller is never in receipt of the gift amount. This gift amount must be deducted from the actual sale price of the real estate prior to statistical analysis.

Adjustments for financing require data on actual and market interest rates, the amount of the loan, and the term and amortization provisions of the loan. Obtaining and properly analyzing such data, as well as estimating the extent to which the market actually capitalizes non-market financing, are difficult and time-consuming and require specialized skills.

A.5.2 Adjustments for Assumed Leases

The sale price of a property encumbered by a long-term lease of at least three years should be adjusted as follows:

- If the contract rent differs significantly from market rent, then the sales price should be adjusted by the difference between the present worth of the two income streams.
- If the contract rent exceeds market rent, the present worth of the difference in the two income streams should be subtracted from the sale price.
- If the contract rent is less than current market rent, the present worth of the difference in the two income streams should be added to the sale price.

A.5.3 Adjustments for Personal Property

Sales screening includes determining the contributory value of any significant personal property included in the sale. Personal property includes such tangibles as machinery, furniture, and inventories and such intangibles as franchises, licenses, and non-compete agreements. Ordinarily, it is not necessary to consider goodwill, going-concern value, business enterprise value, or the like, unless the value of these intangible assets has been itemized in a sales contract or a formal appraisal has been prepared by either party.

It is necessary to decide whether each item included in the sale should be classified as real or personal property. (See *Standard on Valuation of Personal Property* [IAAO 2005], which provides guidance on classification of property as real or personal.)

Sale prices should be adjusted by subtracting the contributory value of personal property received by the buyer. Ordinary window treatments, outdated models of free-standing appliances, and common-grade used furniture included with residential property do not usually influence the sale price of real property and do not require an adjustment unless the items were specifically broken out in the contract as personal property included in the sale price.

If the value of personal property appears to be substantial (10 percent for residential, 25 percent for commercial), the sale should be excluded as a valid sale in statistical analysis unless the sample size is small.

A.5.4 Adjustments for Time

There should be a program to track changes in price levels over time and adjust sale prices for time as required. This step is an important component of a ratio study. Time adjustments must be based on market analysis and supported with appropriate documentation.

Valid time-adjustment techniques are as follows:

- tracking sales and appraisal ratios over time
- including date-of-sale as a variable in regression or feedback models
- analyzing re-sales
- comparing per-unit values over time in homogeneous strata, such as a subdivision or condominium complex
- isolating the effect of time through paired sales analysis
- statistically supported time trend analysis studies

These techniques are discussed in Gloudemans (1990; 1999), *Property Appraisal and Assessment Administration* (IAAO 1990, Appendix 5-3), and *Improving Real Property Assessment* (IAAO 1978, section 4.6). If sales

prices have generally been rising, ratios for sales that occurred after the assessment date tend to understate the overall level of appraisal. Similarly, sales ratios for sales that occurred before the assessment date tend to overstate the level of appraisal. If prices are generally declining, an opposite pattern results. When tracking ratios over time (using the inverse ratio technique) for determining time adjustments, it is important that ratios for chased sales be excluded, since there is no correlation of such sales ratios with the date of sale.

Changes in price levels should be monitored and time adjustments made by geographic area and type of property, because different segments of the market tend to change in value at different rates.

Oversight agencies can make any appropriate time adjustments after making all other adjustments.

A.5.5 Other Adjustments

Adjustments to sales prices should not be made for real estate sales and brokerage commissions; closing costs, such as attorney's fees, transfer taxes, and title insurance; and current or delinquent property taxes. Exceptions to this general rule occur when the buyer agrees to pay real estate commissions and delinquent property taxes, in which case the amounts of the payments should be added to the sale price if not already included in the sale amount. Other exceptions occur when the seller agrees to pay expenses normally paid by the buyer. Such expenses include loan origination fees and repair allowances. Loan origination fees paid by the seller should be deducted from the sale price. Repair allowances should be deducted from the sales price only if the property was in an unrepaired state on the appraisal date, but sold at a higher price reflecting the value of the repairs. If the sale occurred before the appraisal date and the repairs were made prior to that date, no adjustment should be made (Knight, Miceli, and Sirmans 2000).

A.5.6 Special Assessments

Special assessments are used to finance capital improvements or provide services adjacent to the properties they directly benefit. Typically, the property owner is obligated to make annual payments of principal and interest to a local unit of government over a specified number of years. The sale price of a property encumbered by a special assessment can require adjustment if the current balance of the defrayed amount is significant. The sale price can be adjusted upward to account for this lien. If the effect on market value is significant and can be ascertained, an adjustment should be made.

Appendix B. Outlier Trimming Guidelines

B.1 Identification of Ratio Outliers

It is first necessary to determine a procedure to identify outliers. Outlier identification based on the interquartile range (IQR) uses order statistics (see table B-1) and has been shown to be robust for a wide variety of distributions (Iglewicz and Hoaglin 1993; Barnett and Lewis 1994). The term outlier is often associated with ratios that fall outside 1.5 multiplied by the IQR. A factor of 3.0 X IQR often is chosen to identify extreme outliers. Other outlier identification procedures are found in statistical literature and can be used. Outlier identification and trimming should follow the sales validation process and precede the calculation of ratio statistics and related tests or analyses.

The example in table B-1 demonstrates the use of the 1.5 X IQR procedure to identify outlier ratios. The distribution of ratios often is skewed to the right; therefore, it may be preferable to apply appropriate transformations to the ratios prior to applying the IQR method. For example, the use of logarithmic transformations tends to identify fewer high and more low ratios as outliers.

B.2 Scrutiny of Identified Outliers

The preferred method of handling an outlier ratio is to subject it to additional scrutiny to determine whether the sale is a non-market transaction or contains an error in fact. If an error can be corrected (for example, data entry), the property should be left in the sample. If the error cannot be corrected or inclusion of the identified outlier would reduce sample representativeness, the sale should be excluded.

B.3 Outlier Trimming

Once outliers have been identified and scrutinized and any errors resolved, the next step is to exclude those that may unduly influence calculated statistical measures. For this reason, it is acceptable to trim outliers identified by recognized procedures (for cautionary notes on trimming small samples, see Tomberlin [2001] and Hoaglin, Mosteller, and Tukey [1983]. An example of such trimming is found in Table B-2. However, trimming of outliers using arbitrary limits, for example, eliminating all ratios less than 50 percent or greater than 150 percent, tends to distort results and should not be employed.

Detected outliers should be reported and can be treated in a variety of ways, including trimming (D'Agostino and Stephens 1986). If outliers are to be considered for removal, the analyst can select a procedure to trim all or just the extreme or influential outliers (see table B-2). If a trimming method has been used to reject ratios from the sample, this fact must be stated in the resulting statistical

Table B-1. A Distribution-Free Method for Locating Outliers
(The following procedure identifies outlier ratios that fall more than 1.5 times beyond the range of the middle 50 percent of the arrayed sample.)

Locating trim boundaries
Data set before trimming

Rank	Ratio (A/S)
1	0.611
2	0.756
3	0.762
4	0.853
5	0.867
6	0.909
7	0.925
8	0.944
9	1.014
10	1.052
11	1.178
12	1.367
13	1.850
14	2.500
Median ratio	**0.935**
COD	**32.271**

Steps to locate trim boundaries

1. *Locate the first quartile point*
   Formula to locate the first quartile:
   (0.25 x number of ratios) + 0.25
   (0.25 x 14 ratios) + 0.25 = 3.75
   3.75 is three-quarters between the third and fourth ranked ratios.
   Ratio 3 = 0.762
   Ratio 4 = 0.853
   Three-quarters between = (0.853 − 0.762) x 0.75 = 0.068
   The first quartile point = 0.762 + 0.068 = 0.830

2. *Locate the third quartile point*
   Formula to locate the third quartile
   (0.75 x number of ratios) + 0.75
   (0.75 x 14 ratios) + 0.75 = 11.25
   11.25 is one-quarter between the eleventh and twelfth ranked ratios.
   Ratio 11 = 1.178
   Ratio 12 = 1.367
   One-quarter between = (1.367 − 1.178) x 0.25 = 0.047
   The third quartile point = 1.178 + 0.047 = 1.225

3. *Compute the interquartile range*
   The distance between the first and third quartile = interquartile range
   1.225 − 0.830 = 0.395

4. *Establish the lower boundary*
   Lower trim point = first quartile − (interquartile range x 1.5 or 3.0)
   0.830 − (0.395 x 1.5) = 0.238,

5. *Establish the upper boundary*
   Upper trim point = (interquartile range x 1.5 or 3.0) + third quartile
   (0.395 x 1.5) + 1.225 = 1.818

Outliers identified:
1.850
2.500

Table B-2. Effects of Outlier Trimming
Outliers identified in Table B-1 trimmed

	After 1.5x trimming
Rank	***Ratio (A/S)***
1	0.611
2	0.756
3	0.762
4	0.853
5	0.867
6	0.909
7	0.925
8	0.944
9	1.014
10	1.052
11	1.178
12	1.367
Median ratio	0.917
COD	15.649

analysis. Outlier trimming is not mandatory; however, if outlier-trimming procedures are not used, sales with extreme or influential ratios must be thoroughly validated and determined to be highly trustworthy observations because they can play a pivotal role in the ratio study outcome.

B.4 Trimming Limitations

For some distributions, such as when the sample exhibits a high clustering around a specific ratio, the IQR outlier identification method is not appropriate. In such cases the IQR could be quite narrow, leading to the calculation of lower and upper boundaries for outliers and extremes that are quite close to the middle of the data. In such cases, ratios beyond those boundaries should not be automatically excluded, but instead reasonable judgment should be applied to exclude only true outliers or extremes. As one safeguard, analysts can refrain from automatically deleting any "outliers" or "extremes" inside the boundaries where 95 percent (two standard deviations) of the observations would be expected to lie, assuming a normal distribution of data.

It is also appropriate to set maximum trimming limits. For small samples, no more than 10 percent (20 percent in the most extreme cases) of the ratios should be removed. For larger samples, this threshold can be lowered to 5 to 10 percent depending on the distribution of the ratios and the degree to which sales have been screened or validated. Trim limits should be developed in consideration of the extent of sales verification.

In general, IQR-based outlier identification should be undertaken in instances in which sample sizes are sufficient to preclude the aberrant results that can be expected when this procedure is applied to small, highly variable samples.

B.5 Analytical Use of Identified Outliers

After identification, scrutiny, and correction of errors associated with outliers, the procedure can be run again to identify any remaining apparent outliers. If outlier ratios tend to be concentrated in certain areas or other subsets of the sample, they can point directly to systematic errors in the appraisal process and should be stratified and reanalyzed if they are sufficiently representative.

B.6 Reporting Trimmed Outliers and Results

Ratio study reports or accompanying documentation should clearly state the basis for excluding outlier ratios. Statistics calculated from trimmed distributions, obviously, cannot be compared to those from untrimmed distributions or interpreted in the same way.

Appendix C.
Median Confidence Interval Tables for Small Samples

For small samples, tables C-1 and C-2 demonstrate use of a formula based upon the binomial distribution (Clapp 1989) to develop the lower and upper median confidence interval estimates. R_i is the ratio in an array ranked from the lowest ($i = 1$) to the highest (sorted in ascending order). Each confidence interval boundary typically falls between two ratios in the array. The interpolation factor is multiplied by the ratio value and the two are added together to obtain a weighted average. This method should be used for small samples with up to 30 observations (see tables C-1 and C-2). For larger samples the method found in *Property Appraisal and Assessment Administration* (IAAO 1990, p 609) may be used.

Example

Using data from table 1-4 (n =17 ratios) and a 95 percent confidence interval in table C-2:

Lower bound:
[0.695 ($Ratio_5$) X 0.9899] + [0.717 ($Ratio_6$) X 0.0101] = **0.695**

Upper bound:
[0.933 ($Ratio_{13}$) X 0.9899] + [0.895 ($Ratio_{12}$) X 0.0101] = **0.933**

Therefore, the 95% median ratio confidence interval in table 1-4 is from .695 to .933.

From Table 1-4. Demonstration Ratio Study Report

Rank	Parcel #	Appraised value	Sale price*	Ratio
1	9	$87,200	138,720	0.629
2	10	38,240	59,700	0.641
3	11	96,320	146,400	0.658
4	12	68,610	99,000	0.693
5	13	32,960	47,400	0.695
6	14	50,560	70,500	0.717
7	15	61,360	78,000	0.787
8	16	47,360	60,000	0.789
9	17	56,580	69,000	0.820
10	18	47,040	55,500	0.848
11	19	136,000	154,500	0.880
12	20	98,000	109,500	0.895
13	21	56,000	60,000	0.933
14	22	159,100	168,000	0.947
15	23	128,000	124,500	1.028
16	24	132,000	127,500	1.035
17	25	160,000	150,000	1.067

Date: 0/0/00. *No outlier trimming*

** or adjusted sale price*

Table C-1. 90% Confidence Interval Table

n	Lower Bound	Upper Bound
5	.8800 x R^1 + .1200 x R^2	.8800 x R^5 + .1200 x R^4
6	.6333 x R^1 + .3667 x R^2	.6333 x R^6 + .3667 x R^5
7	.2286 x R^1 + .7714 x R^2	.2286 x R^7 + .7714 x R^6
8	.8643 x R^2 + .1357 x R^3	.8643 x R^7 + .1357 x R^6
9	.5667 x R^2 + .4333 x R^3	.5667x R^8 + .4333 x R^7
10	.1067 x R^2 + .8933 x R^3	.1067 x R^9 + .8933 x R^8
11	.7855 x R^3 + .2145 x R^4	.7855 x R^9 + .2145 x R^8
12	.4282 x R^3 + .5718 x R^4	.4282 x R^{10} + .5718 x R^9
13	.9558 x R^4 + .0442 x R^5	.9558 x R^{10} + .0442 x R^9
14	.6511 x R^4 + .3489 x R^5	.6511 x R^{11} + .3489 x R^{10}
15	.2217 x R^4 + .7783 x R^5	.2217 x R^{12} + .7783 x R^{11}
16	.8261 x R^5 + .1739 x R^6	.8261 x R^{12} + .1739 x R^{11}
17	.4603 x R^5 + .5397 x R^6	.4603 x R^{13} + .5397 x R^{12}
18	.9735 x R^6 + .0265 x R^7	.9735 x R^{13} + .0265 x R^{12}
19	.6480 x R^6 + .3520 x R^7	.6480 x R^{14} + .3520 x R^{13}
20	.2072 x R^6 + .7928 x R^7	.2072 x R^{15} + .7928 x R^{14}
21	.8084 x R^7 + .1952 x R^8	.8084 x R^{15} + .1952 x R^{14}
22	.4156 x R^7 + .5844 x R^8	.4156 x R^{16} + .5844 x R^{15}
23	.9413 x R^8 + .0587 x R^9	.9413 x R^{16} + .0587 x R^{15}
24	.5884 x R^8 + .4116 x R^9	.5884 x R^{17} + .4116 x R^{16}
25	.1203 x R^8 + .8797 x R^9	.1203 x R^{18} + .8797 x R^{17}
26	.7371 x R^9 + .2629 x R^{10}	.7371 x R^{18} + .2629 x R^{17}
27	.3161 x R^9 + .6839 x R^{10}	.3161 x R^{19} + .6839 x R^{18}
28	.8687 x R^{10} + .1313 x R^{11}	.8687 x R^{19} + .1313 x R^{18}
29	.4831 x R^{10} + .5169 x R^{11}	.4831 x R^{20} + .5169 x R^{19}
30	.9876 x R^{11} + .0124 x R^{12}	.9876 x R^{20} + .0124 x R^{19}

Table C-2. 95% Confidence Interval Table

n	Lower Bound	Upper Bound
6	.9000 x R^1 + .1000 x R^2	.9000 x R^6 + .1000 x R^5
7	.6857 x R^1 + .3143 x R^2	.6857 x R^7 + .3143 x R^6
8	.3250 x R1 + .6750 x R^2	.3250 x R^8 + .6750 x R^7
9	.9222 x R^2 + .0778 x R^3	.9222 x R^8 + .0778 x R^7
10	.6756 x R^2 + .3244 x R^3	.6756 x R^9 + .3244 x R^8
11	.2873 x R^2 + .7127 x R^3	.2873 x R^{10} + .7127 x R^9
12	.8936 x R^3 + .1064 x R^4	.8936 x R^{10} + .1064 x R^9
13	.6056 x R^3 + .3944 x R^4	.6056 x R^{11} + .3944 x R^{10}
14	.1659 x R^3 + .8341 x R^4	.1659 x R^{12} + .8341 x R^{11}
15	.8218 x R^4 + .1782 x R^5	.8218 x R^{12} + .1782 x R^{11}
16	.4827 x R^4 + .5173 x R^5	.4827 x R^{13} + .5173 x R^{12}
17	.9899 x R^5 + .0101 x R^6	.9899 x R^{13} + .0101 x R^{12}
18	.7076 x R^5 + .2924 x R^6	.7076 x R^{14} + .2924 x R^{13}
19	.3059 x R^5 + .6941 x R^6	.3059 x R^{15} + .6941 x R^{14}
20	.8835 x R^6 + .1165 x R^7	.8835 x R^{15} + .1165 x R^{14}
21	.5479 x R^6 + .4521 x R^7	.5479 x R^{16} + .4521 x R^{15}
22	.0697 x R^6 + .9303 x R^7	.0697 x R^{17} + .9303 x R^{16}
23	.7381 x R^7 + .2619 x R^8	.7381 x R^{17} + .2619 x R^{16}
24	.3373 x R^7 + .6627 x R^8	.3373 x R^{18} + .6627 x R^{17}
25	.8958 x R^8 + .1042 x R^9	.8958 x R^{18} + .1042 x R^{17}
26	.5481 x R^8 + .4519 x R^9	.5481 x R^{19} + .4519 x R^{18}
27	.0677 x R8 + .9323 x R9	.0677 x R20 + .9323 x R19
28	.7221 x R9 + .2779 x R10	.7221 x R20 + .2779 x R19
29	.3063 x R9 + .6937 x R10	.3063 x R21 + .6937 x R20
30	.8709 x R10 + .1291 x R11	.8709 x R21 + .1291 x R20

Appendix D. Coefficient of Price-Related Bias

The coefficient of price-related bias (PRB) is an index of vertical equity that quantifies the relationship between assessment-sales ratios (ASR) and value in percentage terms. A PRB of 0.043 indicates that, on average, assessment ratios increase by 4.3 percent whenever values increase by 100 percent (e.g., double or double again). The PRB has several technical advantages, including being less sensitive to outliers than the PRD, and also quantifies the statistical significance of observed relationships. Using table D-1 as an example, the measure is found as follows:

1. Compute a value proxy, "value," as 50 percent of sale price + 50 percent of assessed value. To ensure that assessed values and sales prices receive equal weight, assessed values can be divided by the median ratio before summing:

   Value = 0.50 × (AV/Median) + 0.50 × SP

   Where:
   AV= Assessed Value
   SP = Sale Price

   Columns (5) and (6) illustrate the calculation. Computing a value proxy based on both assessed values and sales prices minimizes bias inherent in comparing ratios against either assessed values or sales prices alone (see, for example, Gloudemans and Almy 2010, pp 219, 229, 389–391).

2. Take the natural logarithm of the value proxy and divide by 0.693:

   Ln_Value = ln(value)/0.693

   This is shown in column (7) of table D-1. Taking logarithms converts the value proxy to a percentage basis, which substantially minimizes the impact of atypically high values (outliers) in the analysis. Dividing by 0.693 allows each increment of 1 to be interpreted as a change of 100 percent. (For example, ln(100,000)/0.693 = 16.613 and ln(200,000)/0.693 = 17.613).

3. Compute percentage differences from the median assessment ratio (column 8 of table D-1):

Table D-1. Illustration of PRB

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sale	AV	SP	ASR	AV/Med	.5(3) + .5(5) "Value"	Indep Var Ln(Value)/.693	Dep Variable (ASR – Med)/Med
1	116,700	114,500	1.019	128,267	121,383	16.893	0.120
2	130,300	121,000	1.077	143,215	132,107	17.015	0.184
3	130,200	133,900	0.972	143,105	138,503	17.083	0.069
4	145,500	139,000	1.047	159,921	149,461	17.193	0.151
5	134,100	145,000	0.925	147,392	146,196	17.161	0.016
6	153,900	156,500	0.983	169,154	162,827	17.317	0.081
7	143,400	161,100	0.890	157,613	159,357	17.286	–0.022
8	156,900	169,500	0.926	172,451	170,976	17.387	0.017
9	169,000	175,000	0.966	185,751	180,375	17.464	0.061
10	149,200	181,000	0.824	163,988	172,494	17.400	–0.094
11	160,100	188,900	0.848	175,969	182,434	17.481	–0.068
12	191,400	205,000	0.934	210,371	207,685	17.668	0.026
13	177,200	216,150	0.820	194,763	205,457	17.652	–0.099
14	205,500	219,000	0.938	225,868	222,434	17.767	0.031
15	206,500	235,000	0.879	226,968	230,984	17.821	–0.034
16	243,800	249,000	0.979	267,965	258,482	17.984	0.076
17	211,600	258,900	0.817	232,573	245,737	17.911	–0.102
18	242,500	263,000	0.922	266,536	264,768	18.018	0.013
19	258,400	305,900	0.845	284,012	294,956	18.174	–0.072
20	265,900	312,500	0.851	292,255	302,378	18.210	–0.065
21	305,700	336,000	0.910	336,000	336,000	18.362	0.000
22	291,600	360,000	0.810	320,502	340,251	18.380	–0.110
23	312,800	399,900	0.782	343,804	371,852	18.508	–0.140
24	352,200	418,500	0.842	387,109	402,805	18.624	–0.075
25	354,900	459,000	0.773	390,077	424,538	18.700	–0.150
Sum	5,209,300	5,923,250	22.578			**PRB**	–0.120
						Std Error	0.025
	Median	0.910		**COD**	0.075	***t*-value**	–4.721
	Mean	0.903		**PRD**	1.027	**d.f.**	23
	WtdMean	0.879		**Sales**	25	**Sig**	0.000

Pct_Diff = (ASR – Median)/Median

Where:

PCT_Diff = Percentage Difference

ASR = Assessment-Sales Ratio

4. Regress (3) on (2):

Pct_Diff = $b0 + b1 \times$ Ln_Value

Because each increment of 1 in the independent variable represents a 100 percent change in value, the regression coefficient, $b1$, represents the corresponding percentage change in assessment ratios.

Figures D-1 and D-2 below contain plots of assessment ratios with assessed values and sales prices, respectively. Similarly, Figure D-3 is a plot of ratios against the value proxy and Figure D-4 plots percentage differences from the median ratio on logarithms of the value proxy divided by 0.693. In this case, all four plots show a regressive relationship. The PRB quantifies the relationship. As shown toward the bottom of table D-1, PRB = –0.120, meaning that ratios decline by 12.0 percent when values double (and increase by 12.0 percent when values are halved). The relationship is significant at the 99.9 percent confidence level. The 95 percent confidence interval is −0.172 to −0.067.

To illustrate the relative insensitivity of the PRB to outliers, consider table D-2. Sales prices for the first 15 sales increase by increments of $50,000: from $50,000 for sale 1 to $750,000 for sale 15. The ratios alternate from 0.90, to 1.00, to 1.10. Since the first (lowest sale) has a ratio of 0.90 and the highest sale has a ratio of 1.10, there is minor progressivity. As shown in the upper half of table D-3, the COD is 6.7, the PRD is 0.992, and the PRB is 0.02, all good performance measures.

Now consider sale 16 in table D-2, which is a relative outlier with a sale price of $2,500,000 and ratio of 0.75. As shown in the lower half of table D-3, the PRD falls well outside of 0.98 to 1.03 and indicates regressivity. The PRB (as denoted in Table D-3 in the column entitled "Coefficients" and "B"), with a benign value of -0.011, is little affected by the outlier and is not statistically significant.

Figure D-1. Plot of Ratios with Assessed Value

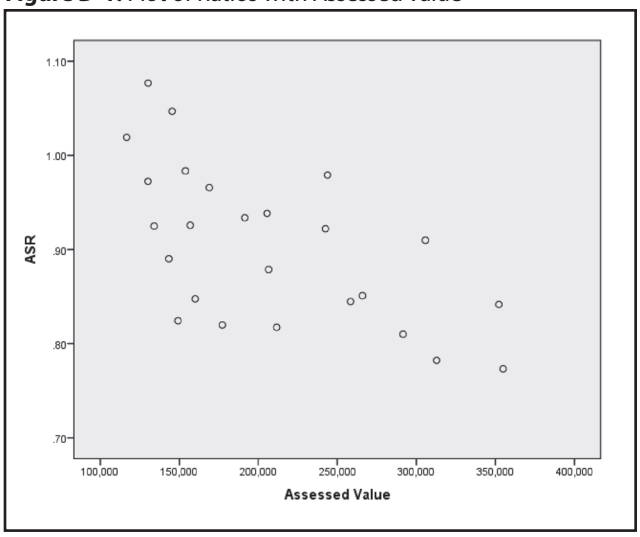

Figure D-2. Plot of Ratios with Sale Price

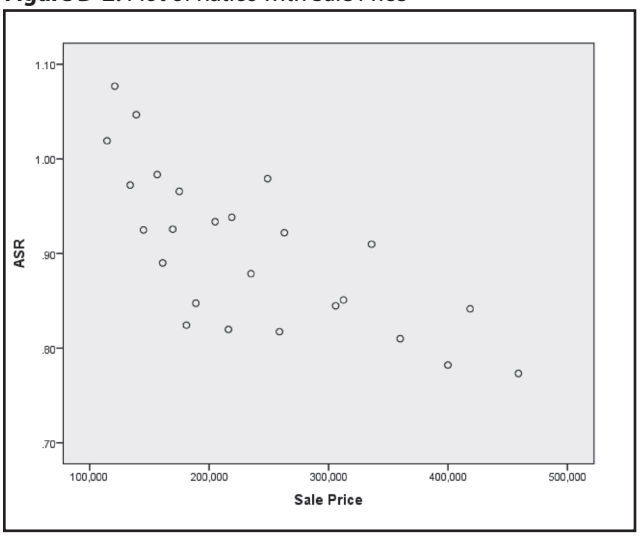

Figure D-3. Plot of Ratios with Value Proxy

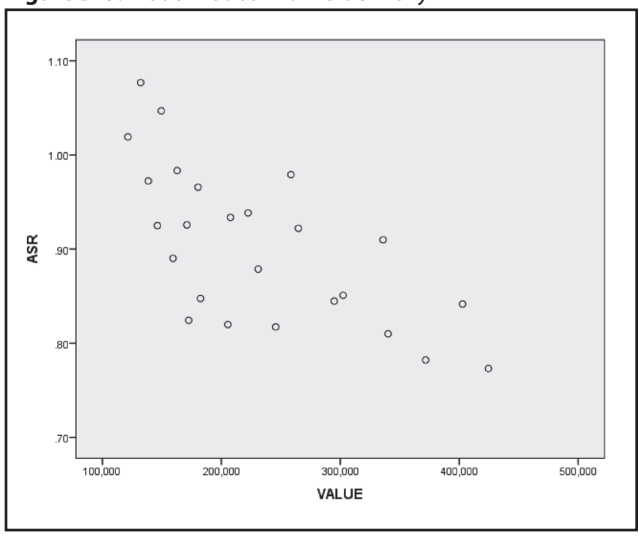

Figure D-4. PRB Plot

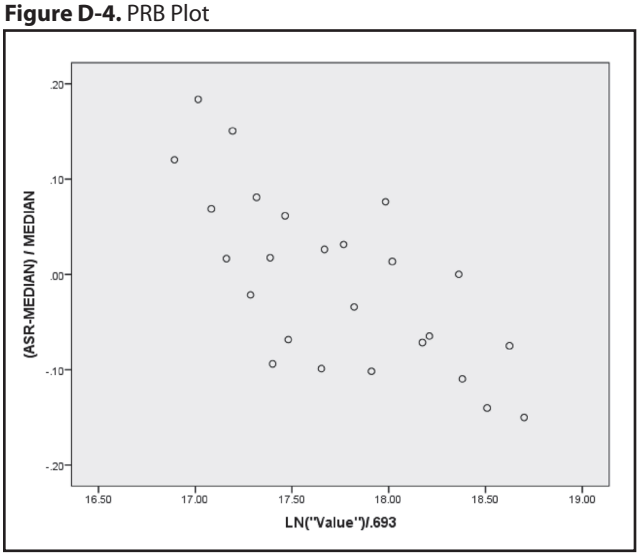

Table D-2. Ratio data with outlier

SALE	PRICE	ASMT	ASR
1	50,000	45,000	0.900
2	100,000	100,000	1.000
3	150,000	165,000	1.100
4	200,000	180,000	0.900
5	250,000	250,000	1.000
6	300,000	330,000	1.100
7	350,000	315,000	0.900
8	400,000	400,000	1.000
9	450,000	495,000	1.100
10	500,000	450,000	0.900
11	550,000	550,000	1.000
12	600,000	660,000	1.100
13	650,000	585,000	0.900
14	700,000	700,000	1.000
15	750,000	825,000	1.100
16	2,500,000	1,875,000	0.750

Table D-3. Ratio statistics with and without outlier

Ratio Statistics for 15 Sales (No Outliers)							
Ratio Statistics for ASMT / PRICE							
Sales	Mean	Median	Weighted Mean	Minimum	Maximum	PRD	COD
15	1.000	1.000	1.008	.900	1.100	.992	.067

Model		Coefficients		*t*	Sig.	95.0% Confidence Interval for *B*	
		B	Std. Error			Lower Bound	Upper Bound
1	PRB	.020	.020	1.032	.321	−.022	.063

Ratio Statistics for 16 Sales (1 Outlier)							
Ratio Statistics for ASMT / PRICE							
Sales	Mean	Median	Weighted Mean	Minimum	Maximum	PRD	COD
16	.984	1.000	.932	.750	1.100	1.056	.078

Model		Coefficients		*t*	Sig.	95.0% Confidence Interval for *B*	
		B	Std. Error			Lower Bound	Upper Bound
1	PRB	−.011	.021	−.520	.611	−.056	.034

Appendix E. Sales Chasing Detection Techniques

As long as sold and unsold parcels are appraised in the same manner and the data describing them are coded consistently, statistics calculated in a sales ratio study can be used to infer appraisal performance for unsold parcels. However, if parcels that sell are selectively reappraised or recoded based on their sale prices or some other criterion (such as listing price) and if such parcels are in the ratio study, sales ratio study uniformity inferences will not be accurate (appraisals will appear more uniform than they are). In this situation, measures of appraisal level also will be unsupportable unless similar unsold parcels were appraised by a model that produces the same overall percentage of market value (appraisal level) as on the parcels that sold based on consistently coded descriptive and locational data.

Assessors and oversight agencies do not need to employ all the detection techniques described in this appendix, but should consider implementing at least one procedure. In some cases, access to assessment information for all properties is necessary to perform the suggested techniques. Agencies that do not have access to these data are at a disadvantage, but should still implement detection techniques, such as those described in sections E.3 and E.4, which do not require such comprehensive assessment information.

E.1 Comparison of Average Value Changes

If sold and unsold properties within a specified group are appraised in the same way, their appraised values should reflect similar average percentage changes from year to year. Accordingly, changes in appraised values for sold and unsold parcels can be compared to determine whether sold parcels have been selectively appraised. Alternatively, the average percent change in value for sample parcels can be compared to that for the population of properties within a specified group or stratum for an indication of selective reappraisal.

For example, if sold parcels are considered representative of a stratum and appraised values increased an average of 10 percent while appraised values for unsold parcels in the same stratum increased an average of only 2 percent, "sales chasing" is a likely conclusion. At a more sophisticated level, the distribution of value changes for sold and unsold parcels can be compared, or statistical tests can be used to determine whether the distributions are different at a given level of confidence.

Statistical significance in the absence of practical significance may be moot. In large samples, small differences in the magnitude of assessed value changes on sold and unsold parcels can be proven to be statistically significant, yet the actual differences may be slight. Therefore, it is prudent to establish some reasonable tolerance, such as 3 percentage points (e.g., a change of 6 percent for sold properties and 3 percent for unsold properties), before concluding that a meaningful problem exists. Such tolerance applies to other detection techniques discussed below.

E.2 Comparison of Average Unit Values

If sold and unsold parcels are appraised equally, average unit values (for example, value per square foot) should be similar. An appropriate test (Mann Whitney or *t*-test) can be conducted to determine whether differences are significant.

E.3 Split Sample Technique

In this technique, two ratio studies are performed, one using sales that occurred before the appraisal date and one using sales after the appraisal date, both adjusted for date of sale as appropriate. Except for random sampling error and any error in time adjustments, results of the two studies should be similar. Sales chasing is indicated if the results of the first study are consistently better than those from the second. In such a case, the second study is still valid; the first study should be rejected.

E.4 Comparison of Observed versus Expected Distribution of Ratios

Assuming the ratio studies are based on sales that have been properly adjusted for time and other factors, a strong indication of the likelihood of "sales chasing" can be obtained by computing the proportion of ratios that would be expected to fall within a particular narrow range of the mean given the lowest likely standard deviation (although this depends somewhat on the assumption of a normal distribution). For example, with a standard deviation of 5 percent given a normal distribution, about 32 percent of the ratios would be expected to fall within ±2 percent of the mean (for example, between 98 and 102 percent, given a mean of 100 percent). Except in highly constrained or well-behaved real estate markets, many appraisers consider such a low standard deviation, corresponding approximately to a COD of 4 percent, to be unachievable. Regardless of the distribution of the ratios, the likelihood is extremely low that there would be a sufficiently representative sample with more than this proportion of ratios in such a narrow range. If such is the case, "sales chasing" is a likely conclusion. Sometimes other processes through

which adjustments to assessments on selling parcels are more pronounced than on the population as a whole mimic the effect of sales chasing, such as more intensive reviews of sales than non-sales. Regardless of the practice, the representativeness of the ratio study is called into question and additional tests should be instituted.

Although samples may not be normally distributed, in which case equivalently precise proportions of expected ratios around the median cannot be determined, the 32 percent concentration is very conservative. Finding such a high concentration of ratios around any measure of central tendency is a strong indicator of sales chasing or of a non-representative ratio study. In addition, when the distribution of ratios is bimodal or multimodal, similar significant concentrations of ratios around these modes can indicate selective reappraisal or sales chasing.

Table E-1 demonstrates the conservative nature of the 32 percent concentration. If the minimum achievable COD is, in fact, higher than 4 percent for the strata or property class being analyzed, then even lower concentrations could indicate sales chasing, and previously discussed investigative procedures should be instituted. One disadvantage to this procedure is that it can be misleading when applied to small samples. Therefore the method should not be employed for sample sizes less than 30.

Even when critical proportions of ratios shown in table E-1 are exceeded, further investigation should be conducted before concluding that sales chasing has occurred.

E.5 Mass Appraisal Techniques

Provided sales are sufficient in number, oversight agencies can develop mass appraisal models to apply to a random sample of unsold properties or to the population of properties that are represented by the sold properties. An independent multiple regression or other automated calibration techniques can be used to develop the models. An appraisal ratio study is then conducted for the unsold parcels by using values predicted by the independent models as indicators of market values. This approach has the following advantages:

- It is objective and rooted in the market.
- The models can be reviewed for sufficient reliability before being applied to the unsold parcels.
- The technique yields measures of central tendency, which can be compared against those produced by the sales ratio study and tested for compliance with standards for the level of appraisal.
- The technique takes the form of an appraisal ratio study but avoids the time and expense of single-property appraisals.

Reliability of this method depends on the accuracy and independence of the mass appraisal models used to generate the value estimates. The models must be consistent with appraisal theory and reviewed for sufficient reliability by examining goodness-of-fit statistics. The models should be independent of those used for assessment purposes.

Table E-1. Example of critical ratio concentrations indicative of sales chasing or similar practices

Minimum achievable COD	Standard deviation assuming normal distribution and mean ratio of 100%	Critical proportion of ratios*	z score based on ± 2% range (Absolute value)	Expected proportion of ratios below 0.98	Expected proportion of ratios below 1.02	Expected proportion between 0.98 and 1.02 (within ± 2% of central tendency)
1.6%	2.00%	69	1.0000	0.1587	0.8413	0.6826
4.0%	5.00%	32	0.4000	0.3446	0.6554	0.3108
5.0%	6.25%	26	0.3200	0.3745	0.6255	0.2510
6.0%	7.50%	22	0.2667	0.3949	0.6051	0.2102
7.0%	8.75%	19	0.2286	0.4110	0.5896	0.1801
8.0%	10.00%	16	0.2000	0.4207	0.5793	0.1586
10.0%	12.50%	13	0.1600	0.4364	0.5636	0.1272
12.0%	15.00%	11	0.1333	0.4467	0.5530	0.1063
14.0%	17.50%	10	0.1143	0.4545	0.5455	0.0910
16.0%	20.00%	8	0.1000	0.4602	0.5398	0.0796

** Given the assumption that the COD shown represents the minimum achievable COD for the property type, class, or strata being analyzed with the ratio study, sales chasing (or a similar distortive procedure) is very likely if the concentration of ratios with ± 2% of a measure of central tendency, such as the median or a mode, or 100%, equals or exceeds this value. This proportion is based on values of the standard normal distribution function and assumption that sample size is greater than 30. The critical number equals the integer immediately exceeding the expected proportion.*

Appendix F. Alternative Uses for Ratio Study Statistics

In addition to the use of statistical measures to determine underlying assessment level and uniformity, comparisons between measures can provide useful information about sample representativeness, the distribution of the ratios, and the influence of outliers. For example, by comparing the mean and weighted mean, even without determining the PRD, the analyst should be aware that a large difference between these two measures indicates probable influence of atypical ratios on high-priced properties. This in turn could mean that outliers are still present in the sample and that the sample is not representative. Alternatively, it could indicate systematic appraisal error in the appraisal of properties within a particular price range. The geometric mean-to-mean relationship can provide similar information, especially about the presence of very low ratios, which have a greater influence on the geometric mean. The relationship between the COD and COV can provide similar additional guidance. This standard chooses the COD as the primary recommended measure of uniformity. This choice reflects the expectation of non-normal distributions of ratios. Despite this consideration, it is useful to recognize that, in a normal distribution, the COV is approximately 1.25 times the COD. When the COV/COD ratio exceeds 1.25, the likely cause is a small number of very high ratios, which may again be non-representative.

It is incumbent on the analyst to review the ratio study sample to attempt to provide a representative sample. Comparisons of statistics, such as those given in this appendix, provide an additional tool to help the analyst in this regard.

Appendix G. Legal Aspects of Ratio Studies

Property taxation is governed by federal, state, and provincial constitutions, statutes, and administrative rules or regulations, many of which require uniform treatment of property taxpayers. Ratio studies play an important role in judging whether uniformity requirements are met. Relevant Canadian Federal statutes based on the Constitution Acts of 1867–1975 provide that municipal councils cannot discriminate between taxpayers of the same class within municipalities.

Relevant United States federal provisions include the Bill of Rights, the commerce clause of the United States Constitution, the Fourteenth Amendment, and the Tax Injunction Act (28 U.S.C. § 1341). Together they guarantee basic protections and due process while still granting states the authority to classify property and grant reasonable exemptions. Many constitutions have clauses that require uniformity in the assessment and taxation of property, although some jurisdictions, either by constitution or statute, permit certain differences between classes. Ratio studies provide a gauge of whether uniformity requirements are being met.

A key U.S. federal statute relating to ratio studies is the U.S. Railroad Revitalization and Regulatory Reform Act ("4-R Act") of 1976 (49 U.S.C. § 11501). The 4-R Act requires that rail transportation property be assessed for tax purposes at no more than 105 percent of the assessment level of other commercial and industrial property in the same taxing jurisdiction. Similar federal statutes relate to air transportation property, motor carriers, and bus lines (49 U.S.C. §§14502 and 40116).

The 4-R Act provides that ratio studies be used to measure alleged discrimination. In such cases, as in any ratio study, the purpose of the study must be clearly defined and the study must be conducted so that it accurately evaluates the issues at hand. Important issues in ratio studies conducted pursuant to the 4-R Act include the proper definition of "other" commercial and industrial property, screening and adjustments to sales data, proper measures of the level of appraisal, and the combining and weighting of centrally valued and locally assessed properties.

Appendix H. Sales Validation Questionnaire

Parcel Identification Number _____ Instrument Number _____
Instrument Type _____ ❑ Multi Parcel Sale ❑ Split Sale Recording Date _____

Seller (Grantor) Name	Buyer (Grantee) Name
_____	_____
Mailing _____	Mailing _____
City/ST/ZIP _____	City/ST/ZIP _____
Phone _____	Phone _____
E-mail address _____	E-mail address _____
Brief Legal Description	Property/Situs Address _____
_____	Name and Mailing Address for Tax Statements
_____	_____
_____	_____
_____	_____

PLEASE ANSWER THE FOLLOWING QUESTIONS:

1. Special factors:
   ❑ Sale between immediate family members:
   SPECIFY THE RELATIONSHIP
   ❑ Sale involved corporate affiliates belonging to the same parent company
   ❑ Sale of convenience (correct defects in title; create a joint or common tenancy, etc.)
   ❑ Auction Sale
   ❑ Deed transfer in lieu of foreclosure or repossession
   ❑ Forced sale or sheriff's sale
   ❑ Sale by judicial order (guardian, executor, conservator)
   ❑ Sale involved a government agency or public utility
   ❑ Buyer (new owner) is a religious, charitable, or benevolent organization, school or educational association
   ❑ Land contract or contract for deed
   ❑ Sale of only a partial interest in the real estate
   ❑ Sale involved a trade or exchange of properties
   ❑ **NONE OF THE ABOVE**
2. Check use of property at the time of sale:
   ❑ Single Family Residence ❑ Agricultural Land
   ❑ Farm/Ranch with Residence ❑ Vacant Lot
   ❑ Condominium Unit ❑ Commercial/Industrial
   ❑ Other: (Specify) _____
   _____
3. Was the property rented or leased at the time of sale? ❑ Yes ❑ No
4. Did the sale price include an existing business? ❑ Yes ❑ No
5. Was any personal property (such as furniture, equipment, machinery, livestock, crops, business franchise or inventory, etc.) included in the sale price? ❑ Yes ❑ No
   If yes, please describe _____
   _____
   Estimated value of all personal property items included in the sale price $ _____
6. Any recent changes to the property? ❑ Yes ❑ No
   ❑ New Construction ❑ Demolition
   ❑ Remodeling ❑ Additions
   Was the work performed by a professional? ❑ Yes ❑ No
   Date Completed _____/_____/_____
   Estimated cost of labor and materials? $ _____
7. Was there a change in use? ❑ Yes ❑ No
   If yes, please explain: _____
   _____
8. Does the buyer hold title to any adjoining property? ❑ Yes ❑ No
9. Was there an appraisal made on the property? ❑ Yes ❑ No
10. Were any **delinquent** taxes assumed by the purchaser?
    ❑ Yes—Amount $_____ ❑ No
11. Were the **delinquent** taxes included in the sale price?
    ❑ Yes ❑ No ❑ NA
12. How property was marketed (check all that apply):
    ❑ Listed with real estate agent ❑ Displayed a "For Sale" sign
    ❑ Advertised in the newspaper ❑ Offered by word of mouth
13. Was the property made available to other potential purchasers?
    ❑ Yes ❑ No
    If not, explain _____
    _____
14. How long was the property on the market? _____
15. What was the asking price? _____
16. Date sales price was agreed upon _____/_____/_____
17. Method of financing (check all that apply):
    ❑ New loan(s) from a Financial Institution
    Name of lending institution: _____
    Cash down payment $_____
    Amount $_____ Interest rate _____% Term _____
    ❑ Assumption of Existing Loan(s)
    Amount $_____ Interest rate _____% Term _____
    ❑ Seller Financing
    Amount $_____ Interest rate _____% Term _____
    ❑ Trade of Property: Estimated Value $ _____
    Describe Traded Property _____
    ❑ All Cash ❑ Not Applicable
18. **Total Sale Price $**_____
19. Was the sale influenced by any unusual circumstances?
    ❑ Yes ❑ No
    If yes, please explain _____
    _____
    _____
20. Is the total sale price a fair reflection of the market value for the real estate on the sale date? ❑ Yes ❑ No If no, please explain _____
    _____
    _____

PRINT NAME - _____

SIGNATURE _____
❑ GRANTOR (SELLER) Daytime Phone No. (_____) _____
❑ GRANTEE (BUYER) Daytime Phone No. (_____) _____
❑ AGENT Daytime Phone No. (_____) _____

Assessment Standards of the International Association of Assessing Officers

Guide to Assessment Standards

Standard on Assessment Appeal

Standard on Automated Valuation Models

Standard on Contracting for Assessment Services

Standard on Digital Cadastral Maps and Parcel Identifiers

Standard on Manual Cadastral Maps and Parcel Identifiers

Standard on Mass Appraisal of Real Property

Standard on Oversight Agency Responsibilities

Standard on Professional Development

Standard on Property Tax Policy

Standard on Public Relations

Standard on Ratio Studies

Standard on Valuation of Personal Property

Standard on Valuation of Property Affected by Environmental Contamination

Standard on Verification and Adjustment of Sales

To download the current approved version of any of the standards listed above, go to:

IAAO Technical Standards

Standard on Mass Appraisal of Real Property

Approved July 2017

International Association of Assessing Officers

This standard replaces the January 2012 *Standard on Mass Appraisal of Real Property* and is a complete revision. The 2012 *Standard on Mass Appraisal of Real Property* was a partial revision that replaced the 2002 standard. The 2002 standard combined and replaced the 1983 *Standard on the Application of the Three Approaches to Value in Mass Appraisal*, the 1984 *Standard on Mass Appraisal*, and the 1988 *Standard on Urban Land Valuation.* IAAO assessment standards represent a consensus in the assessing profession and have been adopted by the Executive Board of IAAO. The objective of IAAO standards is to provide a systematic means by which concerned assessing officers can improve and standardize the operation of their offices. IAAO standards are advisory in nature and the use of, or compliance with, such standards is purely voluntary. If any portion of these standards is found to be in conflict with the *Uniform Standards of Professional Appraisal Practice (USPAP*) or state laws, *USPAP* and state laws shall govern.

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Contents

Standard on Mass Appraisal of Real Property

1. Scope

This standard defines requirements for the mass appraisal of real property. The primary focus is on mass appraisal for ad valorem tax purposes. However, the principles defined here should also be relevant to CAMAs (CAMAs) (or automated valuation models) used for other purposes, such as mortgage portfolio management. The standard primarily addresses the needs of the assessor, assessment oversight agencies, and taxpayers.

This standard addresses mass appraisal procedures by which the fee simple interest in property can be appraised at market value, including mass appraisal application of the three traditional approaches to value (cost, sales comparison, and income). Single-property appraisals, partial interest appraisals, and appraisals made on an other-than-market-value basis are outside the scope of this standard. Nor does this standard provide guidance on determining assessed values that differ from market value because of statutory constraints such as use value, classification, or assessment increase limitations.

Mass appraisal requires complete and accurate data, effective valuation models, and proper management of resources. Section 2 introduces mass appraisal. Section 3 focuses on the collection and maintenance of property data. Section 4 summarizes the primary considerations in valuation methods, including the role of the three approaches to value in the mass appraisal of various types of property. Section 5 addresses model testing and quality assurance. Section 6 discusses certain managerial considerations: staff levels, data processing support, contracting for reappraisals, benefit-cost issues, and space requirements. Section 7 discusses reference materials.

2. Introduction

Market value for assessment purposes is generally determined through the application of mass appraisal techniques. Mass appraisal is the process of valuing a group of properties as of a given date and using common data, standardized methods, and statistical testing. To determine a parcel's value, assessing officers must rely upon valuation equations, tables, and schedules developed through mathematical analysis of market data. Values for individual parcels should not be based solely on the sale price of a property; rather, valuation schedules and models should be consistently applied to property data that are correct, complete, and up-to-date.

Properly administered, the development, construction, and use of a CAMA system results in a valuation system characterized by accuracy, uniformity, equity, reliability, and low per-parcel costs. Except for unique properties, individual analyses and appraisals of properties are not practical for ad valorem tax purposes.

3. Collecting and Maintaining Property Data

The accuracy of values depends first and foremost on the completeness and accuracy of property characteristics and market data. Assessors will want to ensure that their CAMA systems provide for the collection and maintenance of relevant land, improvement, and location features. These data must also be accurately and consistently collected. The CAMA system must also provide for the storage and processing of relevant sales, cost, and income and expense data.

3.1 Overview

Uniform and accurate valuation of property requires correct, complete, and up-to-date property data. Assessing offices must establish effective procedures for collecting and maintaining property data (i.e., property ownership, location, size, use, physical characteristics, sales price, rents, costs, and operating expenses). Such data are also used for performance audits, defense of appeals, public relations, and management information. The following sections recommend procedures for collecting these data.

3.2 Geographic Data

Assessors should maintain accurate, up-to-date cadastral maps (also known as assessment maps, tax maps, parcel boundary maps, and property ownership maps) covering the entire jurisdiction with a unique identification number for each parcel. Such cadastral maps allow assessing officers to identify and locate all parcels, both in the field and in the office. Maps become especially valuable in the mass appraisal process when a geographic information system (GIS) is used. A GIS permits graphic displays of sale prices, assessed values, inspection dates, work assignments, land uses, and much more. In addition, a GIS permits high-level analysis of nearby sales, neighborhoods, and market trends; when linked to a CAMA system, the results can be very useful. For additional information on cadastral maps, parcel identification systems, and GIS, see the *Standard on Manual Cadastral Maps and Parcel Identifiers* (IAAO 2016b), *Standard on Digital Cadastral Maps and Parcel Identifiers* (IAAO 2015), *Procedures and Standards for a Multipurpose Cadastre* (National Research Council 1983), and *GIS Guidelines for Assessors* (URISA and IAAO 1999).

3.3 Property Characteristics Data

The assessor should collect and maintain property characteristics data sufficient for classification, valuation, and other purposes. Accurate valuation of real property by any method requires descriptions of land and building characteristics.

3.3.1 Selection of Property Characteristics Data

Property characteristics to be collected and maintained should be based on the following:

- Factors that influence the market in the locale in question
- Requirements of the valuation methods that will be employed
- Requirements of classification and property tax policy
- Requirements of other governmental and private users
- Marginal benefits and costs of collecting and maintaining each property characteristic

Determining what data on property characteristics to collect and maintain for a CAMA system is a crucial decision with long-term consequences. A pilot program is one means of evaluating the benefits and costs of collecting and maintaining a particular set of property characteristics (see Gloudemans and Almy 2011, 46–49). In addition, much can be learned from studying the data used in successful CAMAs in other jurisdictions. Data collection and maintenance are usually the costliest aspects of a CAMA. Collecting data that are of little

importance in the assessment process should be avoided unless another governmental or private need is clearly demonstrated.

The quantity and quality of existing data should be reviewed. If the data are sparse and unreliable, a major recanvass will be necessary. Data that have been confirmed to be reliable should be used whenever possible. New valuation programs or enhancements requiring major recanvass activity or conversions to new coding formats should be viewed with suspicion when the existing database already contains most major property characteristics and is of generally good quality.

The following property characteristics are usually important in predicting residential property values:

Improvement Data

- Living area
- Construction quality or key components thereof (foundation, exterior wall type, and the like)
- Effective age or condition
- Building design or style
- Secondary areas including basements, garages, covered porches, and balconies
- Building features such as bathrooms and central air-conditioning
- Significant detached structures including guest houses, boat houses, and barns

Land Data

- Lot size
- Available utilities (sewer, water, electricity)

Location Data

- Market area
- Submarket area or neighborhood
- Site amenities, especially view and golf course or water frontage
- External nuisances, (e.g., heavy traffic, airport noise, or proximity to commercial uses).

For a discussion of property characteristics important for various commercial property types, see *Fundamentals of Mass Appraisal* (Gloudemans and Almy 2011, chapter 9).

3.3.2 Data Collection

Collecting property characteristics data is a critical and expensive phase of reappraisal. A successful data collection program requires clear and standard coding and careful monitoring through a quality control program. The development and use of a data collection manual is essential to achieving accurate and consistent data collection. The data collection program should result in complete and accurate data.

3.3.2.1 Initial Data Collection

A physical inspection is necessary to obtain initial property characteristics data. This inspection can be performed either by appraisers or by specially trained data collectors. In a joint approach, experienced appraisers make key subjective decisions, such as the assignment of construction quality class or grade, and data collectors gather all other details. Depending on the data required, an interior inspection might be necessary. At a minimum, a comprehensive exterior inspection should be conducted. Measurement is an important part of data collection.

3.3.2.2 Data Collection Format

Data should be collected in a prescribed format designed to facilitate both the collecting of data in the field and the entry of the data into the computer system.

A logical arrangement of the collection format makes data collection easier. For example, all items requiring an interior inspection should be grouped together. The coding of data should be as objective as possible, with measurements, counts, and check-off items used in preference to items requiring subjective evaluations (such as "number of plumbing fixtures" versus "adequacy of plumbing: poor, average, good"). With respect to check-off items, the available codes should be exhaustive and mutually exclusive, so that exactly one code logically pertains to each observable variation of a building feature (such as structure or roof type). The data collection format should promote consistency among data collectors, be clear and easy to use, and be adaptable to virtually all types of construction. Specialized data collection formats may be necessary to collect information on agricultural property, timberland, commercial and industrial parcels, and other property types.

3.3.2.3 Data Collection Manuals

A clear, thorough, and precise data collection manual is essential and should be developed, updated, and maintained. The written manual should explain how to collect and record each data item. Pictures, examples, and illustrations are particularly helpful. The manual should be simple yet complete. Data collection staff should be trained in the use of the manual and related updates to maintain consistency. The manual should include guidelines for personal conduct during field inspections, and if interior data are required, the manual should outline procedures to be followed when the property owner has denied access or when entry might be risky.

3.3.2.4 Data Accuracy Standards

The following standards of accuracy for data collection are recommended.

- Continuous or area measurement data, such as living area and exterior wall height, should be accurate within 1 foot (rounded to the nearest foot) of the true dimensions or within 5 percent of the area. (One foot equates to approximately 30 centimeters in the metric system.) If areas, dimensions, or volumes must be estimated, the property record should note the instances in which quantities are estimated.
- For each objective, categorical, or binary data field to be collected or verified, at least 95 percent of the coded entries should be accurate. Objective, categorical, or binary data characteristics include such attributes as exterior wall material, number of full bathrooms, and waterfront view. As an example, if a data collector captures 10 objective, categorical, or binary data items for 100 properties, at least 950 of the 1,000 total entries should be correct.
- For each subjective categorical data field collected or verified, data should be coded correctly at least 90 percent of the time. Subjective categorical data characteristics include data items such as quality grade, physical condition, and architectural style.
- Regardless of specific accuracy requirements, consistent measurement is important. Standards including national, local and regional practices exist to support consistent measurement. The standard of measurement should be documented as part of the process. (American Institute of Architects 1995; Marshall & Swift Valuation Service 2017; International Property Measurement Standards Coalition n.d.; Building Owners and Managers Association International 2017)

3.3.2.5 Data Collection Quality Control

A quality control program is necessary to ensure that data accuracy standards are achieved and maintained. Independent quality control inspections should occur immediately after the data collection phase begins and may be performed by jurisdiction staff, project consultants,

auditing firms, or oversight agencies. The inspections should review random samples of finished work for completeness and accuracy and keep tabulations of items coded correctly or incorrectly, so that statistical tests can be used to determine whether accuracy standards have been achieved. Stratification by geographic area, property type, or individual data collector can help detect patterns of data error. Data that fail to meet quality control standards should be recollected.

The accuracy of subjective data should be judged primarily by conformity with written specifications and examples in the data collection manual. The data reviewer should substantiate subjective data corrections with pictures or field notes.

3.3.3 Data Entry

To avoid duplication of effort, the data collection form should be able to serve as the data entry form. Data entry should be routinely audited to ensure accuracy.

Data entry accuracy should be as close to 100 percent as possible and should be supported by a full set of range and consistency edits. These are error or warning messages generated in response to invalid or unusual data items. Examples of data errors include missing data codes and invalid characters. Warning messages should also be generated when data values exceed normal ranges (e.g., more than eight rooms in a 1,200-square-foot residence). The warnings should appear as the data are entered. When feasible, action on the warnings should take place during data entry. Field data entry devices provide the ability to edit data as it is entered and also eliminate data transcription errors.

3.3.4 Maintaining Property Characteristics Data

Property characteristics data should be continually updated in response to changes brought about by new construction, new parcels, remodeling, demolition, and destruction. There are several ways of updating data. The most efficient method involves building permits. Ideally, strictly enforced local ordinances require building permits for all significant construction activity, and the assessor's office receives copies of the permits. This method allows the assessor to identify properties whose characteristics are likely to change, to inspect such parcels on a timely basis (preferably as close to the assessment date as possible), and to update the files accordingly.

Another method is aerial photography, which also can be helpful in identifying new or previously unrecorded construction and land use.
Some jurisdictions use self-reporting, in which property owners review the assessor’s records and submit additions or corrections. Information derived from multiple listing sources and other third-party vendors can also be used to validate property records.

Periodic field inspections can help ensure that property characteristics data are complete and accurate. Assuming that most new construction activity is identified through building permits or other ongoing procedures, a physical review including an on-site verification of property characteristics should be conducted at least every 4 to 6 years. Reinspections should include partial remeasurement of the two most complex sides of improvements and a walk around the improvement to identify additions and deletions. Photographs taken at previous physical inspections can help identify changes.

3.3.5 Alternative to Periodic On-site Inspections

Provided that initial physical inspections are timely completed and that an effective system of building permits or other methods of routinely identifying physical changes is in place, jurisdictions may employ a set of digital imaging technology tools to supplement field reinspections with a computer-assisted office review. These imaging tools should include the following:

- Current high-resolution street-view images (at a sub-inch pixel resolution that enables quality grade and physical condition to be verified)
- Orthophoto images (minimum 6-inch pixel resolution in urban/suburban and 12-inch resolution in rural areas, updated every 2 years in rapid-growth areas or 6–10 years in slow-growth areas)
- Low-level oblique images capable of being used for measurement verification (four cardinal directions, minimum 6-inch pixel resolution in urban/suburban and 12-inch pixel resolution in rural areas, updated every 2 years in rapid-growth areas or 6–10 years in slow-growth areas).

These tool sets may incorporate change detection techniques that compare building dimension data (footprints) in the CAMA system to georeferenced imagery or remote sensing data from sources (such as LiDAR [light detection and ranging]) and identify potential CAMA sketch discrepancies for further investigation.

Assessment jurisdictions and oversight agencies must ensure that images meet expected quality standards. Standards required for vendor-supplied images should be spelled out in the Request for Proposal (RFP) and contract for services, and images should be checked for compliance with specified requirements. For general guidance on preparing RFPs and contracting for vendor-supplied services, see the *Standard on Contracting for Assessment Services* [IAAO 2008].

In addition, appraisers should visit assigned areas on an annual basis to observe changes in neighborhood condition, trends, and property characteristics. An on-site physical review is recommended when significant construction changes are detected, a property is sold, or an area is affected by catastrophic damage. Building permits should be regularly monitored and properties that have significant change should be inspected when work is complete.

3.4 Sale Data

States and provinces should seek mandatory disclosure laws to ensure comprehensiveness of sale data files. Regardless of the availability of such statutes, a file of sale data must be maintained, and sales must be properly reviewed and validated. Sale data are required in all applications of the sales comparison approach, in the development of land values and market-based depreciation schedules in the cost approach, and in the derivation of capitalization rates or discount rates in the income approach. Refer to *Mass Appraisal of Real Property* (Gloudemans 1999, chapter 2) or *Fundamentals of Mass Appraisal (*Gloudemans and Almy 2011 chapter 2) for guidelines on the acquisition and processing of sale data.

3.5 Income and Expense Data

Income and expense data must be collected for income-producing property and reviewed by qualified appraisers to ensure their accuracy and usability for valuation analysis (see Section 4.4.). Refer to *Mass Appraisal of Real Property* (Gloudemans 1999, chapter 2) or *Fundamentals of Mass Appraisal* (Gloudemans and Almy 2011, chapter 2) for guidelines addressing the collection and processing of income and expense data.

3.6 Cost and Depreciation Data

Current cost and depreciation data adjusted to the local market are required for the cost approach (see Section 4.2). Cost and depreciation manuals and schedules can be purchased from commercial services or created in-house. See *Mass Appraisal of Real Property* (Gloudemans 1999, chapter 4) or *Fundamentals of Mass Appraisal (*Gloudemans and Almy 2011, 180–193) for guidelines on creating manuals and schedules.

4. Valuation

Mass appraisal analysis begins with assigning properties to use classes or strata based on highest and best use, which normally equates to current use. Some statutes require that property be valued for ad valorem tax purposes at current use regardless of highest and best use. Zoning and other land use controls normally dictate highest and best use of vacant land. In the absence of such restrictions, the assessor must determine the highest and best use of the land by analyzing the four components—legally permissible, physically possible, appropriately supported, and financially feasible—thereby resulting in the highest value. Special attention may be required for properties in transition, interim or nonconforming uses, multiple uses, and excess land.

4.1 Valuation Models

Any appraisal, whether single-property appraisal or mass appraisal, uses a model, that is, a representation in words or an equation of the relationship between value and variables representing factors of supply and demand. Mass appraisal models attempt to represent the market for a specific type of property in a specified area. Mass appraisers must first specify the model, that is, identify the supply and demand factors and property features that influence value, for example, square feet of living area. Then they must calibrate the model, that is, determine the adjustments or coefficients that best represent the value contribution of the variables chosen, for example, the dollar amount the market places on each square foot of living area. Careful and extensive market analysis is required for both specification and calibration of a model that estimates values accurately. Mass appraisal models apply to all three approaches to value: the cost approach, the sales comparison approach, and the income approach.

Valuation models are developed for defined property groups. For residential properties, geographic stratification is appropriate when the value of property attributes varies significantly among areas and each area is large enough to provide adequate sales. It is particularly effective when housing types and styles are relatively uniform within areas. Separate models are developed for each market area (also known as economic or model areas). Subareas or neighborhoods can serve as variables in the models and can also be used in land value tables and selection of comparable sales. (See *Mass Appraisal of Real Property* [Gloudemans 1999, 118–120] or *Fundamentals of Mass Appraisal* [Gloudemans and Almy 2011, 139–143] for guidelines on stratification.) Smaller jurisdictions may find it sufficient to develop a single residential model.

Commercial and income-producing properties should be stratified by property type. In general, separate models should be developed for apartment, warehouse/industrial, office, and retail properties. Large jurisdictions may be able to stratify apartment properties further by type or area or to develop multiple models for other income properties with adequate data.

4.2 The Cost Approach

The cost approach is applicable to virtually all improved parcels and, if used properly, can produce accurate valuations. The cost approach is more reliable for newer structures of standard materials, design, and workmanship. It produces an estimate of the value of the fee simple interest in a property.

Reliable cost data are imperative in any successful application of the cost approach. The data must be complete, typical, and current. Current construction costs should be based on the cost of replacing a structure with one of equal utility, using current materials, design, and building standards. In addition to specific property types, cost models should include the cost of individual construction components and building items in order to adjust for features that differ from base specifications. These costs should be incorporated into a construction cost manual and related computer software. The software can perform the valuation function, and the manual, in addition to providing documentation, can be used when nonautomated calculations are required.

Construction cost schedules can be developed in-house, based on a systematic study of local construction costs, obtained from firms specializing in such information, or custom-generated by a contractor. Cost schedules should be verified for accuracy by applying them to recently constructed improvements of known cost. Construction costs also should be updated before each assessment cycle.

The most difficult aspects of the cost approach are estimates of land value and accrued depreciation. These estimates must be based on non-cost data (primarily sales) and can involve considerable subjectivity. Land values used in the cost approach must be current and consistent. Often, they must be extracted from sales of improved property because sales of vacant land are scarce. Section 4.5 provides standards for land valuation in mass appraisal.

Depreciation schedules can be extracted from sales data in several ways. See *Mass Appraisal of Real Property* (Gloudemans 1999, chapter 4) or *Fundamentals of Mass Appraisal* (Gloudemans and Almy 2011, 189–192).

4.3 The Sales Comparison Approach

The sales comparison approach estimates the value of a subject property by statistically analyzing the sale prices of similar properties. This approach is usually the preferred approach for estimating values for residential and other property types with adequate sales.

Applications of the sales comparison approach include direct market models and comparable sales algorithms (see *Mass Appraisal of Real Property* [Gloudemans 1999, chapters 3 and 4], *Fundamentals of Mass Appraisal* [Gloudemans and Almy 2011, chapters 4 and 6], and the *Standard on Automated Valuation Models (AVMs)* [IAAO 2003]). Comparable sales algorithms are most akin to single-property appraisal applications of the sales comparison approach. They have the advantages of being familiar and easily explained and can compensate for less well-specified or calibrated models, because the models are used only to make adjustments to the selected comparables. They can be problematic if the selected comparables are not well validated or representative of market value. Because they predict market value directly, direct market models depend more heavily on careful model specification and calibration. Their advantages include efficiency and consistency, because the same model is directly applied against all properties in the model area.

Users of comparable sales algorithms should be aware that sales ratio statistics will be biased if sales used in the ratio study are used as comparables for themselves in model development. This problem can be avoided by (1) not using sales as comparables for themselves in modeling or (2) using holdout or later sales in ratio studies.

4.4 The Income Approach

In general, for income-producing properties, the income approach is the preferred valuation approach when reliable income and expense data are available, along with well-supported income multipliers, overall rates, and required rates of return on investment. Successful application of the income approach requires the collection, maintenance, and careful analysis of income and expense data.

Mass appraisal applications of the income approach begin with collecting and processing income and expense data. (These data should be expressed on an appropriate per-unit basis, such as per square foot or per apartment unit.) Appraisers should then compute normal or typical gross incomes, vacancy rates, net incomes, and expense ratios for various homogeneous strata of properties. These figures can be used to judge the reasonableness of reported data for individual parcels and to estimate income and expense figures for parcels with unreported data. Actual or

reported figures can be used as long as they reflect typical figures (or typical figures can be used for all properties).

Alternatively, models for estimating gross or net income and expense ratios can be developed by using actual income and expense data from a sample of properties and calibrated by using multiple regression analysis. For an introduction to income modeling, see *Mass Appraisal of Real Property* (Gloudemans 1999, chapter 3) or *Fundamentals of Mass Appraisal* (Gloudemans and Almy 2011, chapter 9). The developed income figures can be capitalized into estimates of value in a number of ways. The most direct method involves the application of gross income multipliers, which express the ratio of market value to gross income. At a more refined level, net income multipliers or their reciprocals, overall capitalization rates, can be developed and applied. Provided there are adequate sales, these multipliers and rates should be extracted from a comparison of actual or estimated incomes with sale prices (older income and sales data should be adjusted to the valuation date as appropriate). Income multipliers and overall rates developed in this manner tend to provide reliable, consistent, and readily supported valuations when good sales and income data are available. When adequate sales are not available, relevant publications and local market participants can be consulted.

4.5 Land Valuation

State or local laws may require the value of an improved parcel to be separated into land and improvement components. When the sales comparison or income approach is used, an independent estimate of land value can be made and subtracted from the total property value to obtain a residual improvement value. Some computerized valuation techniques provide a separation of total value into land and building components.

Land values should be reviewed annually. At least once every 4 to 6 years the properties should be physically inspected and revalued. The sales comparison approach is the primary approach to land valuation and is always preferred when sufficient sales are available. In the absence of adequate sales, other techniques that can be used in land appraisal include allocation, abstraction, anticipated use, capitalization of ground rents, and land residual capitalization. (See *Mass Appraisal of Real Property* [Gloudemans 1999, chapter 3] or *Fundamentals of Mass Appraisal* [Gloudemans and Almy 2011, 178–180].)

4.6 Considerations by Property Type

The appropriateness of each valuation approach varies with the type of property under consideration. Table 1 ranks the relative usefulness of the three approaches in the mass appraisal of major types of properties. The table assumes that there are no major statutory barriers to using all three approaches or to obtaining cost, sales, and income data. Although relying only on the single best approach for a given type of property can have advantages in terms of efficiency and consistency, the use of two or more approaches provides helpful cross-checks and flexibility and can thus produce greater accuracy, particularly for less typical properties.

Table 1. Rank of typical usefulness of the three approaches to value in the mass appraisal of major types of property

Type of Property	Cost Approach	Sales Comparison Approach	Income Approach
Single-family residential	2	1	3
Multifamily residential	3	1, 2	1, 2
Commercial	3	2	1
Industrial	1, 2	3	1, 2
Nonagricultural land	–	1	2
Agricultural[a]	–	2	1
Special-purpose[b]	1	2, 3	2, 3

[a] Includes farm, ranch, and forest properties.

[b] Includes institutional, governmental, and recreation properties.

4.6.1 Single-Family Residential Property

The sales comparison approach is the best approach for single-family residential property, including condominiums. Automated versions of this approach are highly efficient and generally accurate for the majority of these properties. The cost approach is a good supplemental approach and should serve as the primary approach when the sales data available are inadequate. The income approach is usually inappropriate for mass appraisal of single-family residential properties, because most of these properties are not rented.

4.6.2 Manufactured Housing

Manufactured or *mobile* homes can be valued in a number of ways depending on the local market and ownership status. Often mobile homes are purchased separately and situated on a rented space in a mobile home park. In this case the best strategy is to model the mobile homes separately from the land. At other times mobile homes are situated on individual lots and bought and sold similar to stick-built homes. Particularly in rural areas they may be intermixed with stick-built homes. In these cases, they can be modeled in a manner similar to that for other residential properties and included in the same models, as long as the model includes variables to distinguish them and recognize any relevant differences from other homes (e.g., mobile homes may appreciate at a rate different from that for stick-built homes).

4.6.3 Multifamily Residential Property

The sales comparison and income approaches are preferred in valuing multifamily residential property when sufficient sales and income data are available. Multiple regression analysis (MRA) and related techniques have been successfully used in valuing this property type. Where adequate sales are available, direct sales models can be used. MRA also can be used to calibrate different portions of the income approach, including the estimation of market rents and development of income multipliers or capitalization rates. As with other residential property, the cost approach is useful in providing supplemental valuations and can serve as the primary approach when good sales and income data are not available.

4.6.4 Commercial and Industrial Property

The income approach is the most appropriate method in valuing commercial and industrial property if sufficient income data are available. Direct sales comparison models can be equally effective in large jurisdictions with sufficient sales. When a sufficient supply of sales data and income data is not available, the cost approach should be

applied. However, values generated should be checked against available sales data. Cost factors, land values, and depreciation schedules must be kept current through periodic review.

4.6.5 Nonagricultural Land

The sales comparison approach is preferred for valuing nonagricultural land. Application of the sales comparison approach to vacant land involves the collection of sales data, the posting of sales data on maps, the calculation of standard unit values (such as value per square foot, per front foot, or per parcel) by area and type of land use, and the development of land valuation maps or computer-generated tables in which the pattern of values is displayed. When vacant land sales are not available or are few, additional benchmarks can be obtained by subtracting the replacement cost new less depreciation of improvements from the sale prices of improved parcels. The success of this technique requires reliable cost data and tends to work best for relatively new improvements, for which depreciation is minimal.

Another approach is a *hybrid* model decomposable into land and building values. Although these models can be calibrated from improved sales alone, separation of value between land and buildings is more reliable when both vacant and improved sales are available.

4.6.6 Agricultural Property

If adequate sales data are available and agricultural property is to be appraised at market value, the sales comparison approach is preferred. However, most states and provinces provide for the valuation of agricultural land at use value, making the sales comparison approach inappropriate for land for which market value exceeds use value. Thus, it is often imperative to obtain good income data and to use the income approach for agricultural land. Land rents are often available, sometimes permitting the development and application of overall capitalization rates. Many states and provinces have soil maps that assign land to different productivity classes for which typical rents can be developed. Cost tables can be used to value agricultural buildings.

4.6.7 Special-Purpose Property

The cost approach tends to be most appropriate in the appraisal of special-purpose properties, because of the distinctive nature of such properties and the general absence of adequate sales or income data.

4.7 Value Reconciliation

When more than one approach or model is used for a given property group, the appraiser must determine which to use or emphasize. Often this can be done by comparing ratio study statistics. Although there are advantages to being consistent, sometimes an alternative approach or method is more reliable for special situations and atypical properties. CAMA systems should allow users to document the approach or method being used for each property.

4.8 Frequency of Reappraisals

Section 4.2.2 of the *Standard on Property Tax Policy* (IAAO 2010) states that current market value implies annual assessment of all property. Annual assessment does not necessarily mean, however, that each property must be re-examined each year. Instead, models can be recalibrated, or market adjustment factors derived from ratio studies or other market analyses applied based on criteria such as property type, location, size, and age.

Analysis of ratio study data can suggest groups or strata of properties in greatest need of physical review. In general, market adjustments can be highly effective in maintaining equity when appraisals are uniform within strata and recalibration can provide even greater accuracy. However, only physical reviews can correct data errors and, as stated in Sections 3.3.4 and 3.3.5, property characteristics data should be reviewed and updated at least every 4 to 6 years. This can be accomplished in at least three ways:

- Reinspecting all property at periodic intervals (i.e., every 4 to 6 years)
- Reinspecting properties on a cyclical basis (e.g., one-fourth or one-sixth each year)
- Reinspecting properties on a priority basis as indicated by ratio studies or other considerations while still ensuring that all properties are examined at least every sixth year

5. Model Testing, Quality Assurance, and Value Defense

Mass appraisal allows for model testing and quality assurance measures that provide feedback on the reliability of valuation models and the overall accuracy of estimated values. Modelers and assessors must be familiar with these diagnostics so they can evaluate valuation performance properly and make improvements where needed.

5.1 Model Diagnostics

Modeling software contains various statistical measures that provide feedback on model performance and accuracy. MRA software contains multiple sets of diagnostic tools, some of which relate to the overall predictive accuracy of the model and some of which relate to the relative importance and statistical reliability of individual variables in the model. Modelers must understand these measures and ensure that final models not only make appraisal sense but also are statistically sound.

5.2 Sales Ratio Analyses

Regardless of how values were generated, sales ratio studies provide objective, bottom-line indicators of assessment performance. The IAAO literature contains extensive discussions of this important topic, and the *Standard on Ratio Studies* (2013) provides guidance for conducting a proper study. It also presents standards for key ratio statistics relating to the two primary aspects of assessment performance: level and uniformity. The following discussion summarizes these standards and describes how the assessor can use sales ratio metrics to help ensure accurate, uniform values.

5.2.1 Assessment Level

Assessment level relates to the overall or general level of assessment of a jurisdiction and various property classes, strata, and groups within the jurisdiction. Each group must be assessed at market value as required by professional standards and applicable statutes, rules, and related requirements. The three common measures of central tendency in ratio studies are the median, mean, and weighted mean. The *Standard on Ratio Studies* (2013) stipulates that the median ratio should be between 0.90 and 1.10 and provides criteria for determining whether it can be concluded that the standard has not been achieved for a property group. Current, up-to-date valuation models, schedules, and tables help ensure that assessment levels meet required standards, and values can be statistically adjusted between full reappraisals or model recalibrations to ensure compliance.

5.2.2 Assessment Uniformity

Assessment uniformity relates to the consistency and equity of values. Uniformity has several aspects, the first of which relates to consistency in assessment levels between property groups. It is important to ensure, for example, that residential and commercial properties are appraised at similar percentages of market value (regardless of the legal assessment ratios that may then be applied) and that residential assessment levels are consistent among neighborhoods, construction classes, age groups, and size groups. Consistency among property groups can be evaluated by comparing measures of central tendency calculated for each group.

Various graphs can also be used for this purpose. The *Standard on Ratio Studies* (IAAO 2013) stipulates that the level of appraisal for each major group of properties should be within 5 percent of the overall level for the jurisdiction and provides criteria for determining whether it can be concluded from ratio data that the standard has not been met.

Another aspect of uniformity relates to the consistency of assessment levels within property groups. There are several such measures, the preeminent of which is the coefficient of dispersion (COD), which represents the average percentage deviation from the median ratio. The lower the COD, the more uniform the ratios within the property group. In addition, uniformity can be viewed spatially by plotting sales ratios on thematic maps.

The *Standard on Ratio Studies* (IAAO 2013*)* provides the following standards for the COD:

- Single-family homes and condominiums: CODs of 5 to 10 for newer or fairly similar residences and 5 to 15 for older or more heterogeneous areas
- Income-producing properties: CODs of 5 to 15 in larger, urban areas and 5 to 20 in other areas
- Vacant land: CODs of 5 to 20 in urban areas and 5 to 25 in rural or seasonal recreation areas
- Rural residential, seasonal, and manufactured homes: CODs of 5 to 20.

The entire appraisal staff must be aware of and monitor compliance with these standards and take corrective action where necessary. Poor uniformity within a property group is usually indicative of data problems or deficient valuation procedures or tables and cannot be corrected by application of market adjustment factors.

A final aspect of assessment uniformity relates to equity between low- and high-value properties. Although there are statistical subtleties that can bias evaluation of price-related uniformity, the IAAO literature (see particularly *Fundamentals of Mass Appraisal* [Gloudemans and Almy 2011, 385–392 and Appendix B] and the *Standard on Ratio Studies* [IAAO 2013]) provides guidance and relevant measures, namely, the price-related differential (PRD) and coefficient of price-related bias (PRB).

The PRD provides a simple gauge of price-related bias. The *Standard on Ratio Studies* (IAAO 2013) calls for PRDs of 0.98 to 1.03. PRDs below 0.98 tend to indicate assessment progressivity, the condition in which assessment ratios increase with price. PRDs above 1.03 tend to indicate assessment regressivity, in which assessment ratios decline with price.

The PRB indicates the percentage by which assessment ratios change whenever values double or are halved. For example, a PRB of −0.03 would mean that assessment levels fall by 3 percent when value doubles. The *Standard on Ratio Studies* calls for PRBs of −0.05 to +0.05 and regards PRBs outside the range of −0.10 to +0.10 as unacceptable.

Because price is observable only for sale properties, there is no easy correction for the PRB, which is usually due to problems in valuation models and schedules. Sometimes other ratio study diagnostics will provide clues. For example, high ratios for lower construction classes may indicate that base rates should be reduced for those classes, which should in turn improve assessment ratios for low-value properties.

5.3 Holdout Samples

Holdout samples are validated sales that are not used in valuation but instead are used to test valuation performance. Holdout samples should be randomly selected with a view to obtaining an adequate sample while ensuring that the number of sales available for valuation will provide reliable results for the range of properties that must be valued (holdout samples of 10 to 20 percent are typical). If too few sales are available, later sales can be validated and used for the same purpose. (For a method of using sales both to develop and test valuation models, see "The Use of Cross-validation in CAMA Modeling to Get the Most Out of Sales" (Jensen 2011).

Since they were not used in valuation, holdout samples can provide more objective measures of valuation performance. This can be particularly important when values are not based on a common algorithm as cost and MRA models are. Manually assigning land values, for example, might produce sales ratio statistics that appear excellent but are not representative of broader performance for both sold and unsold properties. Comparable sales models that value a sold property using the sale of a property as a comparable for itself can produce quite different results when tested on a holdout group.

When a new valuation approach or technique is used for the first time, holdout sales can be helpful in validating use of the new method. In general, however, holdout samples are unnecessary as long as valuation models are based on common algorithms and schedules and the value assigned to a sale property is not a function of its price. Properly validated later sales can provide follow-up performance indicators without compromising the number of sales available for valuation.

5.4 Documentation

Valuation procedures and models should be documented. Appraisal staff should have at least a general understanding of how the models work and the various rates and adjustments made by the models. Cost manuals should be current and contain the rates and adjustments used to value improvements by the cost approach. Similarly, land values should be supported by tables of rates and adjustments for features such as water frontage, traffic, and other relevant influences. MRA models and other sales comparison algorithms should document final equations and should be reproducible, so that rerunning the model produces the same value. Schedules of rental rates, vacancy rates, expense ratios, income multipliers, and capitalization rates should document how values based on the income approach were derived.

It can be particularly helpful to prepare a manual, booklet, or report for each major property type that provides a narrative summary of the valuation approach and methodology and contains at least the more common rates and adjustments. Examples of how values were computed for sample properties can be particularly helpful. The manuals serve as a resource for current staff and can be helpful in training new staff or explaining the valuation process to other interested parties. Once prepared, the documents should be updated when valuation schedules change or methods and calculation procedures are revised.

5.5 Value Defense

The assessment office staff must have confidence in the appraisals and be able to explain and defend them. This confidence begins with application of reliable appraisal techniques, generation of appropriate valuation reports, and review of preliminary values. It may be helpful to have reports that list each parcel, its characteristics, and its calculated value. Parcels with unusual characteristics, extreme values, or extreme changes in values should be identified for subsequent individual review. Equally important, summary reports should show average values, value changes, and ratio study statistics for various strata of properties. These should be reviewed to ensure the overall consistency of values for various types of property and various locations. (See the *Uniform Standards of Professional Appraisal Practice*, Standards Rule 6-7, for reporting requirements for mass appraisals [The Appraisal Foundation 2012–2013].)

The staff should also be prepared to support individual valuations as required, preferably through comparable sales. At a minimum, staff should be able to produce a property record and explain the basic

approach (cost, sales comparison, or income) used to estimate the value of the property. A property owner should never be told simply that "the computer" or "the system" produced the appraisal. In general, the staff should tailor the explanation to the taxpayer's knowledge and expertise. Equations converted to tabular form can be used to explain the basis for valuation. In all cases, the assessment office staff should be able to produce sales or appraisals of similar properties in order to support (or at least explain) the valuation of the property in question. Comparable sales can be obtained from reports that list sales by such features as type of property, area, size, and age. Alternatively, interactive programs can be obtained or developed that identify and display the most comparable properties.

Assessors should notify property owners of their valuations in sufficient time for property owners to discuss their appraisals with the assessor and appeal the value if they choose to do so (see the *Standard on Public Relations* [IAAO 2011]). Statutes should provide for a formal appeals process beyond the assessor's level (see the *Standard on Assessment Appeal* [IAAO 2016a]).

6. Managerial and Space Considerations

6.1 Overview

Mass appraisal requires staff, technical, and other resources. This section discusses certain key managerial and facilities considerations.

6.2 Staffing and Space

A successful in-house appraisal program requires trained staff and adequate facilities in which to work and meet with the public.

6.2.1 Staffing

Staff should comprise persons skilled in general administration, supervision, appraisal, mapping, data processing, ~~and secretarial~~ and clerical functions. Typical staffing sizes and patterns for jurisdictions of various sizes are illustrated in *Fundamentals of Mass Appraisal* (Gloudemans and Almy 2011, 22–25). Staffing needs can vary significantly based on factors such as frequency of reassessments.

6.2.2 Space Considerations

The following minimum space standards are suggested for managerial, supervisory, and support staff:

- *Chief assessing officer (e.g., Assessor, director)*—a private office, enclosed by walls or windows extending to the ceiling, of 200 square feet (18 to 19 square meters)
- *Management position (e.g., chief deputy assessor, head of a division in a large jurisdiction, and so on)*—a private office, enclosed by walls or windows extending to the ceiling, of 170 square feet (15 to 16 square meters)
- *Supervisory position (head of a section, unit, or team of appraisers, mappers, analysts, technicians, or clerks)*—a private office or partitioned space of 150 square feet (14 square meters)
- *Appraisers and technical staff*—private offices or at least partitioned, quiet work areas of 50 to 100 square feet (5 to 10 square meters), not including aisle and file space, with a desk and chair
- *Support staff*—adequate workspace, open or partitioned, to promote intended work functions and access.

In addition, there should be adequate space for

- File storage and access
- Training and meetings
- Mapping and drafting
- Public service areas
- Printing and photocopy equipment
- Library facilities.

6.3 Data Processing Support

CAMAs require considerable data processing support.

6.3.1 Hardware

The hardware should be powerful enough to support applications of the cost, sales comparison, and income approaches, as well as data maintenance and other routine operations. Data downloading, mass calculations, GIS applications, and Web support tend to be the most computer-intensive operations. Processing speed and efficiency requirements should be established before hardware acquisition. Computer equipment can be purchased, leased, rented, or shared with other jurisdictions. If the purchase option is chosen, the equipment should be easy to upgrade to take advantage of technological developments without purchasing an entirely new system.

6.3.2 Software

CAMA software can be developed internally, adapted from software developed by other public agencies, or purchased (in whole or in part) from private vendors. (Inevitably there will be some tailoring needed to adapt externally developed software to the requirements of the user's environment.) Each alternative has advantages and disadvantages. The software should be designed so that it can be easily modified; it should also be well documented, at both the appraiser/user and programmer levels.

CAMA software works in conjunction with various general-purpose software, typically including word processing, spreadsheet, statistical, and GIS programs. These programs and applications must be able to share data and work together cohesively.

Security measures should exist to prevent unauthorized use and to provide backup in the event of accidental loss or destruction of data.

6.3.2.1 Custom Software

Custom software is designed to perform specific tasks, identified by the jurisdiction, and can be specifically tailored to the user's requirements. The data screens and processing logic can often be customized to reflect actual or desired practices, and the prompts and help information can be tailored to reflect local terminology and convention.

After completing the purchase or license requirements, the jurisdiction should retain access to the program source code, so other programmers are able to modify the program to reflect changing requirements.

The major disadvantages of custom software are the time and expense of writing, testing, and updating. Particular attention must be paid to ensuring that user requirements are clearly conveyed to programmers and reflected in the end product, which should not be accepted until proper testing has been completed. Future modifications to programs, even those of a minor nature, can involve system administrator approval and can be a time-consuming, costly, and rigorous job. (See *Standard on Contracting for Assessment Services* [IAAO 2008].)

6.3.2.2 Generic Software

An alternative to custom software is generic software, of which there are two major types: vertical software, which is written for a specific industry, and horizontal software, which is written for particular applications regardless of industry. Examples of the latter include database, spreadsheet, word processing, and statistical software. Although the actual instruction code within these programs cannot be modified, they typically permit the user to create a variety of customized

templates, files, and documents that can be processed. These are often referred to as commercial off-the-shelf software (COTS) packages.

Generic vertical software usually requires modification to fit a jurisdiction's specific needs. In considering generic software, the assessor should determine

- System requirements
- The extent to which the software meets the agency's needs
- A timetable for implementation
- How modifications will be accomplished
- The level of vendor support
- Whether the source code can be obtained.

(See Standard on Contracting for Assessment Services [IAAO 2008].)

Horizontal generic software is more flexible, permitting the user to define file structures, relational table layout, input and output procedures, including form or format, and reports. Assessment offices with expertise in such software (which does not imply a knowledge of programming) can adapt it for

- Property (data) file maintenance
- Market research and analysis
- Valuation modeling and processing
- Many other aspects of assessment operations.

Horizontal generic software is inexpensive and flexible. However, it requires considerable customization to adapt it to local requirements. Provisions should be made for a sustainable process that is not overly dependent on a single person or resource.

6.4 Contracting for Appraisal Services

Reappraisal contracts can include mapping, data collection, data processing, and other services, as well as valuation. They offer the potential of acquiring professional skills and resources quickly. These skills and resources often are not available internally. Contracting for these services not only can allow the jurisdiction to maintain a modest staff and to budget for reappraisal on a periodic basis, but also makes the assessor less likely to develop in-house expertise. (See the *Standard on Contracting for Assessment Services* [IAAO 2008].)

6.5 Benefit-Cost Considerations

6.5.1 Overview

The object of mass appraisal is to produce equitable valuations at low costs. Improvements in equity often require increased expenditures.

Benefit-cost analysis in mass appraisal involves two major issues: policy and administration.

6.5.2 Policy Issues

An assessment jurisdiction requires a certain expenditure level simply to inventory, list, and value properties. Beyond that point, additional expenditures make possible rapid improvements in equity initially, but marginal improvements in equity diminish as expenditures increase. At a minimum, jurisdictions should budget to meet statutory requirements and the performance standards contained in the *Standard on Ratio Studies* (IAAO 2013) and summarized in Section 5.2.

6.5.3 Administrative Issues

Maximizing equity per dollar of expenditure is the primary responsibility of assessment administration. To maximize productivity, the assessor and managerial staff must effectively plan, budget, organize, and control operations and provide leadership. This must be accomplished within the office's legal, fiscal, economic, and social environment and constraints (Eckert, Gloudemans, and Kenyon 1990, chapter 16).

7. Reference Materials

Reference materials are needed in an assessment office to promote compliance with laws and regulations, uniformity in operations and procedures, and adherence to generally accepted assessment principles and practices.

7.1 Standards of Practice

The standards of practice may incorporate or be contained in laws, regulations, policy memoranda, procedural manuals, appraisal manuals and schedules, standard treatises on property appraisal and taxation (see section 6.2). Written standards of practice should address areas such as personal conduct, collection of property data, coding of information for data processing. The amount of detail will vary with the nature of the operation and the size of the office.

7.2 Professional Library

Every assessment office should have access to a comprehensive professional library that contains the information staff needs. A resource library may be digital or physical and should include the following:

- Property tax laws and regulations
- IAAO standards
- Historical resources
- Current periodicals
- Manuals and schedules
- Equipment manuals and software documentation.

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Suggested Reading

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